

# THE OASIS

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

An oasis (/ou'etsis/; plural: oases /ou'etsi: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



## 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 of inflatables pods holding an atmosphere of 101.35kPascal (14.7psi)4 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

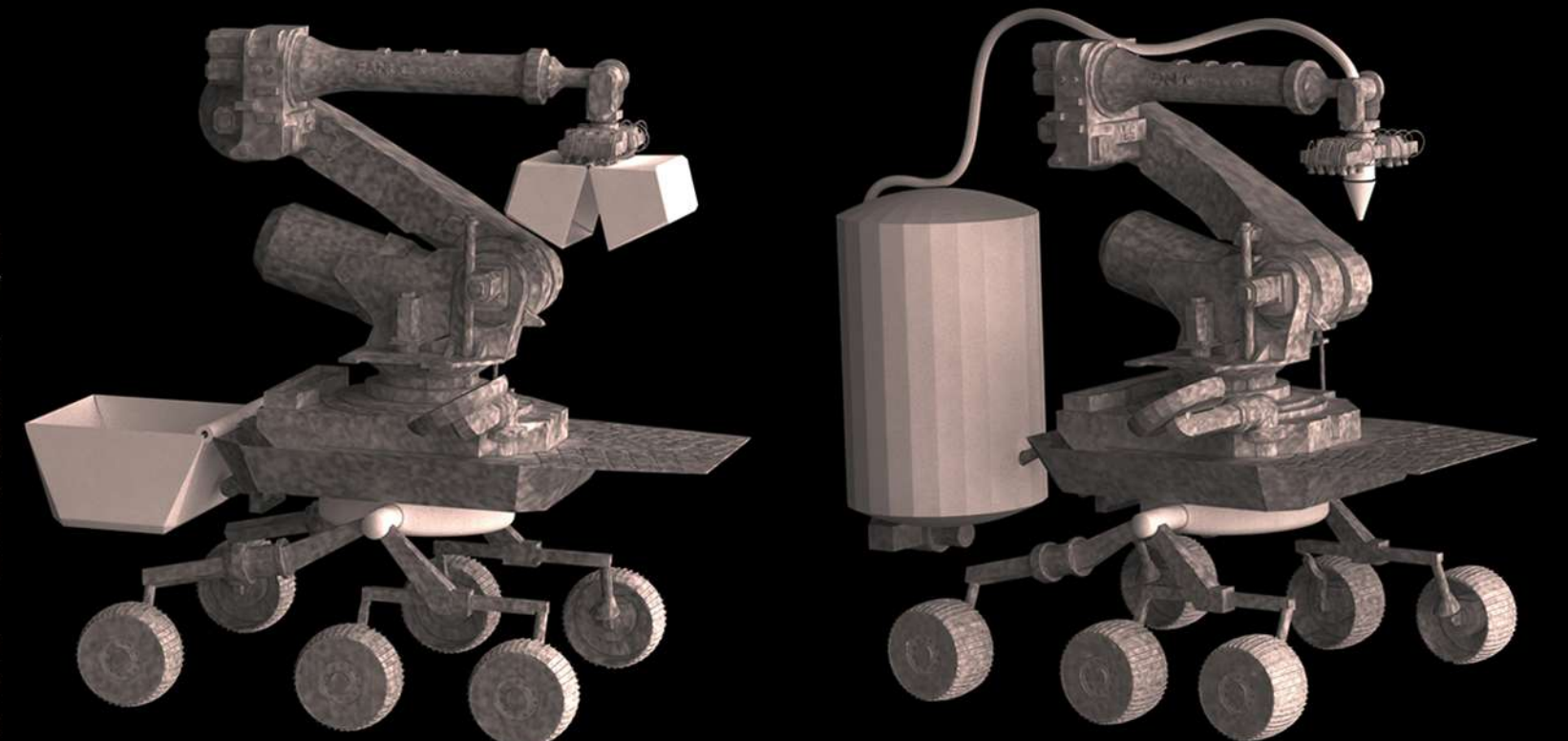
Surface access unit acting as the main entrance airlock to the colony. It contains, Garage and suitport air locks with special Lunar dust removal, collection and disposal

