Technical University of Munich
TUM School of Engineering and Design
Chair of Automotive Technology

Master's Thesis, Semester Thesis or IDP

Redispatch 3.0? Smart Energy System Integration of Electric and Autonomous Trucks

Motivation

Increasing climate protection requirements and a worsening shortage of drivers pose major challenges for logistics. Electrification and automation provide the potential to address these challenges, and especially the combination of both offers promising synergies on a system level. The decoupling from legally binding driving time regulations significantly increases flexibility and opens up new opportunities for a smart integration into a renewable energy system, especially with vehicle-to-grid (V2G) applications.

While existing research mainly considers bidirectional charging at individual sites and with constraints regarding the driver working hours, a systemic view on the public charging system allows for coordinated, country-wide use of energy system integration potentials.

Thesis topic

The aim of this thesis is to assess the economic potential of a smart energy system integration of publicly charging trucks to mitigate redispatch costs, which sum up to three billion euros per year in Germany. For that, an existing simulation of load profiles and mobility patterns at the charging sites can be used. Special emphasis should be given on the effects of the logistics sector and the required adaptions of mobility patterns.

Work packages

- Literature research on the working principle of redispatch and the economics behind it
- Development of system model based on given load profiles and mobility patterns
- Validation of the approach
- Quantification of the economic potential of redispatch-supporting grid integration of partly automated trucks

What you get

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

Requirements

- High level of interest and motivation to drive the electrification and automation of the transport sector
- Initial experience in energy system modeling or energy markets
- Proficiency in Python is required
- Independent and structured way of working
- Very good German or English language skills

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.**

Contact
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Start date
From now

Workplace
FTM (Garching Forschungszentrum) or remote