Optimising the roll-out strategy of Automatic Train Operation

Problem description

Increasing demand for heavily used rail corridors in line with the modernisation of train operation technology is an essential driver for replacing manual driving with Automatic Train Operation (ATO). Several Grades of Automation can be applied from semi-automatic to autonomous train operation. To maximise the service and benefits and minimise the associated cost of shifting towards ATO, additional resource (e.g., available ATO-equipped trains per year or the number of running ATO-equipped per line) and policy requirements on the migration strategy arise. Although ATO has been discussed for many years, no research so far endeavours to provide a concrete roll-out strategy for ATO on a national railway network. Therefore, the research questions arise: What is the optimal migration strategy of ATO on a mainline railway network, considering the resource, time and policy constraints and how can we represent them?

Assignment

- Review the current literature relevant to Automatic Train Operation and its migration strategies.
- Propose a method for efficient and effective replacement of manual driving with Automatic Train Operation on a national railway network.
- Analyse the policy implication and propose an optimal ATO roll-out strategy.
- Write a report and possibly a scientific paper.

Background

A student is expected to have interest and knowledge in railways, automatic train operation and programming as provided in the related MSc courses. You will have an opportunity to further develop skills in railways, data analytics, and mathematical modelling. The research will be mainly performed as an intern at Mott MacDonald and in the Digital Rail Traffic Lab within T&P at TU Delft.

Reference

- Z. Wang et al., Assessment of architectures for Automatic Train Operation driving functions. *Journal of Rail Transport Planning & Management*, 24, 100352, 2022.
- J. Geischberger et al., Optimizing rollout strategies for migration to moving block signaling–A MINLP-based approach for on-board train integrity monitoring technology. *Journal of Rail Transport Planning & Management*, 28, 100417, 2023.

Information

Digital Rail Traffic Lab, www.tudelft.nl/drtlab/

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