

Student project proposal

Project title

Derivation of the Thermal Model of an Hyperloop Pod Prototype and Physical Integration of a Cooling System

Project type MSc thesis BA semester project MSc semester project

Project responsible and e-mail

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Project description

The proposed project is part of the EPFLoop team's research into the experimental validation of a reduced-scale prototype. This prototype is an autonomous vehicle containing an energy storage system, a controller, electromagnetic propulsion devices and sensors.

The aim of the project is to derive an analytical model of the pod, validate it with measurements and simulations, and finally design a cooling system to be implemented in the next prototype.

As an active member of the EPFLoop team, the students will be supposed to collaborate with other team members and to participate to the team regular update meetings.

Tasks of the student

- Select the most appropriate modeling method and derive the thermal model of the pod (including all subsystems).
- Conduct a thermal analysis using a finite element model (fem) software (COMSOL for instance) and use the results to validate the thermal model.
- Define and run an experimental validation of the thermal model on the actual version of the pod.
 - Extract global efficiency of the system.
- Select and design a cooling system for the next version of the pod:
 - Establish specifications.
 - Identify working environment (pressure, temperature, available volume for integration).
 - Design a cooling system (active or passive, according to specifications).
- Integrate the cooling system into the pod, validate experimentally the results.

The project is challenging as the available the volume and the mass in the pod are limited, all solutions have to be explored.

The target is to have an operating device by summer 2024.

Requirements

- Comfortable with hands-on work.
- Work in team with people from different university.
- Knowledge of thermodynamics.
- Knowledge of fem or simulation software is a plus.