

# THE OASIS

***The first Self Sustaining and self sufficient community on Moon (In a Lunar Lava Cave)***

An oasis (/ou'eisis/; plural: oases /ou'eisi:z/) is an isolated area in a desert, typically surrounding a water source, such as a pond or small lake. Oases also provide habitat for animals and even humans

The Lunar Oases are made fertile when sources of freshwater, from frozen aquifers, irrigate the surface via man-made wells after melting and purifying it in the reactor in the core

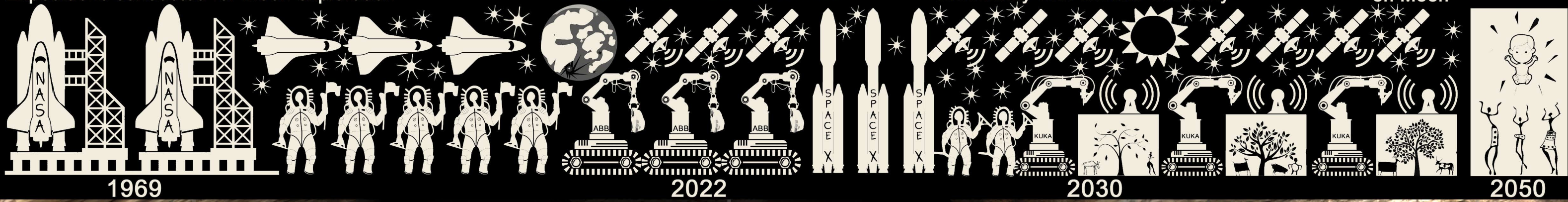


1969 Man First Landing on Moon, Studies Conducted, Expeditions conducted for Moon exploration

2022 Private Sector deploying solar satellites and robots on vehicles

2030 3D Building, establishing self sustaining community with circular economy

2050 First Child Born on Moon



1969

2022

2030

2050



Documenting the whole Lunar History for future generations on walls of the 3D printed Colony

# ARCHITECTURAL PROGRAM

The Oasis consists of four main architectural parts:

1. Surface Access Unit,
2. Safe House, Medical units & Labs.
3. Core Habitat protected from the surface environment.
4. Agricultural Zone.

LED Induction Electricity array of antennas collecting the power from the solar satellites into their own implanted batteries underground to be remitted to the surrounding services

3D printed Life support of core habitat shelters filled with an array or inflatables pods holding an atmosphere of 101.35kPascal (14.7psi) in an Earth-normal gas mix at sea level.

Emergency safe house life supporting pod equipped with medical services

Covered Frozen water Well core by the main reactor in the middle

Hydroponics variety of inflatable pressure vessels of diverse sizes and materials for trees agriculture

Surface access unit acting as the main entrance airlock to the colony, It contains, Garage and suitport air locks

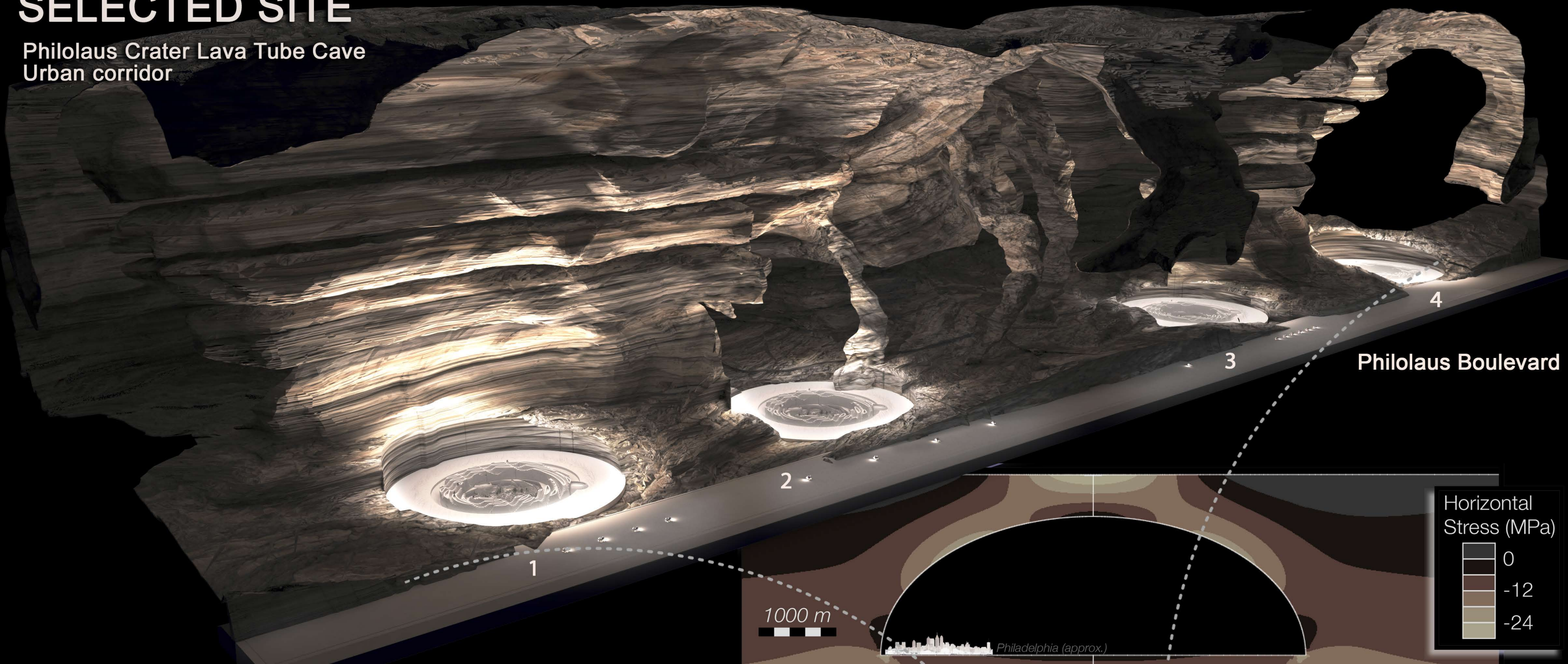
Main Entrance

MAIN COLONY SITE PLAN

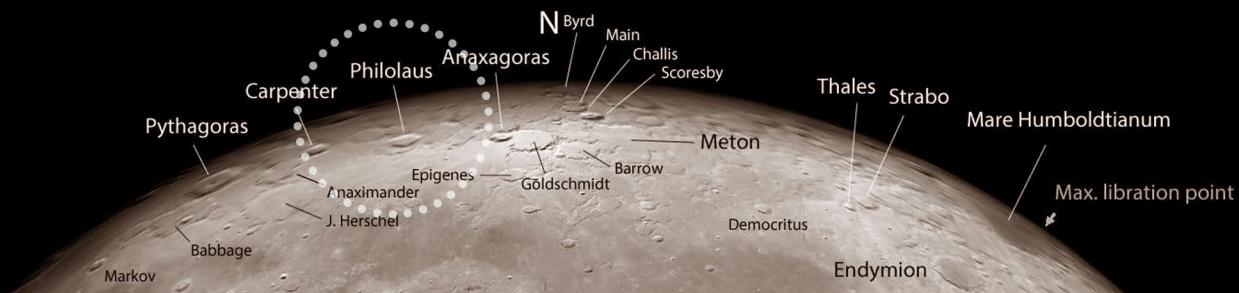


# SELECTED SITE

Philolaus Crater Lava Tube Cave  
Urban corridor



The urban Corridor Including the 4 first colonies inside the Lava tube at the Philolaus Crater



The Philolaus Crater is approximately 43 miles (70 kilometers) wide and located about 340 miles (550 km) from the moon's north pole. The newfound skylights would offer easier access to subsurface ice, alleviating the need to excavate the lunar surface. Also, the crater is located on the nearside of the moon, which means that it would offer future lunar missions the benefit of direct communications with Earth

An estimation of the dimensions of the Lava tube according to recent studies



The location of some of the newly-discovered lava tube skylights at Philolaus Crater, near the moon's North Pole.

