CARISSMA
Institute of Electric, Connected and Secure Mobility

Technische Hochschule Ingolstadt

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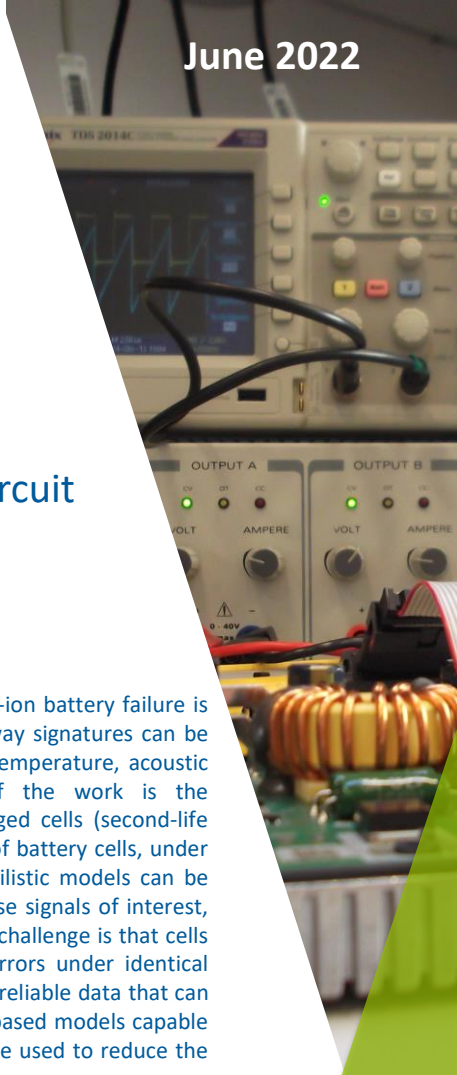

Thesis

Data-driven model to predict internal short-circuit

Description:

Battery failures are dangerous events that can have serious consequences. Predicting Li-ion battery failure is still very limited. The main novelty of this research is to assess whether thermal runaway signatures can be effectively detected prior to onset using available measurement techniques for heat, temperature, acoustic emission, Coulomb efficiency, or electrochemical processes. Another novelty of the work is the implementation of these experiments to detect fault events (e.g., short circuits) in aged cells (second-life batteries). Another novelty of this work could be to identify the most critical condition of battery cells, under which mechanical failure or short circuit is most likely to occur. For this case, probabilistic models can be proposed. Therefore, the next crucial step is to identify the expected magnitude of these signals of interest, which are relevant for initiating dangerous trajectories and then measure them. The big challenge is that cells with identical geometry, chemistry and history may (or may not) present different errors under identical stimuli (mechanical, electrical and thermal). The goal of the proposed thesis is to collect reliable data that can provide physical insights into events that cause battery failures, as well as to feed data-based models capable of making predictions about battery failures (e.g., internal short circuit. These models are used to reduce the number of physical experiments, and therefore cost and time.

Your tasks:

- First phase: Test development, data collection, structuring and imputation of missing data, data cleaning, and inferential statistics.
- Second phase: develop advanced models: AR, MA, ARMA, ARIMA, and ARIMAX. Meta-Algorithms: Boosting, AdaBoost and Gradient Boosting, Evolving Fuzzy System, Algorithms for machine learning (supervised/unsupervised learning, neural networks) (offline and online algorithms). Deep Learning Algorithms.
- Third phase: Writing the text document of the thesis, presentation of the results.

Your profile:

- MatLab or Python experience and knowledge is desirable but not required.
- Basic knowledge of battery systems is desirable.
- Confident use of MS Office.
- Excellent communication and organizational skills.

Interested? Any questions? - Contact us!

Contact:

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