

Semester Thesis or IDP

Large-scale Agent-based Simulation of Electric and Autonomous Road Freight Traffic in Europe

Motivation

The logistics sector is undergoing one of the biggest transformations in its history. To meet ambitious climate targets while addressing a growing shortage of truck drivers, electric and autonomous trucks are becoming key technologies for the future. With automation, the decoupling from legally binding driving time regulations increases flexibility and opens new opportunities for a smart integration into the renewable energy system.

As foundation to analyze the potentials of the energy system integration a simulation of the traffic flows and the corresponding loads at the charging stations. Agent-based simulation models provide the potential to derive detailed usage profiles and allow for the assessment of different system configurations.

Thesis topic

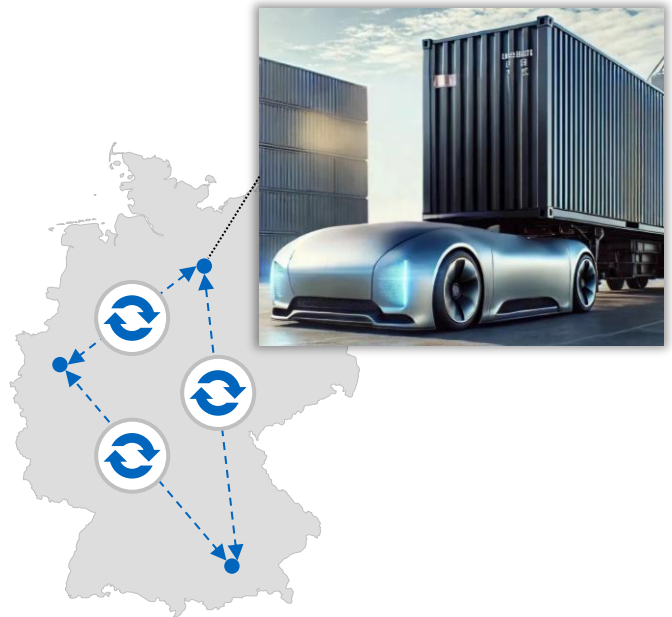
Freight flows are increasingly international, which requires an assessment of the implications of automation and electrification on a European level. Therefore, the goal of this thesis is to apply a tensor- and agent-based simulation framework, which was developed at the chair, to a European freight traffic data set. Due to the large amount of data to process, this represents a challenging task and might require some improvements of existing data pipelines. In addition, you are encouraged to implement own extensions to the simulation framework.

What you get

- Contribute to scientific research in a highly future-oriented field of commercial transport mobility
- Opportunity to deepen your knowledge in energy systems, mobility, and optimization
- Close supervision with weekly meetings
- In case of excellent working performance: Opportunity for a follow-up thesis work (master's thesis) and co-authorship in a scientific paper

Contact

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Work packages

- Familiarization with the existing data processing pipeline and simulation framework
- Implementation of the European data set
- Validation of the model against a simulation that was previously developed at the chair
- Documentation and analysis of the results

Requirements

- High level of interest and motivation to drive the electrification and automation of the transport sector
- Proficiency in Python, experience in software development or handling large data volumes is a plus
- Independent and structured way of working
- Very good knowledge of German or English

I am looking forward to receive your complete application with a CV, current overview of grades, a brief motivation, and any other documents. **The thesis can be written either in German or English.**

Start date

From now

Workplace

FTM (Garching Forschungszentrum) or remote