# MAN MADE SELF SUSTAINING ECOSYSTEM

## We provide Food and shelter where there is No Life

The Closed Self sufficient systems will operate based on the following sequential steps:

1. Air Revitalization – O<sub>2</sub> replenishment, with emergency storage of O<sub>2</sub>.
2. Balancing the Co<sub>2</sub> for plants and O<sub>2</sub> for Human life support
3. Pressure maintenance on hold at atmosphere of 101.35kPascal (14.7psi)<sup>4</sup> in an Earth-normal gas mix at sea level.
3. Buffer gas management for N<sub>2</sub> and any artificial atmosphere constituents such as He.
4. Temperature and humidity management and control for all core habitats
5. Zoned heating, ventilating, and air conditioning (HVAC)
6. Trace Contaminant detection, removal, & control
7. Odor control and removal
8. Particulate contaminant (including lunar dust) removal and filtration, cleaning of filters
9. Grey water primary reprocessing and recycling
10. Solid waste primary processing and recycling

Due to the lack of atmosphere. The colony circular geometry will stay inside the circle clean out of dust and will be a pleasing environment for residents to support their psychological health and well being for long term stays on Moon.

LED Induction Electricity array of antennas collecting the power from the solar satellites into their own implanted batteries underground to be remitted to the surrounding services

3D printed Life support of core habitat shelters filled inside with an array of double sided inflatables pods

The Hydroponics purification tower. The tower provides the following:

1. CO<sub>2</sub> removal and recovery.
2. Temperature and humidity control for trees
3. Dust Removal and filtration, cleaning of filters
4. H<sub>2</sub>O polishing and reserve water tank.

Main reactor operating on Fusion power to maintain water flow to the colony and provide alternative power source beside solar satellites operating in low moon orbit

Emergency Life support unit in case of any failure in the Habitat inflatable failures. It operates independently from the rest of the system and contains all medical and life support facilities

Surface access unit acting as the main entrance airlock to the colony. It contains, Garage and suitport air locks with special Lunar dust removal, collection and disposal

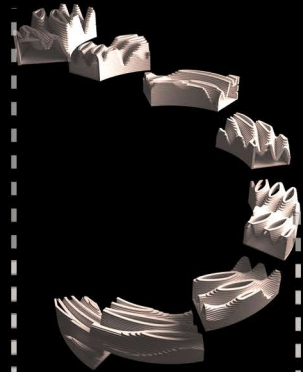
Frozen underground water table layer of water-bearing permeable rock

# FORM GENERATION

Inhabiting a nature like forms

Combining the parametric design and the sacred geometry principles to blend the aroma of the past of our ancestors and the technology of the contemporary design methodologies

According to the time planning strategy, The 3D printed core habitat is intended to be build in a hierarchal manner in 8 phases with a spance of 3 months for each phase to enable the first group of astraunots to use the colony even before it is finished.



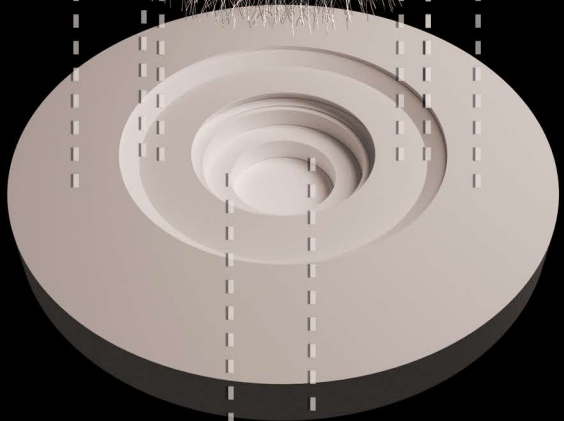
3D printing of the Core habitat units



Building the Agricultural farm to secure food resources



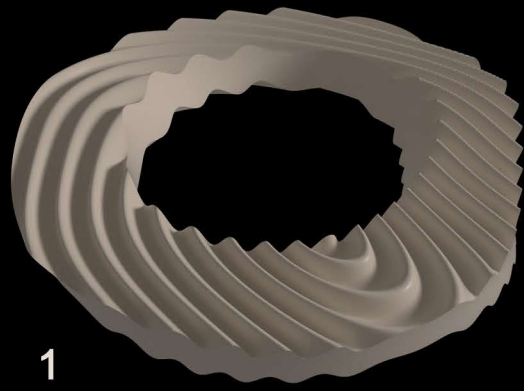
Implanting the array of LED antannas around the site



Site excavation and grading



Implanting the Fusion reactor after drilling the surface to the frozen water level



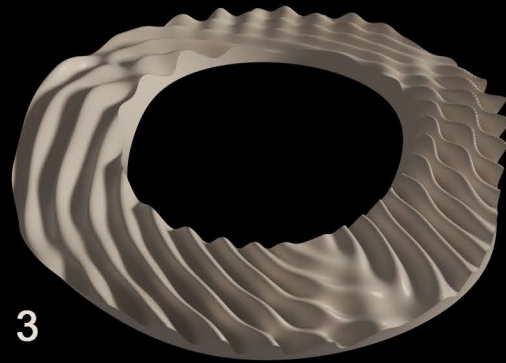
1

Applying a first layer of ripple effect to create an undulating upper surface to stop lunar dust



2

Applying a second layer of wave effect to form a surface that mitigate radiation effect



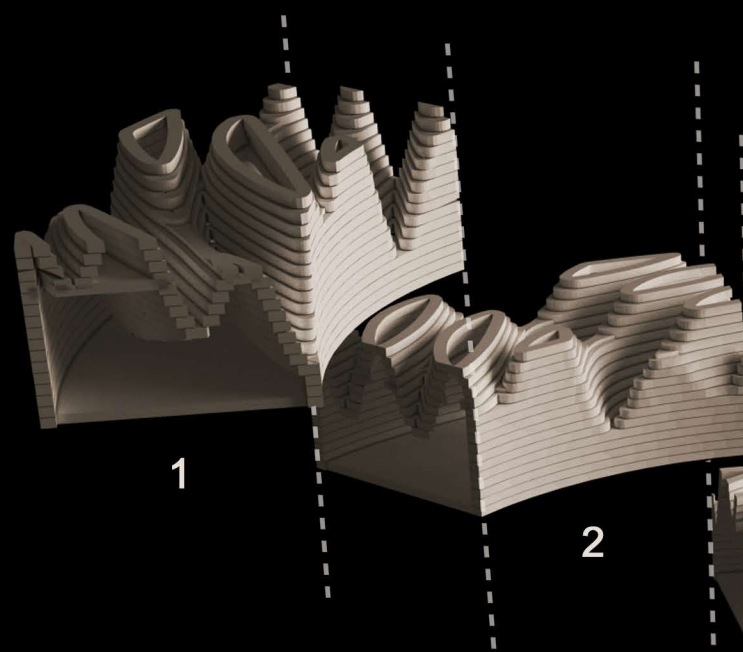
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Applying a third layer of ripple effect to protect the residents from Lunar environment hazards



