



Master thesis No. 1012

Communication Mechanisms for Distributed Train Disposition Based on Swarm Intelligence



Methods

Simulation
Object oriented programming

Topics

Communication networks

Background

At rail traffic control, security-related and purely dispositive components have to be differentiated. With the current control approach the latter are planned centrally. Even the smallest disturbances to the trains and rail lines therefore lead to extensive and time-consuming re-planning of the operational process.

A completely different approach to scheduling in rail transport are distributed coordination procedures through direct coordination between the individual trains. These have to be supported by suitable communication mechanisms.

Your Task

First, a realistic wireless channel model has to be identified by adapting suitable models from the LTE resp. 5G V2X standards. This channel model then has to be implemented in an existing simulator, establishing a flexible simulation platform for the radio-based swarm-coordination communication between the trains. Finally, communication mechanisms to improve the swarm communication have to be implemented (e.g. medium access, adaptive retransmissions, or multi-hop message forwarding). The benefit of these mechanisms has to be evaluated by connecting the network simulator to a railway operation simulator of the Institute of Railway and Transportation Engineering (IEV).

Knowledge and skills acquired

You will gain insights into future vehicle communication processes and practical experience in discrete-time simulation of communication networks in an object-oriented simulation framework.

Requirements

Kommunikationsnetze I
Programming Experience in Java/C++

Contact

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