## CONSTRUCTION METHOD

The Extraterrestrial Vernacularism

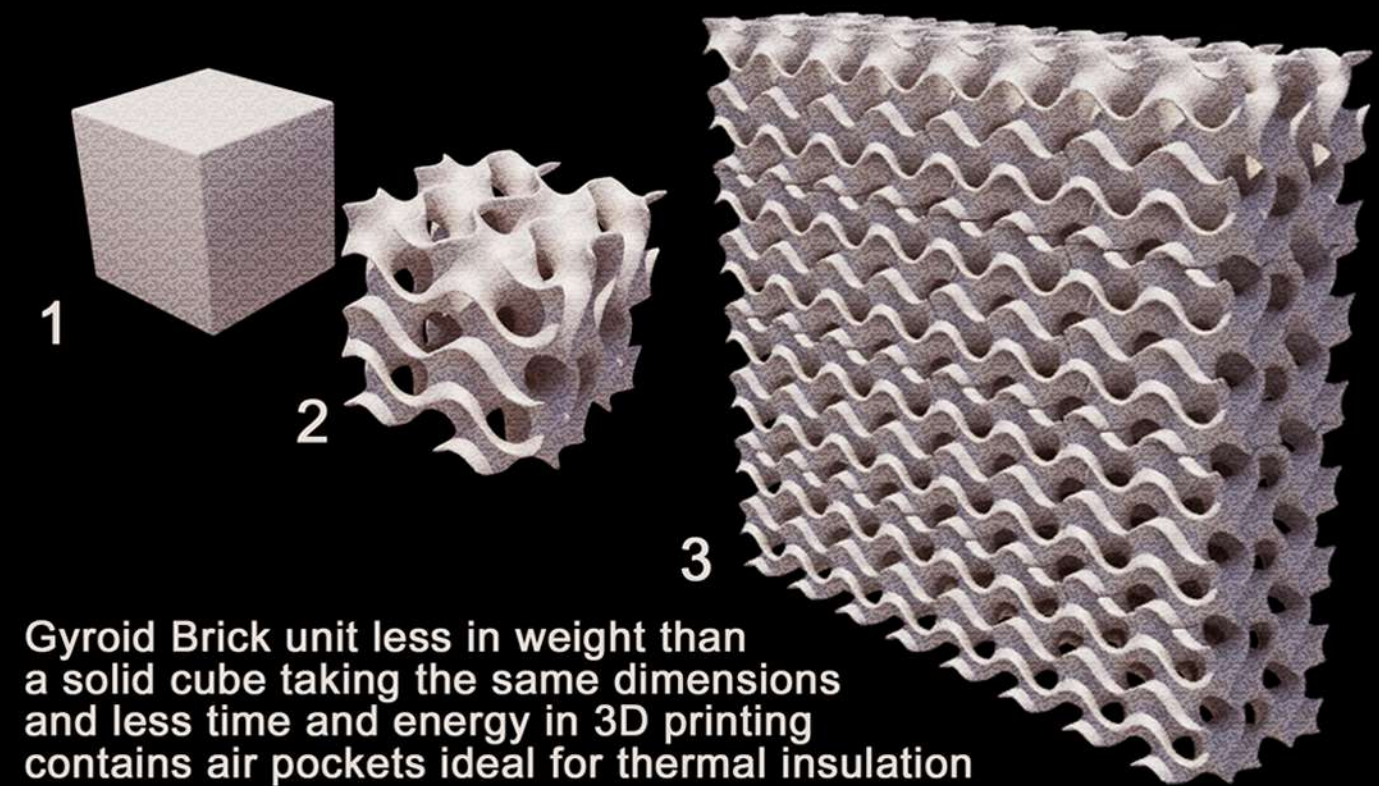
As our ancestors managed to survive in the extremely harsh environments on earth thousands of year ago through building their communities using the local materials of surrounding environment, where as you find mud houses in the Nile valley, Igloo houses in Northern pole, Wooden houses in Northern Russia 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

