Optimizing Battery Testing for Electric Vehicles: A Machine Learning Approach to Lab Management

Master Thesis

Batteries, being the most valuable and defining component of electric vehicles (EVs), are of paramount importance to future mobility. The demand for battery testing facilities is soaring, with capacities being reserved years ahead. Here, prototype battery components (cells, modules) are the unit under test (UUT) to potentially thousands of test instruments (e.g., cyclers).

The planning process involves a multitude of tasks, including the organization of workloads, parameters, and test procedures, mapping of UUTs to test equipment, as well as the setup of equipment. The task of reliably planning and managing the usage, control, and inventory of thousands of test channels surpasses human capabilities due to its complexity. Classic optimization methods on the other hand reach their limits due to plant uncertainties (eg., unavailability due unplanned maintenance) and sometimes unpredictable behavior of the unit under test itself. In this work, new ML-based algorithms shall be implemented, analyzed, and compared to existing methods in managing test labs.

YOUR RESPONSIBILITIES:

- Analyze and adapt data models for battery testing.
- Implement simple test environment to simulate battery test lab.
- Analyze state of the art in ML applicable to plant management
- Select appropriate approaches, and implement prototypes for tasks in the battery testing facility (e.g. allocate test equipment)
- Design an agent prototype that interacts with the environment.
- Design dashboard prototypes to properly communicate necessary changes in resource allocation.

YOUR PROFILE:

- Ongoing master study in the fields of Computer Science, Telematics or Physics
- Good programming skills in Python
- C# skills appreciated
- Knowledge of machine learning algorithms (e.g. reinforcement learning)
- Knowledge of data structures and translations
- Good knowledge of German and English
- For this thesis is your presence from time to time at our headquarter in Graz required

WE OFFER:

- You will receive professional guidance and support from our experienced employees.
- You will have the opportunity to exchange ideas with experts in the company and benefit from their expertise.
- Take the opportunity to immerse yourself in the world of AVL and embed your theoretical knowledge in a practical environment.

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The successful completion of the thesis is remunerated with a one-time fee of EUR €3,500.00 before tax.

You don't want to write your final thesis just for the books. Explore the mobility of the future together with us - maybe you will be a part of it soon!

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