Airlock Project

This semester project aims at developing an airlock for the base used by the astronauts during the mission.

Laboratory:	**CCLab**
Number of students:	**1**
Section:	**ENAC**
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. Among the tasks performed in a space base, astronauts must leave the base for Extravehicular Activities (EVA). The project aims at implementing, in the base, an Airlock that will realistically isolate the base from the external environment. It will allow the analog astronauts to experience the constraints of extraterrestrial environments with more realistic designs during the Earth-based simulation.

Project goal

An Airlock is a key element enabling the transition between the inside of the base and the outer environment. It protects the structure and pressurized atmosphere of the interior from the harsh conditions of the exterior environment, i.e. the vacuum for a moon like environment. This project will focus on the development and design of an airlock with the goal of simulating as realistically as possible the different base operations required for the human exploration of the Moon. The student will have to think about the design and construction of an airlock allowing analog astronauts to safely transition from the inside to the outside of the base, from similar existing systems. Measures and volumes of Sasso San Gottardo, location of the next analog missions, should be used to enable future implementation of the airlock.

Description of the student's work and mission:

- Investigate the state-of-the protocols used in the airlock (decontamination, (de)pressurization), existing airlocks, physiology, and safety requirements.
- Design an airlock plan to be used in a simulated lunar base. Material choices should be adapted to lunar requirements (e.g. composite).
- Implement EVAs' requirements, such as donning and doffing suits.
- Define protocols describing the interactions needed with the system in case of failure or designed situations.
- Fit the airlock in the allocated place so it meets the mission's requirements.
- Adapt the design and material choices to the Earth-based stimulation.
- Clear of implementation choices described in a report.
- Construct a 3D model of both developed designs.
- If time allows it, start constructing pieces of a simulated Airlock.

In order to conduct this project, the student will need to understand the materials constraints and design, 3D visualization, be curious and autonomous.

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