# Robust Driver Advisory Systems and Automatic Train Operation

## Problem description

The railways automation race started long ago, although more research is required to reach the finish line. Automation 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. However, automation technologies are usually difficult to be implemented, as the algorithms embedded need to be carefully calibrated to achieve the target levels of accuracy and performance. To this end, performing several tests and analysing historical operational data are key steps for calibrating such algorithms. Moreover, changing operation conditions and wear may reduce the effectiveness of the calibration. In this regard, automation algorithms that are robust against such varying conditions are to be developed.

## Possible assignment

This project offers multiple scientific and practical directions that could be investigated individually or combined such as new mathematical models and approaches, like robust train trajectory optimization.

Expected research steps are:

- Literature study of existing articles
- Data preparation
- **Develop new robust automation model**
- Experimental study
- Write a report and a scientific paper

## Background

A student is expected to have knowledge and interest in mathematical optimization, data analysis, programming, automation and has basic knowledge of railway transport, such as provided in CIE5803 Railway Traffic Management and Railway Operations and Control. 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.

## References

Wang, P., Goverde, R. M., & Van Luipen, J. (2019). A connected driver advisory system framework for merging freight trains. *Transportation Research Part C: Emerging Technologies*, *105*, 203-221.

## Information

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