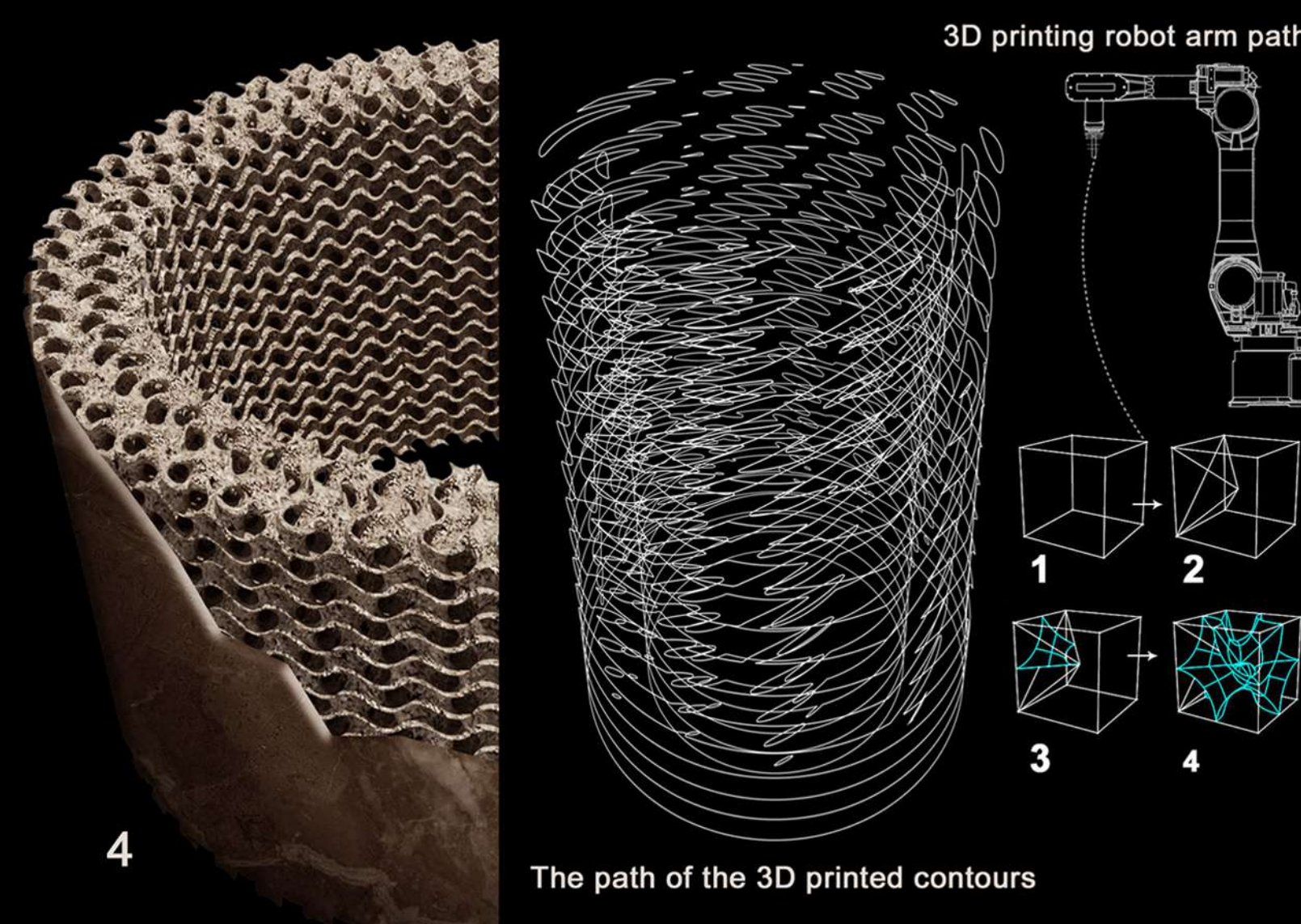
Prototype B  
ABB robotic arm equipped with 3D extruder and regolith reservoir



