Open Master thesis

Smart Battery SoH Estimation

Batteries and battery management are important components in today's society with the advent of electric cars. Therefore, there are efforts to create a standardized way to create an electronic description of an individual battery, called a Battery Pass (https://thebatterypass.eu/). The current template for such a Battery Pass would be a static data sheet describing the different properties of a battery, e.g. material properties, to enable better recycling of old batteries. Another important aspect when describing batteries would be the State of Health (SoH) of a battery over its lifecycle, allowing for better monitoring of batteries and the factors that lead to their degradation over time.

In this project, you will investigate the current Battery Pass standard, methods to determine the SoH of a battery, and design a concept on how such an SoH information could be integrated into an electronic description such as the Battery Pass and periodically updated.

This thesis will be carried out in cooperation with AVL List GmbH within the Arrowhead fPVN project (https://fpvn.arrowhead.eu/fpvn-arrowhead/), where the developed concept will be integrated into an intelligent battery management system. AVL will provide state of the art SoH estimation know-how.

These are your tasks:

1) Get familiar with the European Battery Pass and State of Health (SoH) estimation
2) Literature study on current methods of SoH and electronic descriptions
3) Compare and assess methods found in 2)
4) Create a concept on how SoH estimation can be conducted during the lifecycle of a battery and be included in an electronic description like a Battery Pass.
5) Optional: Include the measurement of external discharges in the concept
6) Optional: Include data governance (which part of the data can be seen by which entity e.g., vehicle owner, manufacturer) in the concept

Your requirements:

- Good knowledge of mathematics and physics
- Creativity and analytical reasoning, organizational talent
- Self-driven motivation to investigate new topics

Nice to have's:

- Intermediate knowledge in programming (e.g., python, matlab)
- Strong interest and background in Standardization

Time period and contact information:

Duration: about 6 months, Start: as soon as possible
Contact: AAU: Univ.-Prof. Dr. Hubert Zangl (hubert.zangl@aau.at),

We offer funding and publication opportunities!