

## Student project proposal

*Project title:* Hyperloop reduced scale pod application, Battery Energy Storage System Engineering

*Project type:* MSc thesis, BA semester project, 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 CO<sub>2</sub> emissions in the range of 5-20 g CO<sub>2</sub>/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 pod will have up to 15 kilograms and 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.
- 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