

XIA Chunqiu

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EDUCATION

09/2024 – 06/2026 Chalmers University of Technology *Master Program, Majoring in Mobility Engineering*

GPA: 4.5/5 Ranking: 1%

Advanced Li-ion Battery Modeling, Multi-physical Modeling for structural batteries, Project-based Python, Advanced System Control, Applied Machine Learning, AI System Design, Data Science and Traffic Safety (Active Safety)

09/2020 – 07/2024 Southwest Jiaotong University *Bachelor's Degree, Majoring in Vehicle Engineering*

AVG: 80.16/100 Ranking: 30%

Project-based Control Fundamentals, Mechanical Vibration, Locomotive Traction & Braking, Basic Testing & Data Acquisition, Fluid Transmission & Control, Mechanical Accuracy Design & Verification, Computer Programming, Machine Learning, Single-Chip Microcontroller Applications, Electrical & Electronic Technology, Motor & Control

RESEARCH EXPERIENCE

07/2025 – Present Chalmers University of Technology, Electrical Engineering (E2) *Student*

Supervised Dr. Shengyu Tao; examined by Professor Changfu Zou.

Cross-Condition Transfer Learning for Battery Health Estimation and Prognostics (Thesis): Developed transfer learning and fine-tuning strategies across battery aging conditions with different charge/discharge rates and depth-of-discharge levels, improving SOH estimation and RUL prediction under unseen operating conditions.

Pulse-Based Diagnostics of Retired Batteries: Developing a rapid SOH estimation method using short current pulses and a novel physics-informed feature derived from unrecovered post-pulse polarization voltage; building a new pulse-response dataset.

Phase Prediction and Lithium Plating Analysis: Building data-driven digital twins from high-fidelity BMNN electrochemical simulations and studying correlations between anode phase evolution and lithium plating.

PUBLICATIONS

[1] Xia, C., Gopinath, V., and Dhairiyasamy, R. Bayesian safe-operating map construction from multimodal reverse-bias diagnostics in perovskite/silicon tandem solar cells. *Solar Energy Mater. Sol. Cells* **306**, 114508 (2026). IF=6.6. DOI: 10.1016/j.solmat.2026.114508.

Role and contribution: Conceptualization (multimodal reverse-bias safety assessment); Methodology (EL/PL/IR diagnostics and Bayesian safe-operating-map construction); Investigation (reverse-bias, partial-shading, and endurance experiments); Data curation and Formal analysis (multimodal data processing, CMII construction, and survival modeling); Software (image-processing and modeling pipeline); Writing – original draft.

[2] Tao, S., Xia, C., Liang, C., Lu, M., Zhang, X., Zhou, G., and Zou, C. A scalable electrochemical observable for battery degradation revealed by symmetric bipolar perturbations. *Joule* (2026). IF=37.1. **Under review.**

Role and contribution: Data curation (battery dataset preprocessing and organization); Software and Formal analysis (large-scale batch computation on a high-performance computing platform and result processing); Visualization (result plotting and figure preparation); Writing – original draft (contribution to the supplementary information).

[3] Tao, S., Xia, C., and Zou, C. Mapping informativeness of pulse excitation for scalable battery capacity diagnosis through diffusion-scaled electrochemical perturbations. *eTransportation*. IF=17.0, 2026. **Under review.**

Role and contribution: Data curation (battery dataset preprocessing and organization); Software and Formal analysis (large-scale batch computation on a high-performance computing platform and result processing); Visualization (manuscript figure preparation); Writing – original draft (contribution to the supplementary information).

[4] Liang, C., Tao, S., Xia, C., Huang, X., Hu, H., Wang, R., Dong, D., Lyu, Z., Zhou, G., and Mo, H. Inline quality grading of commercial lithium-ion battery manufacturing via data-efficient learning and transferable assessment. *Energy Environ. Sci.* (2026). IF=30.5. DOI: 10.1039/D6EE02209J.

Role and contribution: Data curation (integration, preprocessing, and organization of six heterogeneous battery datasets; construction of batch- and material-based datasets and early-cycle lifetime labels).