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



## MAN MADE SELF SUSTAINING ECOSYSTEM

We provide Food and shelter where there is No Life

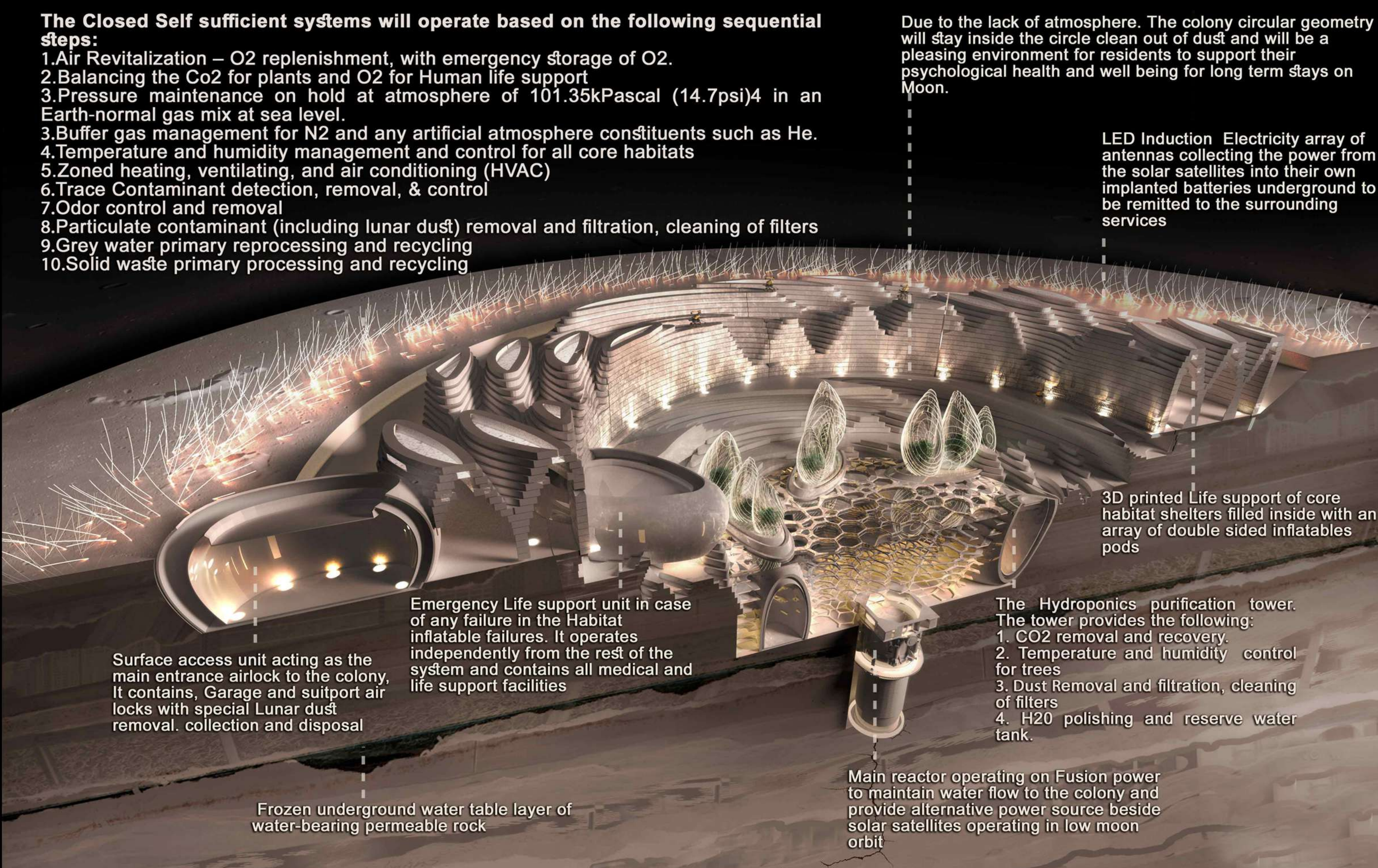
The Closed Self sufficient systems will operate based on the following sequential steps:

- 1.Air Revitalization – O2 replenishment, with emergency storage of O2.
- 2.Balancing the Co2 for plants and O2 for Human life support
- 3.Pressure maintenance on hold at atmosphere of 101.35kPascal (14.7psi)4 in an Earth-normal gas mix at sea level.
- 3.Buffer gas management for N2 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.

