Master Thesis – Fast charging optimization for EV battery using data-driven model

Let us describe the challenge we offer

The increased global average temperature and extreme weather events raise the need for immediate actions to combat climate change. Polestar is committed to driving change towards a climate-neutral future with sustainable electric mobility. However, the speed and convenience of charging at a public station remain as challenges that warrant further investigation.

As the mass adoption of EV is approaching, a fast and seamless charging operation is desirable. Customers are anticipating spending little time waiting for a free charger and charging to be completed. Additionally, the fast charging operation shall not degrade the battery’s capacity and power excessively.

The goals of this project are to understand factors that affect charging time, analyze the impact of ambient conditions, and to account for battery degradation during fast charging operation.

What you’ll do

- Construct battery models with various levels of complexity suitable for charging optimization.
- Estimate the total charging time for reaching the target battery energy level.
- Optimize fast charging protocol by considering charging time, energy efficiency, and battery degradation. Analyze the robustness of charging protocols under various environmental patterns.

Who you are

- M.Sc. in Automatic Control, Mechatronics, Applied Mathematics, Computer Science, Electrical Engineering, or similar
- Good knowledge in Python and MATLAB/Simulink
- Completed courses and with good knowledge in mathematical optimization. A background with machine learning and Bayesian optimization is an advantage.
- Analytical and independent

Duration

- 20 weeks / 30 ECTS
- Starting date: January 2023
- Estimated end date: Summer 2023 (extendable to one year)
- Number of students: 2 students
- This position is based at our HQ in Gothenburg, Sweden.

Supervisors

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