4

Applying a first layer of ripple effect to create an undulating upper surface

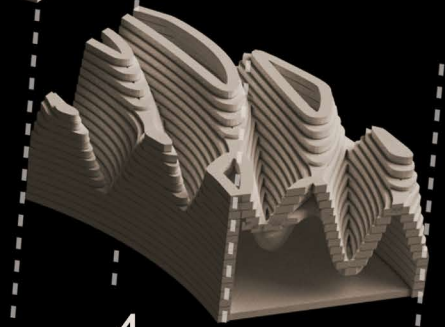


1

2



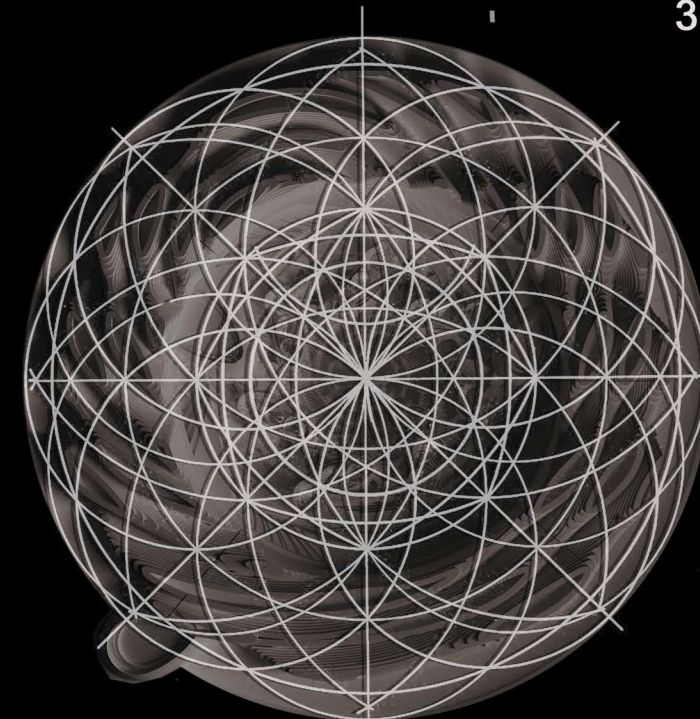
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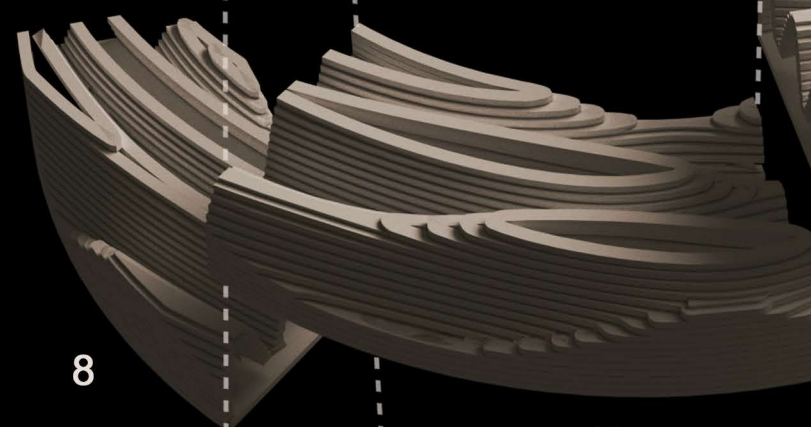
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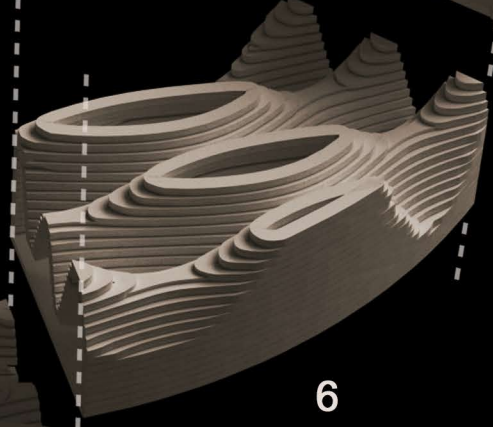


The Geometric design of the colony was inspired from the Octagram circular formation of the sacred geometry



8

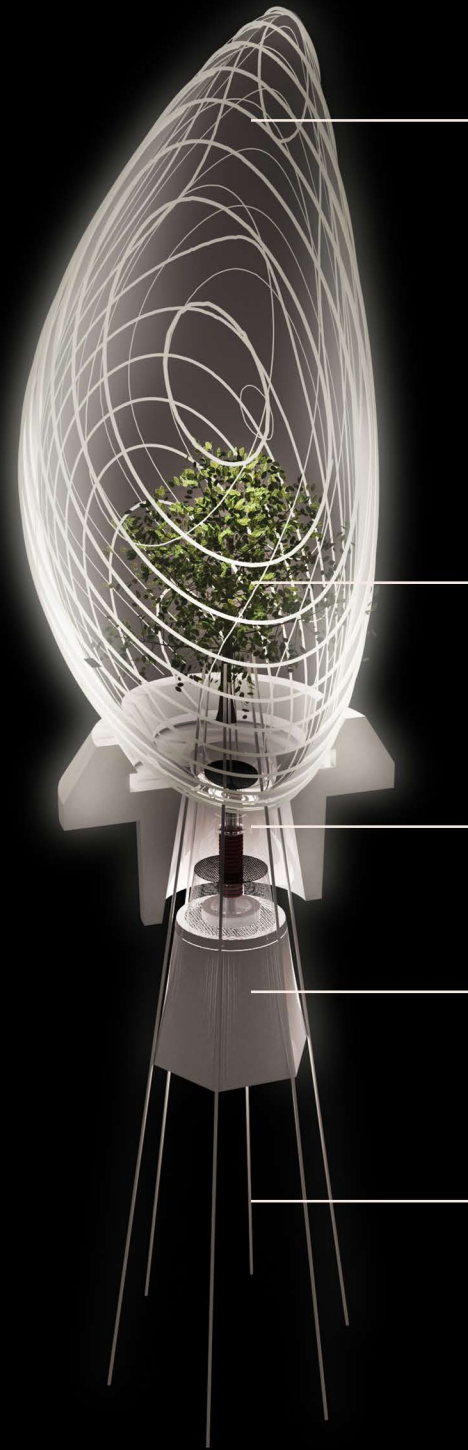
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# LUNAR FOOD PRODUCTION

