Yi Pan — Curriculum Vitae

CONTACT INFORMATION

School of Computing,
The University of Georgia
Athens, Georgia, U.S.

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SUMMARY

Second-year Ph.D. candidate in Computer Science at the University of Georgia focusing on **Quantum AI**, **Generative AI**, and **Multimodal Learning**. My research integrates **quantum–classical hybrid intelligence**, **foundation model adaptation**, and **cross-modal representation learning** to build scalable, interpretable, and energy-efficient generative systems. I have developed frameworks such as **AQCF**, **MolQAE**, and **QCHMAE** for quantum-enhanced representation learning, and **RadiologyGPT** and **ChatRadioValuer** for multimodal generative understanding. My long-term vision is to advance the foundation of **Quantum–Generative Intelligence**—bridging physics-inspired computation, foundation modeling, and scientific reasoning toward next-generation AI systems. I have co-authored over 30+ publications (IEEE TBME, TNNLS, QAI, EMNLP, ICLR, AAAI QIML) with more than 1500 citations.

RESEARCH INTERESTS

- **Core Areas:** Quantum Artificial Intelligence, Generative Foundation Models, Multimodal and Cross-Modal Learning, Brain-Inspired and Efficient AI Systems
- **Methods:** Quantum–Classical Hybrid Modeling (VQCs, QUBO-based optimization), Transformer and Multimodal Architecture Design, Representation Learning, and Large-scale Efficient Fine-Tuning
- **Objectives:** Building unified, interpretable, and energy-efficient **Quantum Generative AI** systems capable of learning across modalities and domains, and establishing theoretical–practical links between quantum optimization, generative modeling, and multimodal reasoning

EDUCATION

School of Computing, 2024 - Now
The University of Georgia, Athens
Georgia, U.S.
Ph.D.
Computer Science

Glasgow College, 2020 - 2024
University of Electronic Science and Technology of China
Chengdu, China
Bachelor of Engineering
Electronic Information Engineering
GPA: 3.87/4.00 **(TOP 10%)**

James Watt School of Engineering, 2020 - 2024
University of Glasgow
Glasgow, UK
*Bachelor of Engineering (**First Class Honours**)*
Electronics and Electrical Engineering
GPA: 3.87/4.00 **(TOP 10%)**

SELECTED PROJECT EXPERIENCES

• **AQCF: Adaptive Quantum–Classical Fusion Transformer for Next-Generation Language Models** Mar. 2025 – May 2025
Project Lead
School of Computing, The University of Georgia
My Role: Led the development of **AQCF**, a hybrid Transformer architecture integrating classical and quantum computation for adaptive, entropy-aware language modeling.

- Proposed an **entropy-driven adaptive circuit** to dynamically adjust quantum depth and gate configuration, mitigating barren plateaus.
- Designed **quantum memory banks** for unified quantum–classical attention and efficient information retrieval.
- Built a **fusion controller** enabling stable training and 35–40% quantum utilization under NISQ constraints.

Outcome: Introduced a scalable framework toward **Quantum-Enhanced LLMs**, accepted at *AAAI Quantum Intelligence in Machine Learning (QIML 2025)*.

• **QCHMAE: Quantum–Classical Hybrid Molecular Autoencoder for Sequence Reconstruction** May 2025 – Aug. 2025
Theoretical Contributor & Experimental Support
School of Computing, The University of Georgia
My Role: Supported the theoretical formulation and empirical validation of **QCHMAE**, extending MolQAE toward hybrid quantum–classical molecular decoding.
- Contributed **theoretical extensions** linking quantum compression in MolQAE to hybrid autoencoding architectures.
- Assisted in designing the **joint optimization objective** balancing quantum fidelity and sequence similarity.
- Helped execute experiments on QM9, verifying fidelity (84%) and reconstruction similarity (60%).

Outcome: Established a theoretical bridge between **quantum feature encoding and classical decoding**, accepted at *AAAI QIML 2025*.

• **MolQAE: Quantum Autoencoder for Molecular Representation Learning** Mar. 2025 – May 2025
Project Lead
School of Computing, University of Georgia
My Role: Developed **MolQAE**, the first quantum autoencoder to directly map SMILES strings into quantum states for molecular representation learning.
- Designed a **parameterized quantum encoder–decoder** using U_3 and CNOT gates for structural encoding.
- Achieved **high-fidelity compression** (up to 0.968) with hierarchical latent/ancilla qubit processing.
- Implemented a **hybrid quantum–classical training loop** for stable optimization on NISQ simulators.

Outcome: Demonstrated a practical framework for **quantum molecular representation learning**, accepted at *IEEE International Conference on Quantum Artificial Intelligence (QAI 2025)*.

• **ChatRadio-Valuer: Scalable Foundation Model Fine-Tuning for Domain-General Radiology Report Generation** Feb. 2023 – Aug. 2025
Data & System Engineering Lead
Collaborating Institutions: UESTC, NWPU, UGA, and multi-center hospitals
My Role: Led the design of a scalable **supervised fine-tuning (SFT)** and evaluation framework for adapting foundation models across diverse biomedical domains.
- Developed a **distributed fine-tuning pipeline** using PyTorch and DeepSpeed with parameter-efficient adaptation (LoRA/Adapters) under heterogeneous compute environments.
- Designed large-scale **benchmark and ablation experiments** for cross-domain generalization and scaling behavior analysis.

