How should trains drive themselves?

Problem description

Automatic Train Operation (ATO) shows many potential benefits, as it may contribute to improve the service in a sustainable way, to optimize the network capacity and to reduce costs in the long term. Train control is usually considered as a two-step approach. First, a reference speed profile is calculated by means of a trajectory generator. Second, a trajectory tracking algorithm monitors continuously the train speed and location to calculate the exact amount of tractive and brake effort to be applied in order to follow the reference speed profile. In this project, we aim to study energy-efficient trajectory tracking algorithms for ATO.

Assignment

This project offers multiple scientific and practical directions that could be investigated individually or combined such as developing new mathematical models and trajectory tracking approaches for ATO.

Expected research steps are:

- Literature study on trajectory tracking algorithms
- Data preparation
- **Develop a trajectory tracking algorithm suitable for an ATO application**
- Experimental study
- Write a report and a scientific paper

Background

A student is expected to have knowledge and interest in mathematical optimization, control, data analysis, programming and has basic knowledge of railway transport, such as provided in CIE5803 Railway Traffic Management. The project builds on recent developments of the Digital Rail Traffic Lab with NS. It can be performed as a final thesis project or research project. The project could be performed within NS.

Information

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