

## Student project proposal

*Design and implementation of an Hyperloop test track data acquisition system and actuators control*

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*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 EPFL Hyperloop team (EPFLoop). The project goal is to design, develop and experimentally validate a data acquisition system and control of vacuum pumps of a reduced-scale Hyperloop test track built on the EPFL campus.

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.

*Tasks of the student*

- Sensors selection (type, communication protocols...)
- Sensors location identification (how many sensing stations (sensors + MCU) to install inside the infrastructure and where)
- 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)
- Experimental validation of the entire system

*Requirements*

- Basic knowledge of sensing systems and communication protocols
- Basic LabVIEW programming skills
- Basic Javascript/Linux programming skills
- Basic knowledge of source code control tools (git, sourcetree...)
- Willingness to work in a motivated team