- Collaborated with clinicians to align optimization objectives with diagnostic reasoning and ensure model interpretability.

Outcome: Established a robust **foundation model adaptation framework** demonstrating superior domain generalization and reproducibility, published in *IEEE Transactions on Biomedical Engineering (TBME)*, 2025.

Honors AND AWARDS

- NSF Student Travel Award, AAAI FSS25 (QIML) *Nation-level*
- Outstanding Graduate **(Ratio: 10%)**, UESTC *University-level*
- **First Prize** Scholarship for Academic Excellence in Academic Year 2021-2022 **(Ratio: 8%)**, UESTC *University-level*
- Scholarship for English Proficiency in Academic Year 2021-2022 **(Ratio: 6.25%)**, Glasgow College, UESTC *College-level*
- **First Prize** Scholarship for Academic Excellence in Academic Year 2020-2021 **(Ratio: 8%)**, UESTC *University-level*
- Academic Scholarship in Academic Year 2020-2021 (Ratio: 5%, 30,000RMB), Glasgow College, UESTC *College-level*
- **Second Prize** in "NECCS" (National English Competition for College Students) in Academic Year 2020-2021 *Nation-level*
- **Second Prize** in "FLTRP (Foreign Language Teaching and Research Press)—National Talent Cup"—English Writing Contest, Sichuan Division (ranked 32^{nd} in Sichuan Province & the sole Second Prize from UESTC) *Province-level*
- **First Prize** in "FLTRP—National Talent Cup"—Preliminary Contest at School Level, National English Writing Contest (one of the two selected for participating in following contests as the representative of UESTC) *University-level*

SELECTED PUBLICATIONS

- **Pan, Y.**, Jiang, H., Chen, J., Li, Y., Zhao, H., Zhao, L., Abate, Y., Wang, Y. and Liu, T., Bridging Classical and Quantum Computing for Next-Generation Language Models.
  First AAAI Symposium on QIML. 2025

- Jahin, A., **Pan, Y.**, Wang, Y., Liu, T., and Zhang W., Quantum-Classical Hybrid Molecular Autoencoder for Advancing Classical Decoding.
  First AAAI Symposium on QIML. 2025

- **Pan, Y.**, Jiang, H., Ruan, W., Zhu, D., Li, X., Abate, Y., Wang, Y. and Liu, T., *MolQAE: Quantum Autoencoder for Molecular Representation Learning.*
  IEEE QAI. 2025

- Zhao, H., Li, J., **Pan, Y.**, Liang, S., Yang, X., Dou, F., Liu, T., and Lu, J., HELENE: Hessian Layer-wise Clipping and Gradient Annealing for Accelerating Fine-Tuning LLM with Zeroth-Order Optimization.
  EMNLP Main Conference. 2025

- Zhong, T., Zhao, W., Zhang, Y., **Pan, Y.**, Dong, P., Jiang, Z., Jiang, H., Zhou, Y., Kui, X., Shang, Y., et al., *ChatRadio-Valuer: A Chat Large Language Model for Generalizable Radiology Report Generation Based on Multi-institution and Multi-system Data.*
  IEEE TBME. 2025

- Liu, Z., Li, Y., Shu, P., Zhong, A., Jiang, H., **Pan, Y.**, Yang, L., Ju, C., Wu, Z., Ma, C., et al., *Radiology-GPT: a large language model for radiology.*
  Meta-Radiology. 2025

- Zhong, T., **Pan Y.**, Zhang, Y., Wei, Y., Yang, L., Wu, Z., Liu, Z., Wei, X., Li, W., Yao, J., Ma, C., Han, Y., Li, X., Zhu, D., Jiang, X., Shen, D., Han, J., and Zhang, T., *ChatABL: Abductive Learning via Natural Language Interaction with ChatGPT.*

IEEE TNNLS. 2025

• Ruan, W., Lyu, Y., Zhang, J., Cai, J., Shu, P., Ge, Y., Lu, Y., Gao, S., Wang, Y., Wang, P., Zhao, L., Wang, T., Liu, Y., Fang, L., Liu, Z., Liu, Z., Li, Y., Wu, Z., Chen, J., Jiang, H., **Pan, Y.**, Yang, Z., Chen, J., et al., *Large Language Models for Bioinformatics*.
Quantitative Biology. 2025

• **Pan, Y.**, Jiang, H., Chen, J., Li, Y., Zhao, H., Zhou, Y., Shu, P., Wu, Z., Liu, Z., Zhu, D., Li, X., Abate Y., and Liu T., *EG-SpikeFormer: Eye-Gaze Guided Transformer on Spiking Neural Networks for Medical Image Analysis*.
IEEE ISBI (Oral Presentation). 2025