## Regenerative Life Support Hydroponics Pods



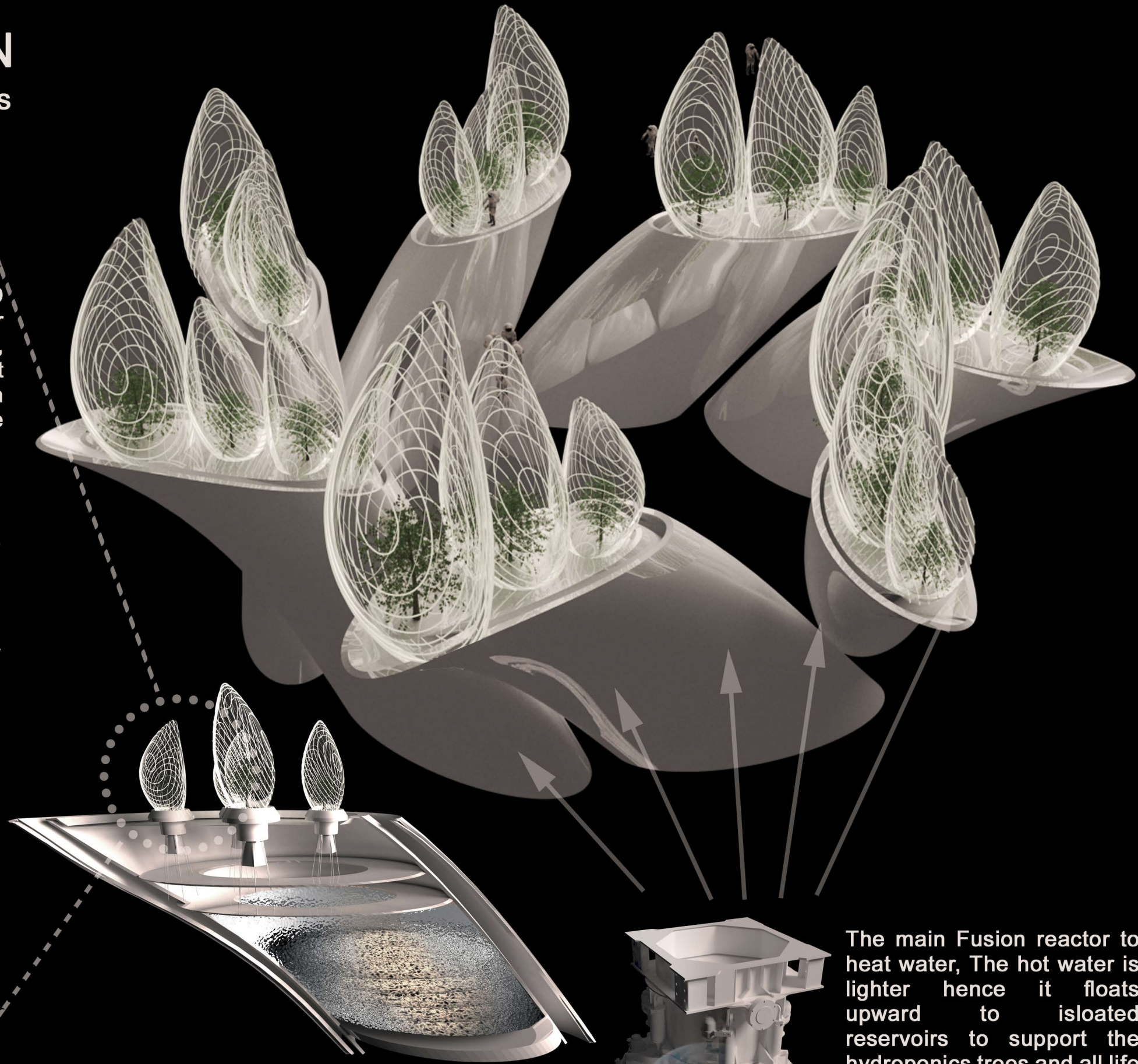
Pressurized Inflatable vessel reinforced with LED wires to provide light for photosynthesis process., The multi-color LEDs that are tuned due to the growth phase and height of the plants.

Hydroponics implanted trees for food production

Hydroponics cup to carry minerals for trees

Polymer based Purified melted water reservoir for sub-irrigation method for the tree

6 Lightweight heavyduty polymer tubes to fix the tree battery in the main stage and absorb water to the trees



Hydroponics is a subset of hydroculture, which is a method of growing plants without soil by using mineral nutrient solutions in a water solvent. Terrestrial plants may be grown with only their roots exposed to the mineral solution, or the roots may be supported by an inert medium, such as perlite or gravel.

Section through the Hydroponics purification tower. The tower provides the following:

1. CO2 removal and recovery.
2. Temperature and humidity control for trees
3. Dust Removal and filtration, cleaning of filters
4. H2O polishing and reserve water tank.



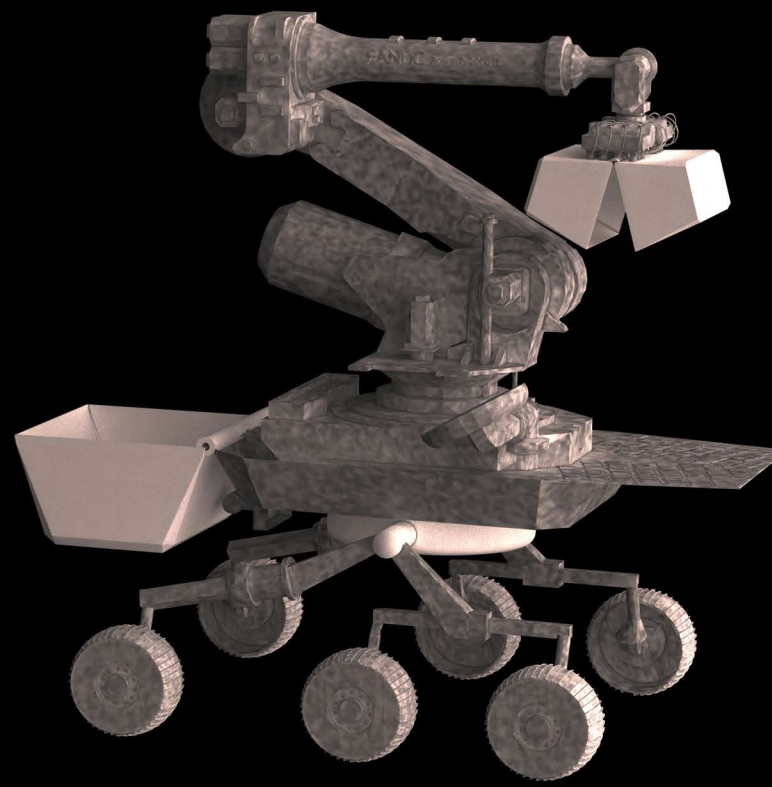
The main Fusion reactor to heat water, The hot water is lighter hence it floats upward to isolated reservoirs to support the hydroponics trees and all life form in the colony