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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



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

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

Frozen underground water table layer of water-bearing permeable rock

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

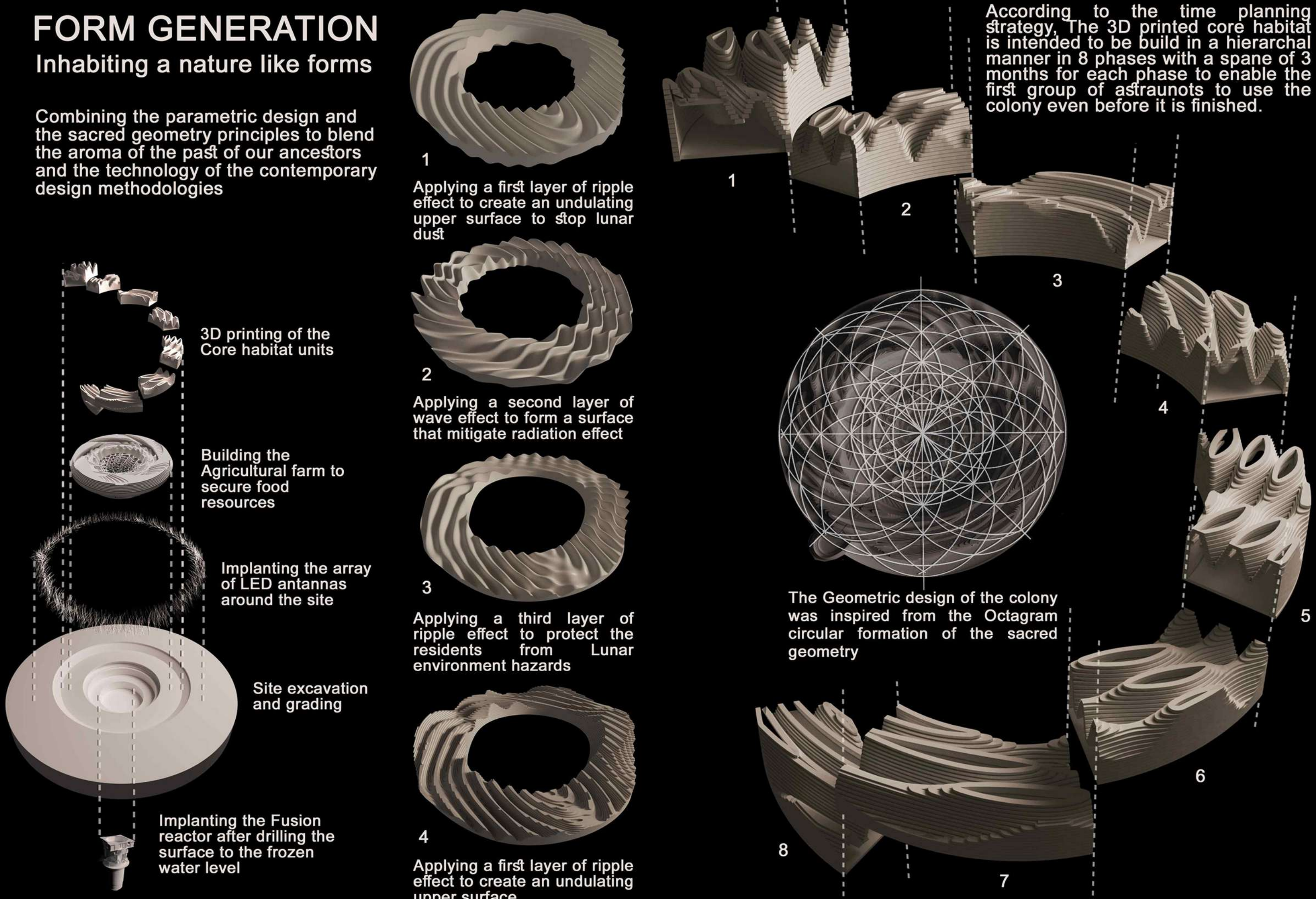
The Hydroponics - purification - tower. The tower provides the following:  
1. CO2 removal and recovery  
2. Temperature and humidity control for trees  
3. Dust Removal and filtration, cleaning of filters  
4. H2O polishing and reserve water tank