• Li, Y., Kim, S., Wu, Z., Jiang, H., **Pan, Y.**, Jin, P., Song, S., Shi, Y., Liu, T., Li, Q. and Li, X., *ECHOPulse: ECG Controlled Echocardio-gram Video Generation*.
ICLR. 2025

• Zhong, T., Liu, Z., **Pan, Y.**, Zhang, Y., Zhou, Y., Liang, S., Wu, Z., Lyu, Y., Shu, P., Yu, X., et al., *Evaluation of OpenAI o1: Opportunities and Challenges of AGI*.
Arxiv. **Co-first Author** 2024

• Zhang, Y., **Pan, Y.**, Zhong, T., Dong, P., Xie, K., Liu, Y., Jiang, H., Liu, Z., Zhao, S., Zhang, T., Jiang, X., Shen D., Liu T., and Zhang X., *Potential of Multimodal Large Language Models for Data Mining of Medical Images and Free-text Reports*.
Meta-Radiology. **Co-first Author** 2024

• Chen, Y., Xiao, Z., **Pan, Y.**, Zhao, L., Dai, H., Wu, Z., Li, C., Zhang, T., Li, C., Zhu, D. and Liu, T., Mask-Guided Vision Transformer for Few-Shot Learning.
IEEE TNNLS. 2024

• Xiao, Z., Chen, Y. , Yao, J., Zhang, L., Liu, Z., Wu, Z., Yu, X., **Pan, Y.**, Zhao, L., Ma, C., Liu, X., Liu, W., Li, X., Yuan, Y., Shen, D., Zhu, D., Yao, D., Liu, T., and Jiang, X., Instruction-ViT: Multi-modal prompts for instruction learning in vision transformer.
Information Fusion. 2024

• Liu Y., He H., Han T., Zhang X., Liu M., Tian J., Zhang Y., Wang J., Gao X., Zhong T., **Pan Y.**, Xu S., Wu Z., Liu Z., Zhang X., Zhang S., Hu X., Zhang T., Qiang N., Liu T., and Ge B., Understanding LLMs: A Comprehensive Overview from Training to Inference.
Neurocomputing. 2024

• Wang, J., Liu, Z., Zhao, L., Wu, Z., Ma, C., Yu, S., Dai, H., Yang, Q., Liu, Y., Zhang, S., Shi, E., **Pan, Y.**, Zhang, T., Zhu, D., Li, X., Jiang, X., Ge, B., Yuan, Y., Shen, D., Liu, T., and Zhang, S., Review of large vision models and visual prompt engineering.
Meta-Radiology. 2023

• Zhao, H., Ling, Q., **Pan, Y.**, Zhong, T., Hu, J.Y., Yao, J., Xiao, F., Xiao, Z., Zhang, Y., Xu, S.H., Wu, S.N., Kang, M., Wu, Z., Liu, Z., Jiang, X., Liu, T., and Shao Y., Ophtha-LLaMA2: A Large Language Model for Ophthalmology.
Arxiv. **Co-first Author** 2023

• Wang, J., Shi, E., Yu, S., Wu, Z., Ma, C., Dai, H., Yang, Q., Kang, Y., Wu, J., Hu, H., Yue, C., Zhang, H., Liu, Y., **Pan, Y.**, Li, X., Ge, B., Zhu, D., Yuan, Y., Shen, D., Liu, T., Zhang, S., Prompt engineering for healthcare: Methodologies and applications.
Arxiv. 2023

ACADEMIC SERVICE

Professional Memberships:

- IEEE Student Member
- AAAI Student Member

Journal and Conference Reviewer:

- ***Journals***
  - IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
  - IEEE Transactions on Artificial Intelligence (TAI)
  - Frontiers in Oncology
  - European Journal of Radiology Artificial Intelligence
- ***Conference***
  - International Conference on Learning Representations (ICLR) 2026
  - International Conference on Machine Learning (ICML) 2025

SKILLS

Languages: Python, C/C++, MATLAB, Bash
DL/LLM Tooling: PyTorch, Transformers, DeepSpeed
Quantum Frameworks: CUDA-Q, Pennylane, Qiskit
Focus: Multimodal LLMs, instruction/prompt design, embedding learning, efficient inference, and quantum-classical model integration

INTERNSHIP

• Graduate Research Intern — Massachusetts General Hospital and Harvard Medical School
May 2025. - Aug. 2025 — Boston, U.S.

TEACHING EXPERIENCE

• Teaching Assistant — School of Computing, UGA
Aug. 2025. - Now — Athens, U.S.

• Teaching Assistant — Glasgow College, UESTC
Sep 2023. - Jun. 2024 — Chengdu, China

RELEVANT PROGRAMME

• Artificial Intelligence Internship Programme — *Business AI Lab NTU*
Distinction Grade

• Artificial Intelligence and Public Health — *UCLA*
Project-based Learning

• Introduction to Data Analytics — *IBM*
Coursera Online Certificate

• Introduction to Programming with MATLAB — *Vanderbilt University*
Coursera Online Certificate