# CONSTRUCTION METHOD

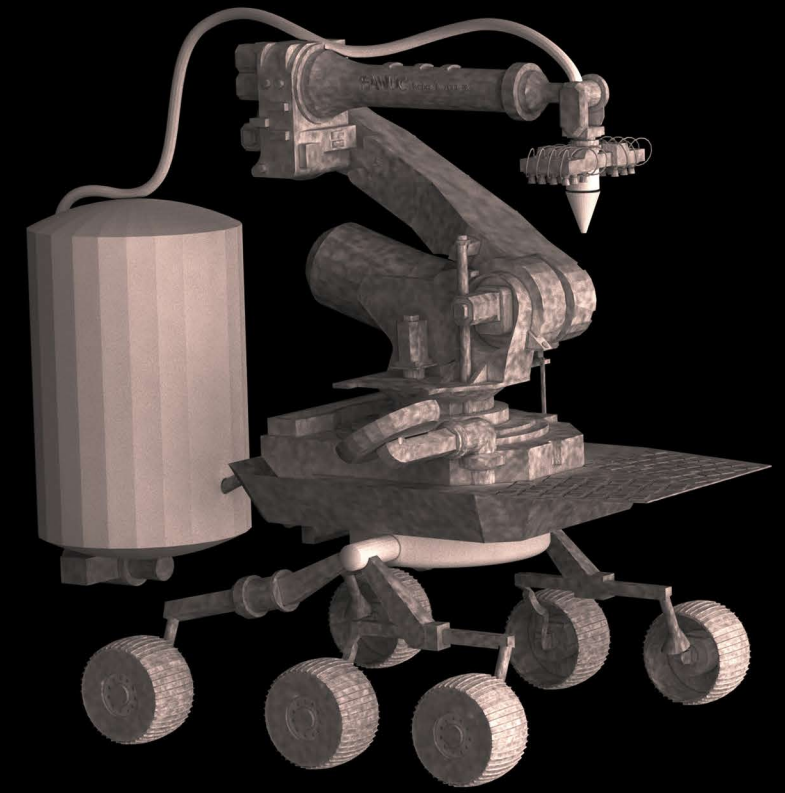
## The Extraterrestrial Vernacularism

As our ancestors managed to survive in the extremely harsh environments on earth thousands of year ago through building their communities using the local materials of surrounding environment, where as you find mud houses in the Nile valley, Igloo houses in Northern pole, Wooden houses in Northern Russia and Canada. The same principle applies on Moon. Using today's technology of 3D printing forming a weight-bearing 'catenary' dome design with a minimal surfaces structured wall to shield against thermal fluctuations and space radiation, incorporating a pressurised inflatable inside it to shelter astronauts.

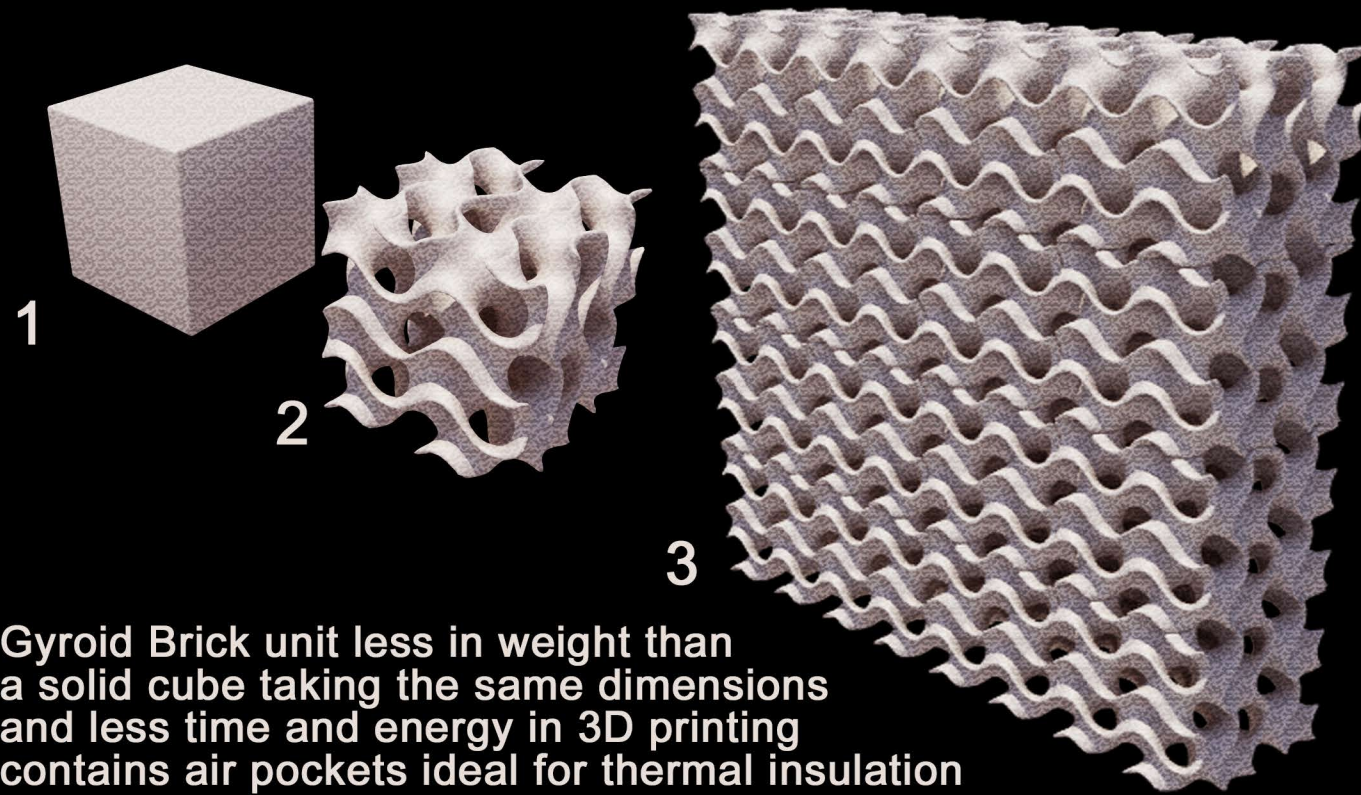
Using a robotic arm with 3D extruder, on a mobile vehicle with 6 m frame to spray a binding salt on Lunar regolith mixed with magnesium oxide (widely available on Moon) to create a sand-like building material.



Prototype A  
ABB robotic arm equipped with excavation unit for digging and regolith gathering



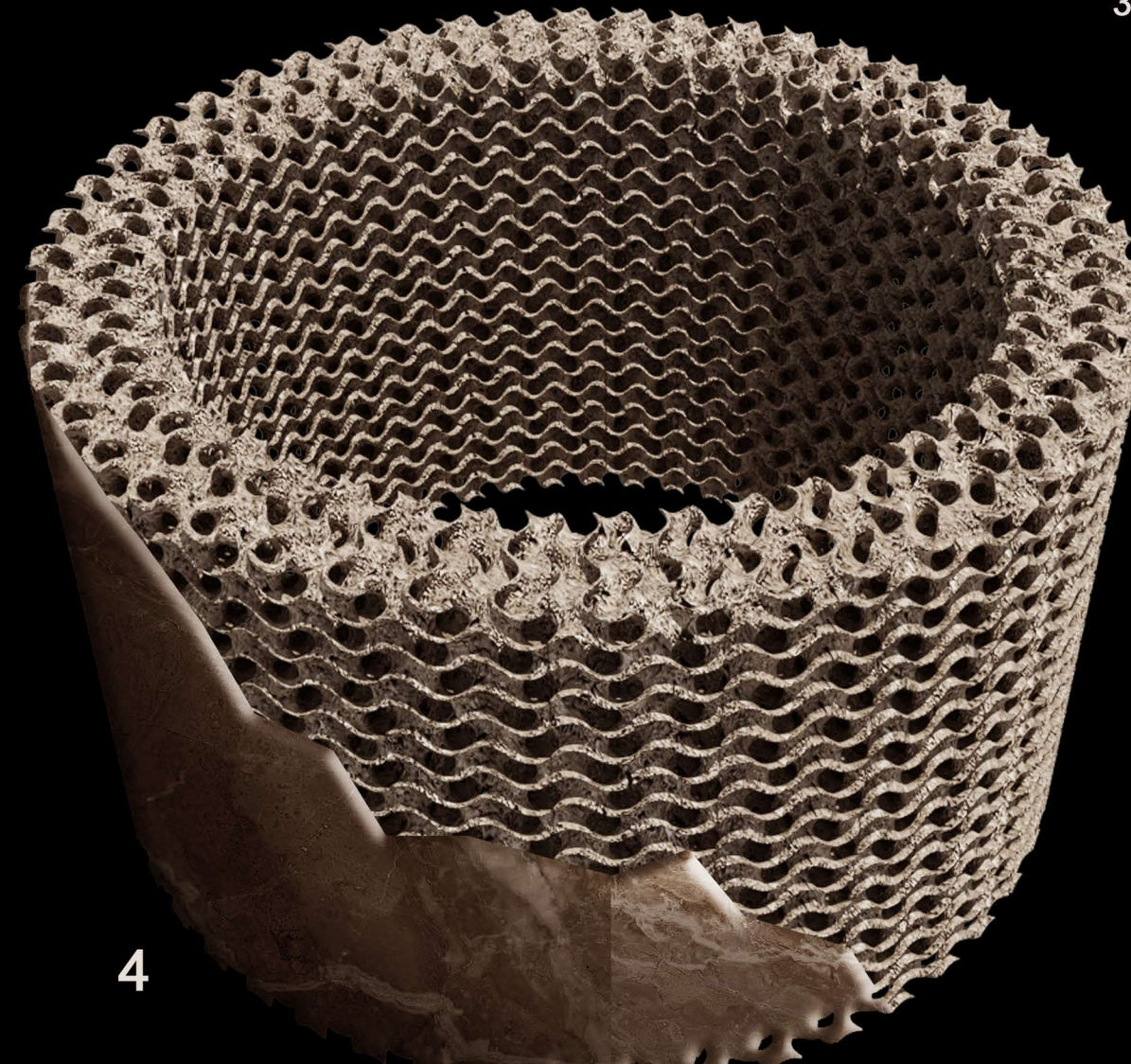
Prototype B  
ABB robotic arm equipped with 3D extruder and regolith reservoir



