Qiqi Hu

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Overview

I am currently a Master's student at Tsinghua University (expected graduation: Dec. 2026), with research interests in applying artificial intelligence and scientific machine learning to energy systems and sustainability, particularly battery thermal safety and low-carbon energy system modeling and optimization. With an interdisciplinary background in computer science and energy engineering, my research spans lithium-ion battery thermal management, physics-informed and generative models for multiphysics processes, and trustworthy AI, supported by prior training in information security and privacy-preserving computation.

Education

Tsinghua University (2023 - 2026)
Master of Environmental Science and New Energy Technology, advised by Hongda DU

Southern University of Science and Technology (2024 - 2025)
Visiting student, Department of Computer Science and Engineering

Qingdao University (2019 - 2023)
Bachelor of Information Security, School of Computer Science and Technology

Work Experience

Postgraduate Researcher Sep 2023 - present

- Guangdong Provincial Key Laboratory of Thermal Management Engineering and Materials, Tsinghua University
- Focus on: Thermal management and energy safety
- Supervisor: Professor Hongda DU

Researcher of Intern Mar 2024 - Dec 2024

- Visual Intelligence and Perception Lab, Southern University of Science and Technology
- Focus on: Trustworthy diffusion models and content security in AIGC
- Supervisor: Professor Feng ZHENG

Researcher of Intern Dec 2021 - Dec 2022

- Undergraduate Student Research Training program, Qingdao University
- Focus on: Secure outsourcing computation and privacy-preserving
- Supervisor: Professor Hanlin ZHANG

Projects

1. Metadata-Only Machine Learning for Predicting Thermal Runaway Severity of Lithium-Ion Batteries Demo

- Proposed a metadata-only machine learning framework to predict thermal runaway severity without relying on calorimetry or ejection experiments.
- Developed an interpretable Severity Index and a CatBoost-based classifier using battery design metadata, achieving 81% accuracy and 100% recall for high-severity cells.

- Applied SHAP-based interpretability and sensitivity analysis to identify key factors affecting thermal runaway severity and ensure engineering robustness.

2. PCM–Air Hybrid Battery Thermal Management System for UAV Applications *Submitted to Journal of Energy Storage*

- Designed a hybrid BTMS integrating phase change materials (PCM) and air cooling for lithium-ion batteries under high-power UAV operating conditions.
- Performed multiphysics numerical simulations and parametric studies, followed by entropy-weighted TOPSIS multi-objective optimization.
- Reduced the maximum battery temperature by 43.3% (below 46.8 °C) with only a 22.2 wt% increase in system mass.

3. Copyright Protection for Diffusion-Based Image-to-Image Generation Demo

- Proposed a dual-protection framework combining digital watermarking and latent-space adversarial perturbations for diffusion models.
- Achieved robust and transferable copyright protection without model fine-tuning, while maintaining high visual quality and reliable watermark extraction.

4. Privacy-Preserving Secure Shared Nearest Neighbor Clustering for IoT Article

- Developed a cloud-assisted, privacy-preserving SNN clustering scheme for resource-constrained IoT devices using orthogonal matrix transformation.
- Reduced local computation time from 10.859s to 1.183s while preserving clustering accuracy, validated on real-world datasets.

Honors

- **Typical Graduate (1st place)**, School of Computer Science and Technology, Qingdao University, (Recognized in the School's Annual Talent Development Report) (2023)
- **Qingdao University Star Award** — Highest university-wide honor (2023)
- Honorable Mention, International Mathematical Contest in Modeling (MCM) (2021)
- 1st Prize, Qingdao University Modeling Competition (2021)
- 2nd Prize, Asia-Pacific Mathematical Modeling Competition (2020)

Skills

Programming	Python, Matlab, Latex, C
Framework	PyTorch, Tensorflow (for deep learning), Sklearn (for machine learning)
Tools	Linux, VSCode, Anaconda, Office, COMSOL
Languages	Chinese (Native), English (fluent)