Project proposal

## Incorporating physical insights in machine learning models of an internal combustion engine

In this project, we want to investigate and evaluate Machine Learning methods for fault diagnosis of an internal combustion engine. Data will be used from one of the engines in the vehicular systems engine lab to train and analyze one or more machine learning methods for fault diagnosis of non-linear dynamic systems.

Machine learning have been successful in many different applications. However, to estimate a general data-driven model for a specific system requires significant training data which is not always available. For many physical systems there are often some physical insight about the system behavior and how different signals are related to each other. This information can range from high-fidelity mathematical models describing system dynamics to a structural representation only describing how different component are connected sensor locations. In this project we want to investigate how to incorporate knowledge about the physical system when designing a data-driven model for regression.

In this project, the main objective is to

* Design a data-driven model for regression of an internal combustion engine.
* Investigate how to incorporate knowledge about the system structure in the data-driven model, for example system dynamics and sensor locations.
* Evaluate the performance of the regression model and the benefits of including physical model information.

If you are interested or have questions, please feel free to mail me: **daniel.jung@liu.se**

or come by my office in the vehicular systems corridor (B-building behind Café Java).