Gyroid Brick unit less in weight than a solid cube taking the same dimensions and less time and energy in 3D printing contains air pockets ideal for thermal insulation



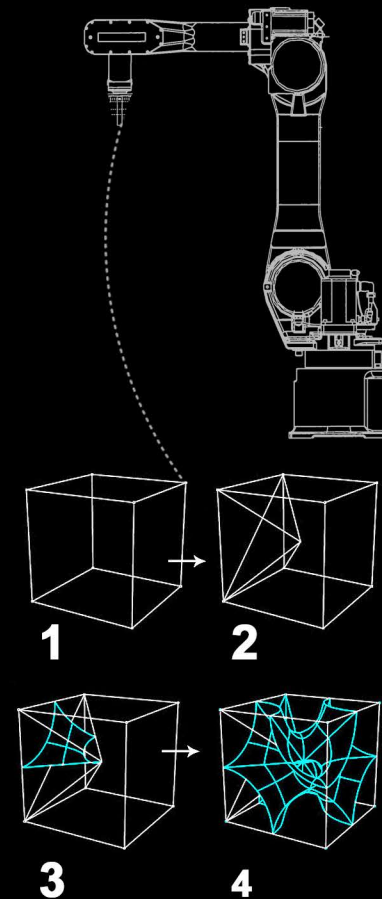
Source of Inspiration, Mesa Verde cliff dwellings Vernacular architecture



4

The structure of the Inner wall

3D printing robot arm path

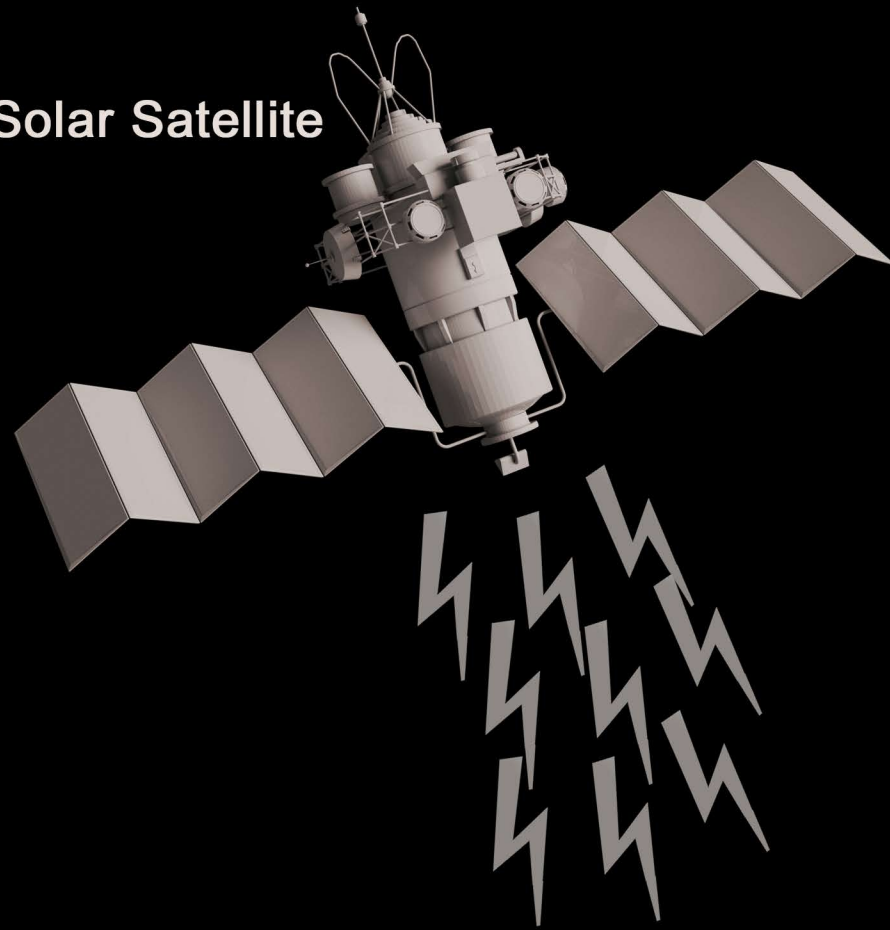




# COLONY POWERING

Space-based solar power (SBSP) is the concept of collecting solar power in outer space and distributing it to Moon surface. Potential advantages of collecting solar energy in space include a higher collection rate and a longer collection period and sending it back to the Lava cave based colony due to the lack of direct contact with sun, and the possibility of placing a solar collector in an orbiting location where there is no night. No fraction of incoming solar energy is lost on its way through the Moon's surface due to the lack of atmosphere. Space-based solar power systems convert sunlight to microwaves outside in the orbit, avoiding these losses and the downtime due to the Moon's rotation, And its cost will be much less than establishing an infrastructure on moon's surface.