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

## 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

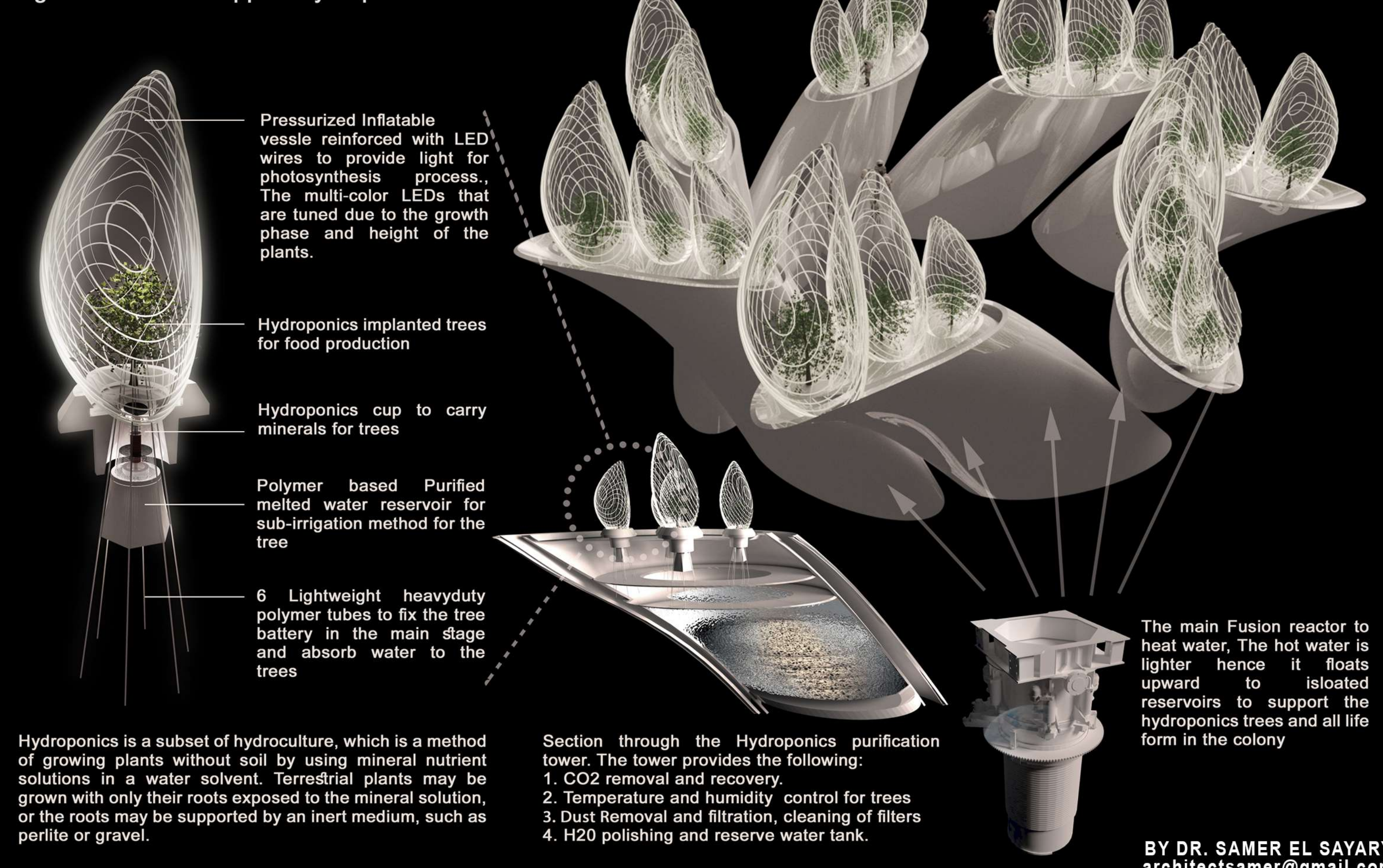


According to the time planning strategy. The 3D printed core habitat is intended to be build in a hierarchal manner in 8 phases with a span of 3 months for each phase to enable the first group of astronauts to use the colony even before it is finished.

