

Yi Li (PhD)

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Profile

Battery Simulation & Digital Analytics Engineer with 7+ years working experience shaping battery models and cloud digital data platforms across automotive, motorsport, and aerospace programs. Expert in empirical, semi-empirical, and physics-based cell and pack simulations, lifetime-prediction and thermal-electrical models, and high-fidelity SOC/SOH algorithms. Initiated and built a cloud-native “Digital Battery Factory” platform plus automated data pipelines that cut analysis cycles by 60 % and raised prediction accuracy by 50 %+. Managed high-volume cell-testing labs, published 3 first-author papers (>1,500 citations), and led multi-partner industry-academia collaborations—valued for turning complex electrochemistry into clear engineering actions.

Technical skills

- Li-ion Battery Aging and Lifetime Prediction Modelling;
- Li-ion Battery Testing, Characterization and DOE
- Cell to Pack thermal-Electrical Modeling and parameterisation
- Machine learning for battery SOX analysis (SOC, SOH)
- Cloud Data Engineering
- MATLAB/Simulink/Simscape;
- Python
- COMSOL
- Data processing, analysis and visualisation
- Battery Design failure mode and effect analysis (DFMEA)

Professional experience

3/2024-now

Senior Battery System Performance Engineer, Fortescue, Oxford, UK

- Lead a battery team for motorsport programs (**Formula E, LMDh, Extreme H**), guiding engineers to deliver fast, reliable battery-performance analysis (SOH and failure prediction) under tight deadlines.
- Set up a data-driven workflow for automizing battery digital passport generation that cut analysis cycle time by **≈ 80 %**. Led SOH-estimation development, boosting accuracy by **50 %+** and shrinking turnaround from **1 week to 1 day**.
- Initiated, architected and launched a cloud-native “Digital Battery Factory” platform which blends race telemetry, manufacturing data, and cell-test results into a real-time digital twin, delivering instant root-cause analytics, predictive quality alerts, and live SOH dashboards from factory floor to pit wall.
- Led multiple cell selection and pack sizing activities for future projects (e.g. IndyCar HV)

06/2023-1/2024

Battery System Modeling Engineer, Envision Energy COE, London, UK

- **Developed high-accuracy cell lifetime prediction model:** Created a model in Python for large-format Li-ion cells used in grid energy applications within 1 month, with limited testing data. Achieved prediction accuracy with < 2% error in validation tests. Integrated factors like cell-to-cell variance and inhomogeneous temperature distribution into a probabilistic approach for enhanced lifetime prediction.
- **Constructing physics based model for PINN integration.** Developing single-particle models in Python as a

foundation for Physics-Informed Neural Networks (PINN). Aiming to improve State-of-Health (SOH) prediction accuracy using on-field data. Blending physics-based modelling with machine learning for better battery health estimation.

06/2021-06/2023

Senior Simulation Engineer, Vertical Aerospace, Bristol, UK

- **Developed cell lifetime prediction and cell thermal-electrical performance models with < 5% error:** Spearheaded model development for cell warranty applications, including experiment design and aging mechanism identification via IC/DV analysis. Developed ECMS to estimate battery thermal-electrical responses under eVTOL flying conditions, achieving voltage RMSE < 20 mV and surface temperature RMSE < 2 °C. Explored methods for developing fast charge profiles, focusing on anode voltage level monitoring.
- **Optimised test procedures from cell to pack level for enhanced model accuracy and resource efficiency:** Defined cell performance characterisation and parameterisation for thermal-electrical models, creating a comprehensive cell testing library to improve modelling efficiency and cell selection. Used statistical methods (e.g. central-composite design) for cell ageing test to reduce test cost.
- **Established cloud cell data pipeline from scratch:** Directed the development of a cell testing database and data processing pipeline, reducing querying overheads by 70% and improving data quality.
- **Technical project leadership:** Co-led the a government-funded project to deliver a smart charger for EV-TOL aircraft. Supervised PhD students, coauthoring a research paper which showcases a blend of industrial and academic research.

10/2019-05/2021

Cell Project Engineer, McLaren Automotive, Woking, UK

- **Created company's first battery lifetime prediction model from scratch,** designed for cells operating under extreme use conditions. The model achieved high accuracy when validated on real-time driving cycle tests and was subsequently used for root-cause investigations, enabling the team to identify and prevent accelerated degradation in test packs.
- **Developed thermal electrical models:** Led electrical modelling activities, developed battery cell models, and established a standard process for fast and accurate cell parameterisation. Constructed thermal models (0D in MATLAB & 1D in GT-SUITE) for single cells and modules to assess thermal performance under various scenarios.
- **Managed high-power/energy cell development projects:** Defined cell technical specifications and testing plans. Drove lightweight design in collaboration with designers and suppliers. Coordinated teams to meet key targets, including safety and performance. Provided strategic analysis for budgeting and advocated new battery technology benefits to senior management.

10/2018-09/2019

Senior Research Associate, Lancaster University, Lancaster, UK

Research focus: Li-ion battery lifetime prediction and ageing mechanism identification for niche vehicles

- **Developed ageing mechanism identification toolbox:** Used IC/DV analysis to identify root cause of fast SOH loss at ~80% SOC during calendar ageing. This discovery led to a co-published paper on the findings.
- **Set up cell testing facility and associated data processing workflows:** Designed and executed testing plans on various Li-ion cell types, managing data from over 50 channels to create a data pool for battery lifetime prediction.

10/2014-03/2015

Master student (intern) at BMW, Munich, Germany: Cell characterization

Education

09/2015-09/2019

PhD (with highest honour) in Electrical Engineering and Energy Technology, Vrije Universiteit Brussel, Belgium (industrial sponsor: ENGIE Laborelec)

Topic: Development of battery health estimation and prediction methods for online application

- **Created accurate SOH estimation tool:** Developed online SOH estimation tools using data-driven methods, resulting in less than 5% estimation error, and disseminated research findings through international conferences and three high-impact factor journal publications.
- **Constructed efficient SOC electrical models with < 3% error rate:** Models showed high accuracy for high energy Li-ion batteries across various applications (e.g. EV, grid, and V2G).

10/2012-04/2015:

Master's Degree in Advanced Material Science, Technical University of Munich, Munich, Germany

09/2008-06/2012

Bachelor's Degree in chemical engineering, East China University of Science and Technology, Shanghai, China (Top 3 out of 31 students in the class)

Selected publications

- Li et al., A quick on-line state of health estimation method for Li-ion battery with incremental capacity curves processed by Gaussian filter. *Journal of Power Sources*, 2018.
- Li et al., Random forest regression for online capacity estimation of lithium-ion batteries. *Applied Energy*, 2018.
- Li et al., Data-driven health diagnostics and lifetime prognostics for lithium ion battery: a review, *Renewable & Sustainable Energy Reviews*, 2019.

Language skills

Chinese: native; English: fluent; German: intermediate