Solar Satellite

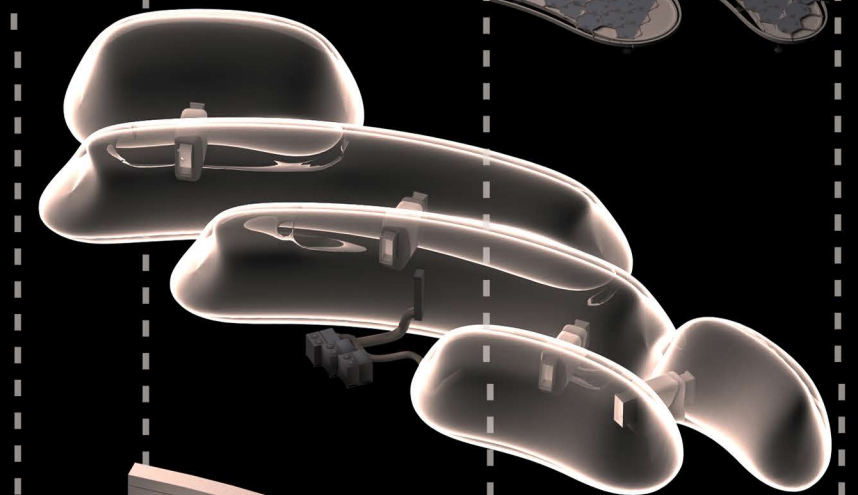


LED antennas that capture the induction electricity from the solar satellites and stores it in underground batteries to emit later to the colony devices and services



Piezoelectric flooring tiles to generate electricity from human activity inside the core habitat inflatables

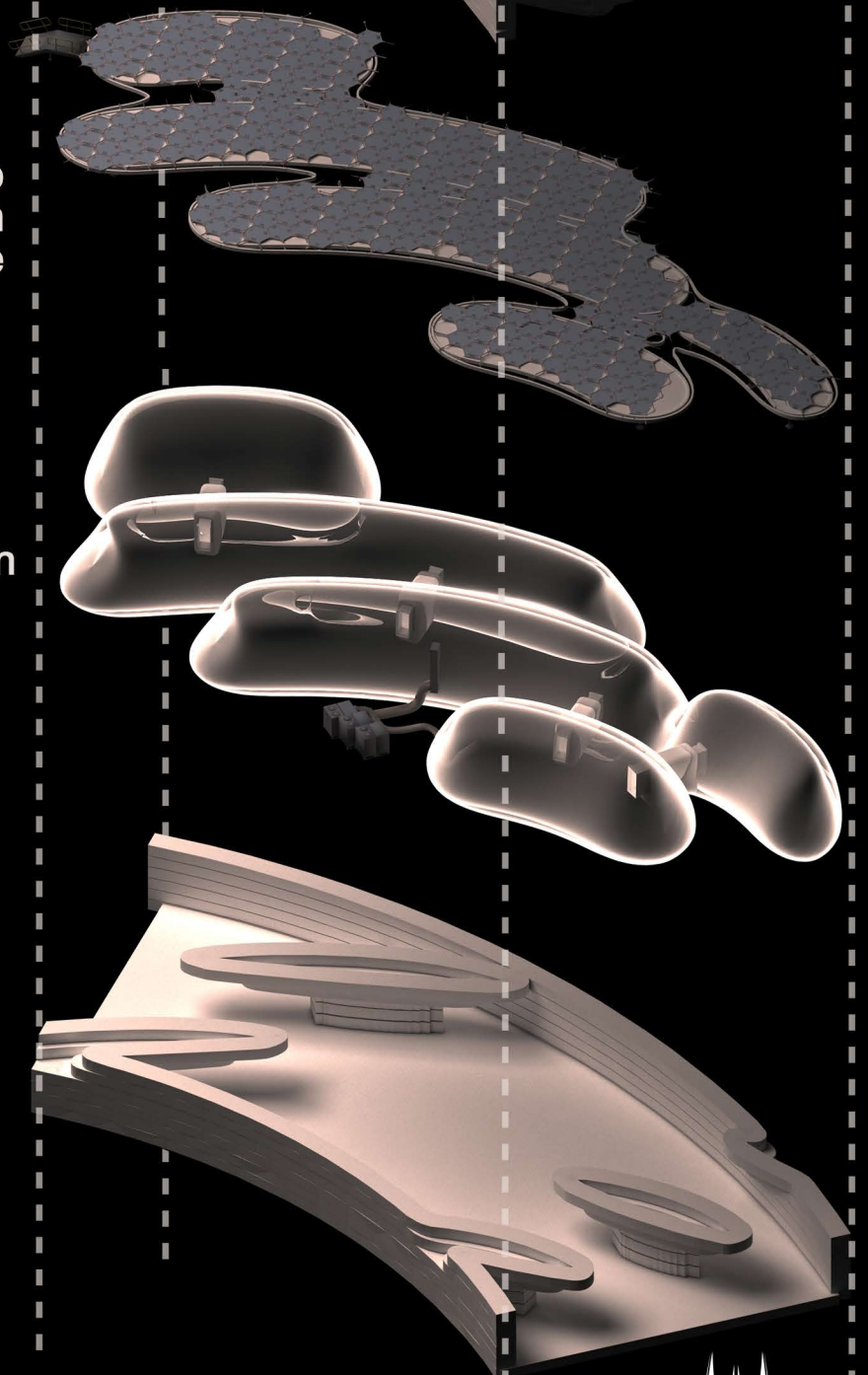
Double skin inflatables



The array of deployed antennas surrounding the colony

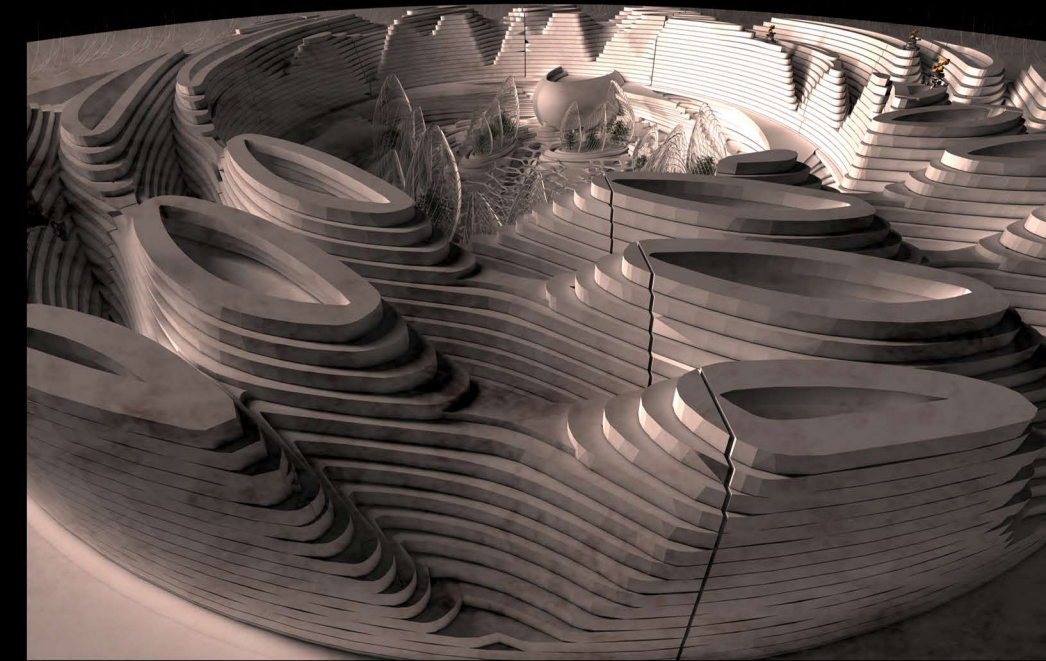
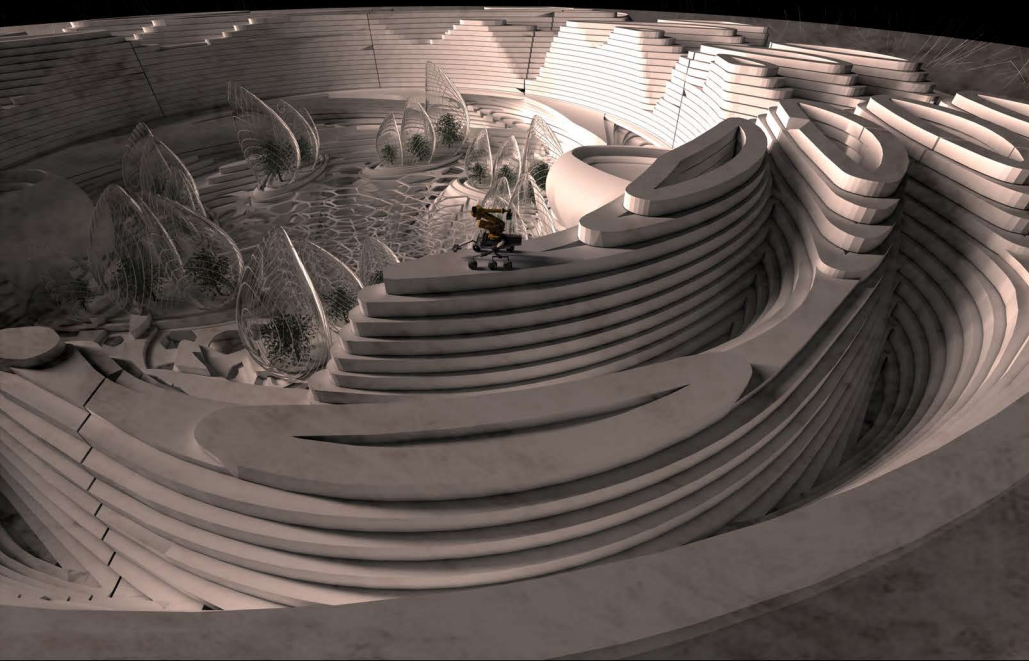
The graded surface of flooring

