

Master Thesis, Semester Thesis or IDP

Development of a Python Framework for Agent-based Simulation of Autonomous Trucks in Transfer Hub-based Freight Transport

Motivation

Increasing climate protection requirements and a worsening shortage of drivers pose major challenges for logistics. One concept that addresses both problems simultaneously is a transfer hub-based freight transport, in which highway sections are handled autonomously, but drivers continue to transport goods to and from hubs near highways. By swapping trailers at the hubs, conflicting objectives with regard to range, payload and charging capacity of battery-electric tractor units can also be handled.

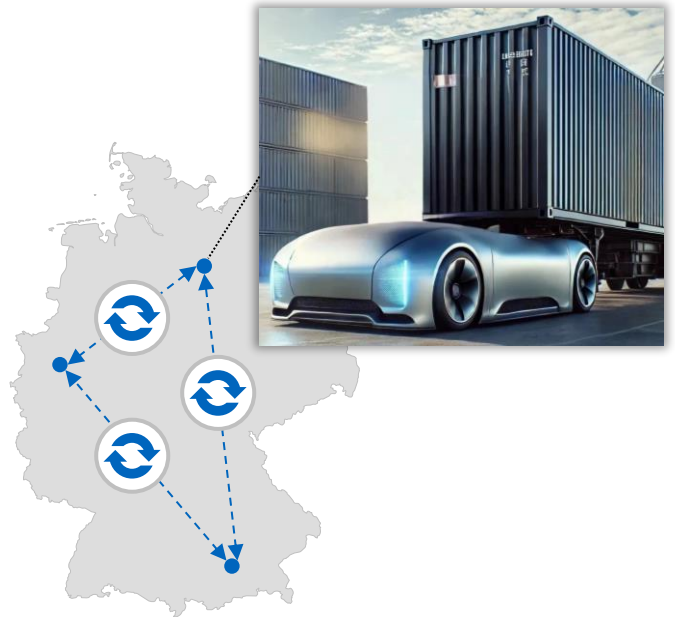
A simulation model for hub-based freight transport is currently being developed at the chair. However, current frameworks do not reach the required degree of adaptability while also providing sufficient performance for country-wide simulations.

Thesis topic

The goal of this thesis or IDP is the development of a Python framework that enables agent-based simulation at scale, followed by an exemplary usage of the framework to simulate hub-based freight transport in Germany. For this, existing pre- and postprocessing pipelines can be used. Optionally, you are encouraged to implement own extensions like machine learning-based optimizations.

What you get

- The possibility to benefit from a pioneering role and to make your contribution for shaping the future of logistics
- The opportunity to start a project from scratch and to implement your own ideas
- A publication of the framework is intended, in case of outstanding work results, you'll get the opportunity to co-author a scientific paper



Work packages

- Literature research and identification of possible base frameworks that meet the performance requirements of the simulation
- Implementation of a framework and application on the use case of autonomous trucks in hub-based freight transport
- 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 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 or IDP can be written either in German or English.**

Contact

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Start date

From now

Workplace

FTM (Garching Forschungszentrum) or remote