

Semester Thesis / Master Thesis

AI- and stochastic-based forecasting of electricity generation and consumption in a logistics depot with electric trucks

Motivation:

Commercial vehicles contribute significantly to greenhouse gas emissions in European road transport. The transition to battery-powered commercial vehicles is the most promising way to sustainably reduce emissions. This transition is in line with the European Commission's ambitious target to reduce CO₂ emissions from heavy-duty commercial vehicles by 90 percent by 2040. In addition, many companies will demand a green supply chain in the future.

During their downtimes at the logistics depot (e.g. overnight), the battery electric trucks (BETs) offer the possibility of temporarily storing energy from the power grid thanks to their large battery storage systems. This energy can be purchased and stored at low price times, for example, and sold back to the grid operator at high price times (V2G). However, the underlying sales algorithm requires information on consumption and generation forecasts at the logistics location (When is how much electricity generated by PV? When are BETs available for intermediate storage? ...).

Thesis topic:

The aim of this thesis is to investigate current research approaches in the field of load profile and generation forecasting for a logistics depot with an electric truck fleet. For this purpose, a literature review should map the state of the art of forecasting methods that include historical and real-time data. Based on this, a prototype algorithm will be implemented that is able to provide the site energy management with important forecast information about the power generators and consumers at the site.

You get:

- Contribution to scientific research in a very future-oriented area of commercial transportation mobility
- In the case of outstanding work: opportunity for further work (Master's thesis) and co-authorship of a paper publication



Work packages:

- Literature research on stochastic prediction algorithms (AI-based and traditional algorithms)
- Comparison of different approaches with regard to their suitability for use in the area of an electrified logistics depot
- Implementation of an approach
- Validation with real data

Your profile:

- Passion for e-mobility and technologies to accelerate the energy transition
- Ideally initial experience with AI/stochastic methods
- Ideally initial programming experience in Python
- Independent and structured way of working
- Very good knowledge of the German or English language

I look forward to receiving your application with a CV, current overview of grades (+ additional documents if applicable) and a brief motivation. **The thesis can be written in either German or English.**

Contact:

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Start date:

Immediately (or by arrangement)

Workplace:

FTM, Garching Forschungszentrum. The work can also be done in the home office.