3D printed colony roof

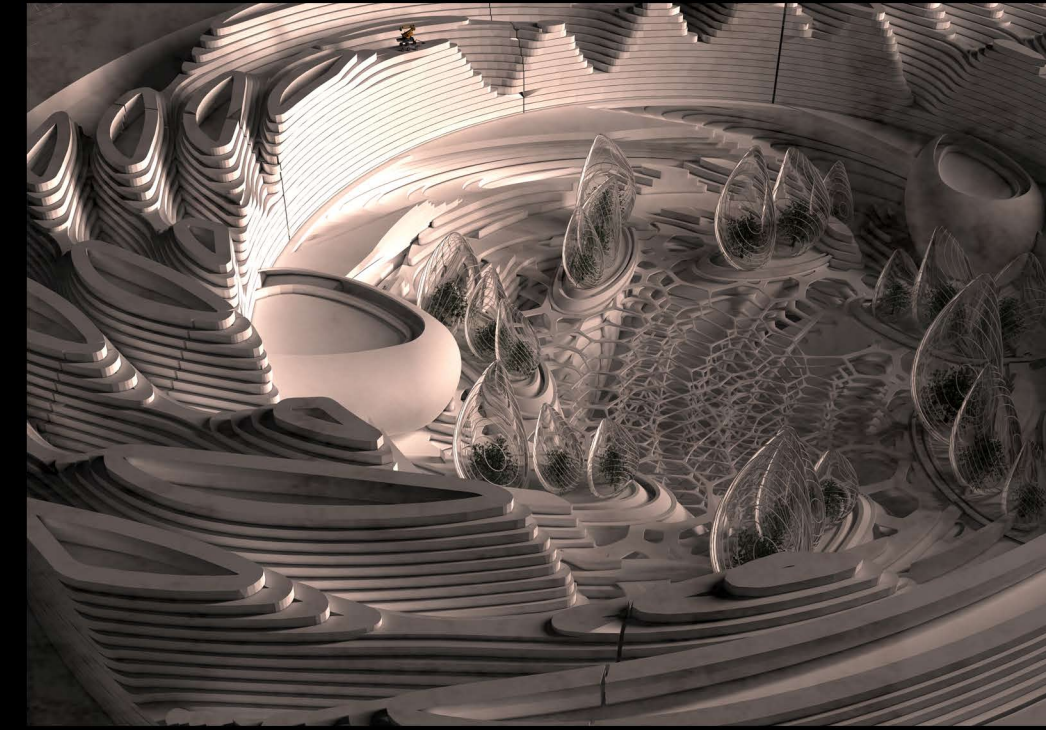
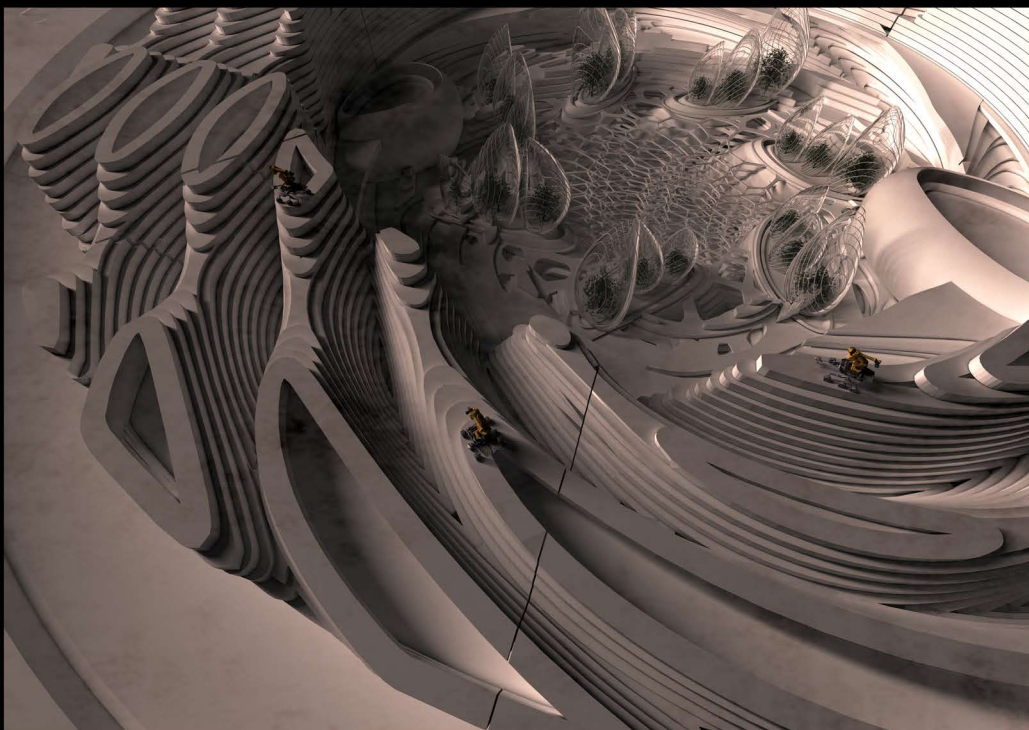


# HYGIENE AND PSYCHOLOGICAL WELL BEING

Biodigital Morphogenesis approach to support all life forms



The Circular geometry of the introversial Oasis is intended to keep it as a safe and clean environment for the residents, where no dust could enter inside the colony due to the lack of the atmosphere. All surface access units are equipped with dust collection, removal and disposal devices. Also the Inner arena is well lit trees inflatables for supporting the psychological aspect of the space residents, where the view of trees were proven to enhance the mood and heal in many psychopath diseases.



The new environment will form a new Lunar culture for the future generation that would be born and survive on Moon. It is the same as the very first beginnings on Earth thousands of years ago with the desert culture where Mankind learnt to survive and live. It is the new Utopia rather than a dystopia