[5] Tian, H., Tao, S., Xia, C., Tang, Y., Lin, Z., Lu, M., Zhu, J., and Mo, H. Automated screening of large-scale retired batteries without manual labeling via a pretrained vision model beyond the battery domain. *Energy Environ. Sci.* (2026). IF=30.5. **Under review.**

Role and contribution: Data curation (standardized preprocessing of multi-source retired-battery datasets, including cycle

extraction, charge–discharge segmentation, SOC alignment, resampling, and normalization).

[6] Yang, Y., Luo, Z., **Xia, C.**, Wu, X., and Tao, S. Unlocking label-efficient battery health estimation via physics-feature-guided learning from electrochemical impedance spectroscopy. *Green Energy Intell. Transp.* (2026). IF=21.5. **Under review.**
Role and contribution: Data curation (preprocessing and organization of the EIS aging dataset across temperature, DOD, SOC, and SOH conditions); Visualization (preparation of selected manuscript figures).

[7] **Xia, C.** A foldable small-sized solar panel transforming solar panels from rigid fixtures to portable objects. *Proc. SPIE* **12979**, 129791T (2024). DOI: 10.1117/12.3015589.

Role and contribution: Conceptualization (foldable solar-panel design); Methodology (mechanical modeling); Formal analysis (dynamic and thermodynamic simulations); Writing – original draft.

[8] **Xia, C.**, Wang, T., and Xu, D. A technique for modeling and optimizing the design of wave energy conversion devices. *J. Phys.: Conf. Ser.* **2655**(1), 012023 (2023). DOI: 10.1088/1742-6596/2655/1/012023.

Role and contribution: Conceptualization (wave-energy conversion concept); Methodology (develop mathematical model); Writing – original draft; Manuscript submission.

PROJECTS

09/2025 – 02/2026 Microstructure reconstruction and RVE for structural battery composites Individual project
Supervised by Carl Larsson (Chalmers). Reconstructed a representative volume element (RVE) microstructure of carbon-fibre structural battery composites based on Ripley’s K/L-functions and two-point correlation functions, and developed a proof-of-concept diffusion-based generative model to explore microstructure generation under limited-data conditions.

09/2024 – 03/2025 Battery Electrochemical Modelling and BMS Design Individual project
Supervised by Pro. Yicun Huang (Uppsala) and Dr. Xiaolei Bian (Chalmers Next Labs AB). Focused on battery electrochemical modelling and control, including the formulation and application of the Single Particle Model (SPM), Kalman-filter-based state estimation, and model predictive control (MPC) for Battery Management System (BMS). Developed an SPM-based nonlinear battery model in MATLAB/Simulink and evaluated how different discretization schemes affected estimation accuracy, closed-loop stability, and control performance.

04/2022 - 04/2023 Network Attack and Defense Strategy Analysis by ATT&CK Knowledge Base Core Member
Built a website for automatic analysis of red and blue battles using established databases, leveraging Java to develop secure backend interfaces for seamless frontend integration.

INTERNSHIPS

05/2025-07/2025 Weyland Innovation Group Battery Management System Engineer
Optimized flying-car battery-management algorithms for enhanced pack safety and stability, developed a multi-sensor impact-localization solution to streamline maintenance, implemented real-time visualization of key metrics on the main control display. Conducting preliminary research and prototype testing model for an electricity-price forecasting system.

07/2022-09/2022 Jiangsu OCPT Institute Co., LTD. Programmer
Assisted in processing and analyzing vehicle control system data using Python, gained familiarity with structured diagnostic data, and enhanced Python and MySQL skills for large dataset reporting.

AWARDS

07/2023	Third Prize in the Campus Final of “Jiuzhou Cup” 2023 Logistics Technology (Crane) Competition
09/2022	Second Prize in National Mathematical Modeling Competition for College Students

SKILLS

Software	Python Matlab / Simulink C++ Julia Solidworks Ansys COMSOL
Languages	English (IELTS 6.5, Business Proficiency), Mandarin (Native), Swedish (Beginner)

REFERENCE

Dr. Shengyu Tao, Chalmers University of Technology, Master supervisor, shengyu.tao@chalmers.se
Prof. Dr. Weiqun Liu, Southwest Jiaotong University, Vice Dean of the School of Mechanical Engineering, Bachelor supervisor, weiqunliu@home.swjtu.edu.cn