

Jiale Liu

✉ jialeliu.joey@gmail.com · 🌐 github.com/xyjoey · 🔗 linkedin.com/in/xyjoey

🏠 Address: No.2006 Xiyuan Avenue, West Hi-Tech Zone, Chengdu, Sichuan, China 611731

🎓 Education

Sep. 2021 Jun. 2025	University of Electronic Science and Technology of China (UESTC) , Chengdu, China <i>BEng in Communication Engineering (in Progress)</i> GPA: 3.96/4.00, Rank: 1/150 (Ratio: 0.67%) Scholarships: China National Scholarship (2023 & 2024), University First-class Scholarship (2022 - 2024)
Sep. 2021 Jun. 2025	University of Glasgow (Joint Program) , Glasgow, UK <i>BEng (Hons) in Electronics and Electrical Engineering (in Progress)</i> GPA: 20.11/22.00

☰ Competencies

Programming	Python, C/C++, MATLAB, LaTeX
ML Frameworks	PyTorch, Pandas, NumPy, SciPy
Embedded Systems	MicroPython, ARM Assembly, C/C++, RTOS
AI Research	Transformer, CNN, SNN, LLMs
Software Tools	Git, Docker, GNU/Linux
Language Proficiency	English (Fluent, 3 years of full-time education in English-speaking environment, with all courses and assignments delivered in English), IELTS: 8.0

📖 Publications

- **Jiale Liu**, Huan Wang*, “A Brain-Inspired Energy-Efficient Wide Spiking Residual Attention Framework for Intelligent Fault Diagnosis”, *Reliability Engineering & System Safety*, vol. 243, 2024, p. 109873. (**IF=8.1**)
- **Jiale Liu**, Huan Wang*, “Wafer Composite Defect Recognition Framework based on Residual Dynamic Perception Network with Asymmetric Multi-Label Loss”, **submitted to** *ISA Transactions* (**IF=7.3, Major Revision**)
- Xiaopeng Liu, **Jiale Liu**, Bingxiang Sun*, Weige Zhang, “Cooperative Fusion Framework based on Fourier and Transformer for Rotating Machinery Fault Diagnosis”, **submitted to** *IEEE Transactions on Systems, Man, and Cybernetics: Systems* (**IF=8.7**)
- Jiaxiang Hu, **Jiale Liu***, “QGFORMER: Quantum-Classical Hybrid Transformer Architecture for Gravitational Wave Detection”, 2023 20th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP), IEEE, 2023, pp. 1–5. (**Oral Presentation, 5% Papers**)
- Xiaopeng Liu, **Jiale Liu**, Bingxiang Sun*, Weige Zhang, “An Integrated Framework of Fourier Transform and Transformer for Rotating Machinery Fault Diagnosis,” 2024 IEEE International Conference on Prognostics and Health Management (ICPHM), Spokane, WA, USA, 2024, pp. 161-166

🔬 Selected Research Experiences

Mitigating Image Steganography Based Backdoor Attacks in Federated Learning Using Contrastive Adversarial Learning

Dec. 2023 - Present

Security | Machine Learning | Contrastive Learning

- Explored simulated methods to reduce backdoor attacks in federated learning.
- Utilized DCT (Discrete Cosine Transform) steganography to embed backdoor triggers in images.
- Employed contrastive learning to mitigate the effect of backdoor attacks.

Fault Diagnosis Framework for Rotating Machinery Based on Frequency Domain Analysis

Nov. 2023 - Jan. 2024

Fault Diagnosis | Fourier Transform | Machine Learning

- Applied Fourier transform to extract key features from vibration signals and mitigate noise interference.
- Implemented a hybrid CNN-Transformer approach to classify various types of faults.
- Achieved state-of-the-art performance in various noise environments, leading the best existing model by 5.3% in the high noise setting (-8 dB).
- Contributed to two papers as the co-first author, which has been published in the 2024 IEEE ICPHM and currently under review by IEEE TSMC (see publications).