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

## LUNAR FOOD PRODUCTION

Regenerative Life Support Hydroponics Pods



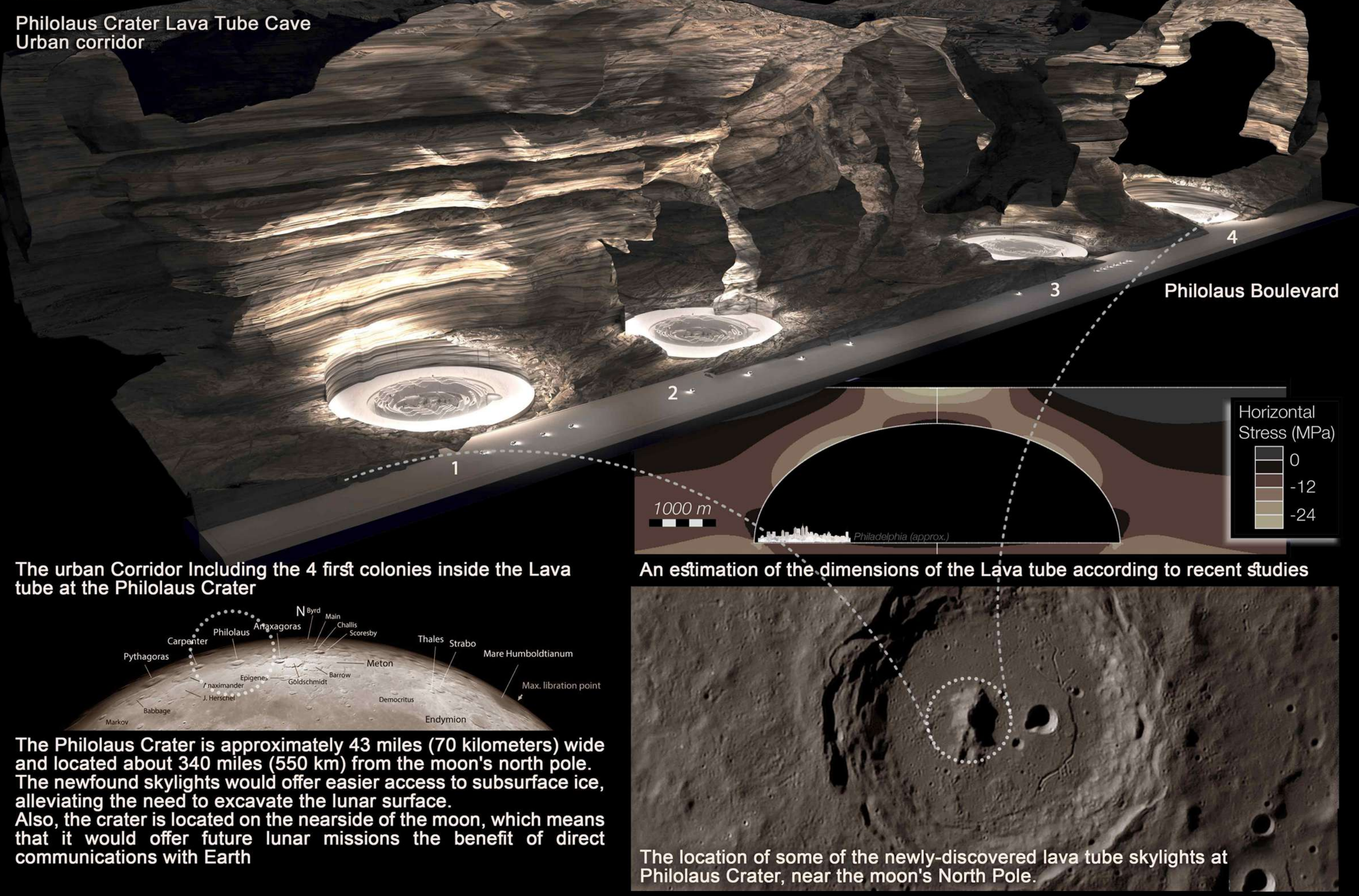
Hydroponics is a subset of hydroculture, which is a method of growing plants without soil by using mineral nutrient solutions in a water solvent. Terrestrial plants may be grown with only their roots exposed to the mineral solution, or the roots may be supported by an inert medium, such as perlite or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

