Real-time Electric Vehicle Routing

Background

During the recent years there has been a growing effort to promote sustainable fuel solutions, with special focus on increasing the use of electric vehicles. As a result, many challenges associated with energy management arise when considering electric commercial vehicles. Additionally, current urban traffic scenarios add to the complexity with congestions. The FFI project EL FORT 2 – Electric Fleet Optimization in Real-Time being carried out by Volvo and Chalmers, focuses on logistics optimization for electric trucks. In this study, factors affecting electromobility are being investigated.

Problem description

The topic of this thesis work is to develop a dynamic vehicle routing problem model and solution method. The problem is derived from the classic Travelling Salesman problem, but in this case in real-time and applied to electric trucks. The objective is to implement the model and integrate it with the traffic simulation tool SUMO in order to validate the method. The results will be used as input to other on-going and future research projects with focus on electric vehicles at Volvo.

Some of the main tasks are:

1) Literature survey on dynamic vehicle routing problems. Investigate what has been developed for internal combustion vehicles and understand the gap to adapt it to electric vehicles.
2) Develop a model for real-time routing for electric delivery trucks with a solution method such as dynamic programming or another suitable approach.
3) Implement the model and validate it with the traffic simulation tool SUMO.
4) Write an MSc thesis report. Present the results at a Volvo seminar.

Group size: 2 persons
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