Quantum Machine Learning for Gravitational Wave Detection

Sep. 2023 - Nov. 2023

Glitch Classification | Quantum Machine Learning

- Designed and constructed a hybrid quantum-classical transformer architecture for glitch classification.
- Implemented quantumbased designs which demonstrated the potential for computational efficiency and scalability.
- Outperformed traditional neural network structures including CNN, Transformer, and MAE.

- › Co-authored a paper as the co-first author, which has been selected for oral presentation in the 2023 ICCWAMTIP (see publications).

Spiking Neural Network (SNN) for Bearing Fault Diagnosis

Jan. 2023 - Dec. 2023

Fault Diagnosis | Spiking Neural Network | Machine Learning

- › Proposed an SNN-based framework for fault diagnosis in industrial settings.
- › Outperformed the existing SOTA model by 15% under high noise environment (-4dB).
- › Provided 64 times energy efficiency advantage compared to ANNs.
- › Enhanced the interpretability of SNN by visualizing the spiking patterns.
- › Published a paper as the first author in Reliability Engineering & System Safety (see publications).

Pedestrian Counting Based on Optical Flow Estimation

Nov. 2022 - Jul. 2023

Optical Flow | Transformer | Pedestrian Counting

- › Employed a transformer architecture for unsupervised optical flow estimation.
- › Used middle layer embeddings to generate density maps for pedestrian counting.

Wafer Defect Diagnosis Based on CNN and Asymmetric Loss

Nov. 2021 - Jul. 2022

Wafer Defect Diagnosis | CNN | Attention Mechanism | Asymmetric Loss

- › Developed a plug-and-play module to enhance accuracy in wafer defect recognition.
- › Implemented an asymmetric loss function to mitigate the negative effect of category imbalance.
- › Achieved a high classification accuracy of 99.13% on the MixedWM38 dataset.
- › Completed a paper as the first author, which is currently under second-round review (see publications).

Selected Other Projects

STM32 and OpenMV Smart Vehicle Development

Mar. 2024 - Jun. 2024

Embedded System | Machine Vision | Team Work

- › Developed a smart vehicle on the STM32G4 and OpenMV platform to execute predefined tasks as the team leader working closely with five other members
- › Designed and implemented vision algorithms for lane tracking, arrow recognition, pedestrian detection and collision avoidance.

2024 COMAP's Interdisciplinary Contest in Modeling

Jan. 2024 - Feb. 2024

Mathematical Modeling | Game Theory | Machine Learning

- › Developed a unified framework to assess and manage risks associated with extreme weather events impacting insurance claims.
- › Created models of various climatic factors using physical and geographical methods.
- › Integrated economic modeling and game theory to optimize underwriting decisions.
- › Employed deep learning and classification algorithms to evaluate the importance of landmarks.
- › **Achievement: Finalist** in the competition.

College Students' "Internet+" Innovation Entrepreneurship Competition

Apr. 2023 - Nov. 2023

Entrepreneurship | Battery Monitoring | Prediction | Domain Adaptation

- › Designed and developed a lithium battery thermal runaway monitoring system that incorporates multi-modal sensors and machine learning algorithms.
- › Innovated sensor design with novel materials and packaging technologies.
- › Implemented algorithms focusing on temporal prediction and cross-domain adaptation.
- › **Achievement: Bronze Medal** in the competition.

National College New Energy Vehicle Big Data Application Innovation Competition

Aug. 2022 - Dec. 2022

Battery Monitoring | Unsupervised Learning | AutoEncoder

- › Developed an algorithm to monitor lithium battery thermal runaway.
- › Utilized semi-supervised and unsupervised learning techniques, along with AutoEncoder architecture.
- › **Achievement: Second Prize** in the competition.

Teaching Assistant Experiences

Embedded Processors | Glasgow College Hainan, UESTC

Mar. 2024 - Jun. 2024

Introductory Programming | Glasgow College, UESTC

Sep. 2024 - Present

Digital Circuit Design | Glasgow College, UESTC

Sep. 2024 - Present

Machine Learning & AI | Glasgow College, UESTC

Sep. 2024 - Present

- › Undertook responsibilities including supervising lab sessions and tutoring students.
- › Developed a deeper understanding of related knowledge in embedded processors, and refined communication skills.