



# Integration of a miniaturized O<sub>2</sub> sensor into a space suit helmet

This project aims to integrate a miniaturized O<sub>2</sub> sensor into a space suit helmet to monitor the user's breathable atmosphere at all times during extra-vehicular activities.

**Laboratory:** NEMS  
**Number of students:** 2  
**Section:** GM, EL, PH  
**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, the analog astronauts will live together in close contact during the two weeks of the mission to experience the constraints of extraterrestrial environments during the Earth-based simulation. The project aims at optimizing their environment to make their mission as realistic as possible.

## Description of the project

In this 14-week long project, you will have to integrate a miniaturized O<sub>2</sub> sensor into a space suit helmet to monitor the user's breathable atmosphere. Both mechanical and electrical sensor integration will be required. Additionally, the sensor data will need to be processed. Thus, a graphical interface for the visualization of the O<sub>2</sub> data in real time will need to be created.

The miniaturized sensors will be delivered in the form of a small PCB of approximately 3 cm x 3 cm in size and will provide a digital output in UART format. The project will have three main tasks:

1. Integrate the sensor mechanically in a space suit helmet in a way that would not interfere with the user and other functional elements inside.
2. Connect the PCB to the primary or secondary computing unit in order to relay the digital signal for processing.
3. Process the signal and create a graphical interface for visualization of the O<sub>2</sub> concentration. Alternatively, if a graphical interface for the helmet already exists, the O<sub>2</sub> data can be integrated as an additional plugin/tab into the existing digital control panel of a space suit.

## Requirements

The project can be performed in a group of 2 students with backgrounds in electrical engineering or physics (sensor integration + firmware), and in software engineering (data processing + frontend visualization)

### 1. Electrical engineering/physics student:

- CAD design, 3D printing and/or CNC
- Firmware programming
- Arduino/Raspberry Pi

### 2. Software engineering student:

- Python for data processing
- Graphical user interfaces

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