

## Student project proposal

### *Project title*

**Avionics and navigation systems implementation for a reduced-scale Hyperloop prototype**

*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 framed within the activities of the control and avionics team of the EPFL Hyperloop team (EPFLoop). The project goal is to develop a data acquisition and control system for the Hyperloop reduced-scale test track built on the EPFL campus, and to update the current prototype control software for the second version of the prototype.

The data acquisition system consists of different blocks including sensors data streaming into a dedicated telecommunication system and storage in a time series database (InfluxDB). A User Interface (UI) to represent the stored quantities will have to be designed and developed using the Grafana visualization web application.

The second part of the project deals with the control of the Hyperloop pumps responsible for the tube's vacuum, via dedicated microcontrollers installed along the infrastructure and controlled from a dedicated control room.

Moreover, the student will be in charge of performing all the upcoming Hyperloop tests and therefore work in close contact with all the other members of the team.

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*

- Real time data acquisition software development on NI microcontrollers (compactRIO).
- Connection between microcontrollers and base station PC.
- Data storage:
  - InfluxDB database architecture design and implementation.
  - Grafana UI development.
- Pumps control software design and development on NI microcontrollers (compactRIO).
- Adaptation of the current Hyperloop prototype control software into the second version of the prototype.
- Experimental validation of the entire system.

### *Requirements*

- Strong LabVIEW skills (at least one EPFL class where it was supposed to be learned)
- Basic knowledge of timeseries database, in particular InfluxDB
- Basic knowledge of Grafana web application
- Basic knowledge of source code control tools (git, epfl gitlab,...)