



Space
Situational
Awareness

SEMESTER PROJECT

ENERGY MANAGEMENT FOR AN AUTONOMOUS OBSERVATION STATION

AUTUMN 2024



EPFL

Project overview

- **Type of Project:** Semester project
- **Duration:** 14 weeks (Official start/end date: September 9-December 20)
- **Submission of final report:** January 13
- **Final Presentation:** TBD
- **Recommendation:** This project is suitable for students with an interest in energy management and solar technologies.

Context

The number of objects orbiting Earth, such as satellites and debris, is increasing at an unprecedented rate. The high speeds at which orbiting objects travel mean even small collisions can lead to significant damage or satellite loss, resulting in substantial costs for operators and further contributing to debris proliferation. This proliferation poses significant hazards to space traffic and various fields related to space activities.

The [SSA EPFL Team](#) aims to set up an open-source catalogue containing important information on as many object detectable in Earth orbit as possible. This catalogue will allow anyone to access detailed information about these objects, with complete transparency.

To achieve this goal, the SSA EPFL Team will deploy two fully automated telescopes housed under protective cupolas. The first prototype is already constructed and installed on an EPFL rooftop.

Project Scope

The project focuses on establishing an energy-efficient solution for a second protective cupola, ensuring self-sufficiency in power supply. Situated within a natural reserve, our remote observation station will operate off-grid, necessitating reliance on powerful battery systems. The primary objective involves calculating the energy requirements of our setup and developing initial strategies, including the potential integration of solar panels for daytime battery recharging.

This project aims to optimize energy management while minimizing ecological footprint, ensuring continuous and reliable observation operations.



Tasks

- Assess the energy requirements of the remote observation station, considering all operational components.

- Develop preliminary energy management strategies, including the integration of solar panels for daytime battery recharge.
- Design the actual system architecture, selecting appropriate components such as batteries, solar panels, and energy management systems.

Prerequisites

- Familiarity with energy consumption principles and calculations.
- Ability to evaluate and implement renewable energy solutions, such as solar panels.

Contact

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