



Hydroponic Farm Project

This semester's project aims at implementing a hydroponic farm for the base used by the astronauts during the mission. The farm would be implemented with a recycling water system as water on other celestial bodies is rare and needs to be saved.



Laboratory: CHANGE + TBD

Number of students: 1

School: ENAC, GM, SV

Status: Available

Global description of the mission

Asclepios aims at organizing a simulated space mission. For this purpose, the association rents existing infrastructure and builds its base inside. Therefore, by design, the mission will take place on Earth, where many parameters are different than on other celestial bodies. However, they will still live in the base for the duration of the mission, using dehydrated food as a source of energy. For longer missions, freshly grown vegetables and fruits would eventually be necessary. The project aims at creating a hydroponic farm implantable in lunar conditions. The farm would use a closed loop water system in order to recycle this limited resource. It will allow the analog astronauts to experience the constraints of extraterrestrial environments in greater realism during the Earth-based simulation with a more diverse alimentation.

Project goal

Cultivating crops will be essential to a sustained human presence on the Lunar surface, initially supplementing food from resupply missions, and eventually aiming to create a self-sustaining colony. Additionally, crops cultivation would answer some of the mission's and crew's needs while improving astronaut's well-being. One potential method for growing plants in extraterrestrial bases is by utilizing a hydroponic setup, whereby plants are cultivated without soil in water-based nutrient solutions. The main advantage of this method is the absence of the need for soil to be transported from Earth, or for fertile regolith to be sourced. This project aims to design a compact hydroponic greenhouse for a simulated small lunar base. The greenhouse should be designed and constructed in a way that allows for easy cultivation and harvesting of crops by analog astronauts, while prioritizing the minimisation of water loss through creation of a closed-loop recycling system.

Description of the student's work and mission:

1. Investigate the state-of-the-art hydroponic farms and closed loop water recycling systems.
2. Understand limitations imposed by the extraterrestrial environment and imagine ways to overcome it.
3. Design a hydroponic greenhouse for use in a simulated small lunar base, with modular trays that can be transported.
4. Implement a protocol to monitor the water contamination.
5. Clear description of implementation choices described in a report.
6. Construct a prototype of the developed design.

In order to conduct this project, the student will need to know about recycling systems, be curious and autonomous, and be able to work in a team.

Name of Supervisor:

Sara Bonetti, sara.bonetti@epfl.ch

Name of Asclepios' contact:

Arnault Monoyer
arnault.monoyer@epfl.ch