Section through the Hydroponics purification tower. The tower provides the following:  
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## SELECTED SITE

Philolaus Crater Lava Tube Cave  
Urban corridor



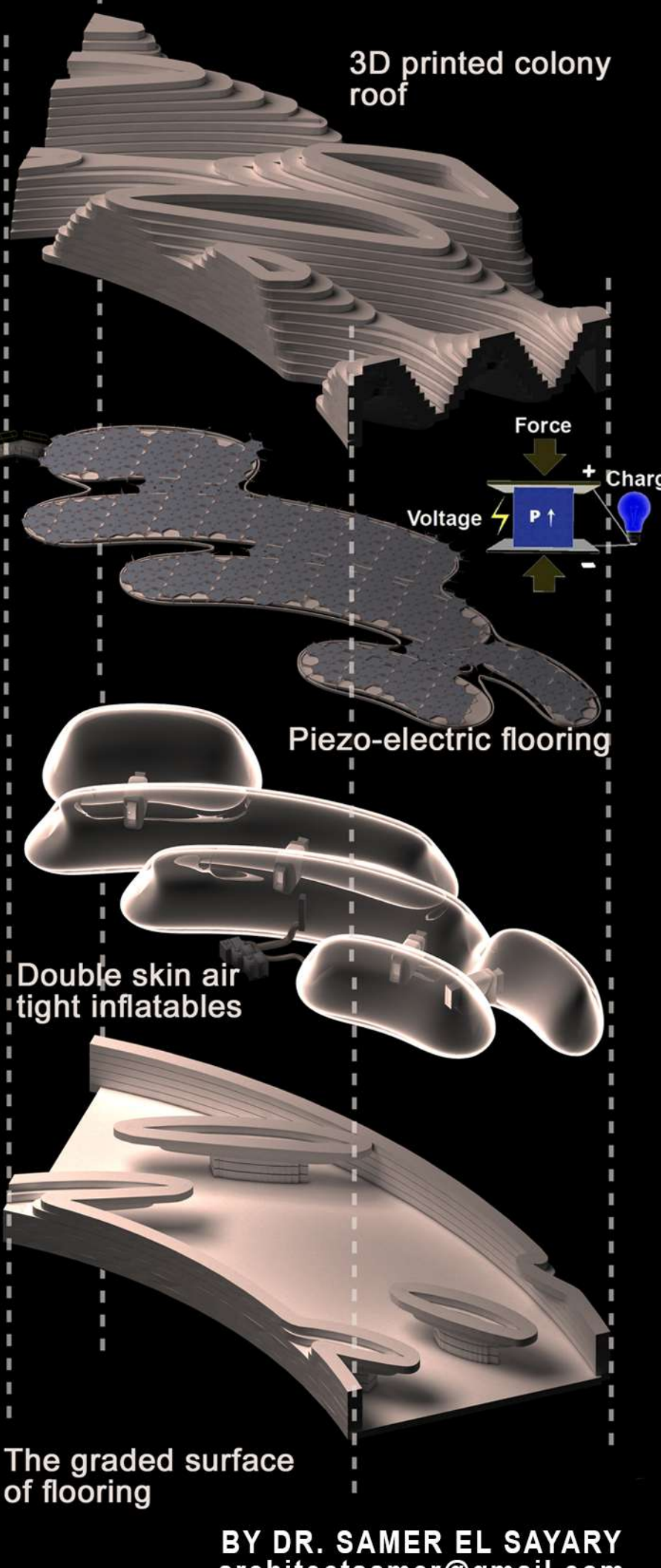
The urban Corridor Including the 4 first colonies inside the Lava tube at the Philolaus Crater

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

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

## 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.



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