

Student project proposal

Project title

Hyperloop reduced scale pod application, Battery Energy Storage System Engineering

Project type MSc thesis MSc semester project

Project responsible and e-mail

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Project description

The Hyperloop transportation system is composed by a constrained space characterized by a low-pressure environment (operated at approximately 50 mbar), that is usually represented by tubes/tunnels that also house a dedicated rail system responsible for the mechanical constraining of energy-autonomous vehicles (called *capsules* or *pods*) carrying a given payload. Hyperloop capsules are expected to be self-propelled and can use the tube's rail for guidance, magnetic levitation and propulsion purposes. For an average speed in the order of two-three times larger than the one of high-speed electric trains and a maximum speed to the order of the speed of sound, Hyperloop is expected to achieve average energy consumption in the range of: 30-90 Wh/passenger/km and CO₂ emissions in the range of 5-20 g CO₂/passenger/km.

The EPFL Distributed Electrical System Laboratory (DESL) is currently active in developing optimal sizing methods of the full-scale electrical propulsion system for Hyperloop capsules. The expected performance of the defined propulsions systems will be validated by means of a reduced-scale pod mock-up to be built at the EPFL. Within this context, we are looking for BA/Master EE students interested to work on the Battery Energy Storage System (BESS) of the reduced-scale pod. In particular, the tasks of the student are listed here below.

Tasks of the student

- Design and optimize the weight of a BESS pack; the BESS weight will represent an important part of the system.
- Design the electrical connection and wiring of the cells; the wires need to be chosen in order to withstand for such discharge rate.
- Design the cooling system; understand how the heat will be extracted from the cells and whether
- Choose the sensors for the BESS.
- Design the data acquisition system of the BESS

Requirements

- Able to work in team, committed and open to learn
- Knowledge of BESS design is preferred