Qingyuan Liu

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Education

Columbia University in the City of New York *Sep. 2023 – May 2025*
Master of Science in Computer Engineering New York, USA
◦ Overall GPA: 3.92/4.00 (Ranked Top 3/30 [])

Huazhong University of Science and Technology *Sep. 2019 – Jul. 2023*
Bachelor of Engineering in Computer Science and Technology Wuhan, China
◦ Overall GPA: 3.75/4.00, Last 2 Years GPA: 3.90/4.00

Research Interests

- **Interpretability**: Knowledge Mechanisms and Editing, Controllable Generation, Causal Inference.
- **Trustworthy AI**: Data synthesis with LLMs, Hallucination Mitigation, Adversarial ML.
- **AI for Science**: Medical Vision Foundation Models, Physics-informed Diffusion Model.

Publications

*Equal Contribution, C=Conference, S=In Submission

[S.1] **Qingyuan Liu***, Jiachen Gu*, Yunzhi Yao, Hong Wang, and Nanyun Peng. **Energy-Regularized Sequential Model Editing on Hyperspheres**. In submission to *The Fourteenth International Conference on Learning Representations* **(ICLR)**. 2026.

[S.2] **Qingyuan Liu**, Yun-Yun Tsai, Ruijian Zha, Pengyuan Shi, Victoria Li, Chengzhi Mao and Junfeng Yang. **LAVID: An Agentic LVLM Framework for Diffusion-Generated Video Detection**. arXiv Preprint. 2025. (ICCV 2025 score: 442)

[C.1] Baohua Yan, **Qingyuan Liu**, Zhaobin Mo, Kangrui Ruan, Xuan Di. **Balanced Latent Space of Diffusion Models for Counterfactual Generation**. In *The Thirteenth International Conference on Learning Representations Deep Generative Model in Machine Learning: Theory, Principle and Efficacy Workshop* **(ICLR DeLTa)**. 2025.

[C.2] **Qingyuan Liu**, Pengyuan Shi, Yun-Yun Tsai, Chengzhi Mao, and Junfeng Yang. **Turns Out I'm Not Real: Towards Robust Detection of AI-Generated Videos**. In *IEEE / CVF Computer Vision and Pattern Recognition Conference 2024,* **(CVPR GenAI)**. ***Columbia Engineering Research Highlight***

[C.3] Zhaobin Mo*, **Qingyuan Liu***, Baohua Yan, Longxiang Zhang, and Xuan Di. **Causal Adjacency Learning for Spatiotemporal Prediction Over Graphs**. In *Proceeding of 27th IEEE International Conference on Intelligent Transportation Systems* **(ITSC)**. 2024.

[C.4] **Qingyuan Liu**, Yuxuan Zhou, and Shuai Bao. **Accurate Face Swap using CycleGAN**. In *International Conference on Cloud Computing, Internet of Things, and Computer Applications* **(CICA)**. 2022.

Research Experience

[] PLUSLAB, University of California, Los Angeles *Jan. 2025 – Present*
Research Assistant advised by Prof. Nanyun (Violet) Peng Los Angeles, USA
◦ ***Pr. 1: Energy-Regularized Sequential Model Editing on Hyperspheres (Lead Researcher)***: Developed SPHERE (Sparse Projection for Hyperspherical Energy-Regularized Editing), projecting new knowledge onto sparse subspaces of edited weight to preserve hyperspherical uniformity with rigorous proof linking hyperspherical uniformity to editing stability; achieved +16.4% average editing capability over baselines while most faithfully preserving general performance on LLaMA3 (8B) and Qwen2.5 (7B). **First-Author Paper submitted to ICLR 2026.**

[] VLAA LAB, University of California, Santa Cruz *May 2025 – Present*
Research Assistant advised by Prof. Yuyin Zhou Santa Cruz, USA
◦ ***Pr. 1: Unified Vision-Language Foundation Model for Brain MRI Interpretation (Lead Researcher)***: Developed large-scale vision foundation models for 3D brain imaging (i.e., T1, MPRAGE, DWI), trained on 20+ public datasets with 60,000 scans; designed a multi-stage paradigm with self-supervised pretraining, vision-language alignment, and instruction tuning, equiping the model with transferable visual representations, cross-modal reasoning, and robust instruction-following capabilities.

[] DitecT Lab, Columbia University *Sep. 2023 – Present*
Research Assistant advised by Prof. Xuan (Sharon) Di New York, USA
◦ ***Pr. 1: Causal Adjacency Learning for Spatiotemporal Prediction Over Graphs (Lead Researcher)***: Designed the Causal Adjacency Learning (CAL) framework, enhancing prediction performance on the ODD dataset; applied a heuristic method combining correlation calculation and conditional independence testing; achieved +26.7% average RMSE improvement on SafeGraph dataset over baselines based on distance, correlation, and attention matrix. **First-Author Paper accepted by ITSC 2024.**

◦ ***Pr. 2: Balanced Latent Space of Diffusion Models for Counterfactual Generation (Core Researcher)***: Proposed a controllable diffusion generation framework that balances latent space via guiding signals, enabling generation of counterfactual data while preserving factual consistency. Experiments on MNIST demonstrate its potential for counterfactual data generation. **Second-Author Paper accepted by ICLR DeLTa 2025.**

[🌐] Software Systems Laboratory, Columbia University *Sep. 2023 – May 2025*
Research Assistant advised by Prof. Junfeng Yang New York, USA

◦ ***Pr. 1: Turns Out I'm Not Real: Towards Robust Detection of AI-Generated Videos (Lead Researcher)***: Developed Diffusion Reconstruction Error (DIRE) based method for detecting AI-generated videos by leveraging video generation models as reconstruction modules and incorporating temporal information; achieving up to 93.7% accuracy on datasets including Stable Video Diffusion, Sora, Pika, and Gen-2. **First-Author Paper accepted by CVPR GenAI 2024; featured as Columbia Engineering Research Highlight**.

◦ ***Pr. 2: LAVID: An Agentic LVLM Framework for Diffusion-Generated Video Detection (Lead Researcher)***: Designed LAVID, an agentic framework leveraging LVLMs with external tool calls (i.e., Optical flow, Sharpen, SAM) for AI-generated video detection, improving F1 score by 6.2%-30.2% across four state-of-the-art LVLMs, including GPT-4o, Gemini-1.5-Pro, Qwen-VL and LLaVA. **First-Author paper with ICCV 2025 score: 442.**

[🌐] Department of Computer Science, Illinois Institute of Technology *May 2021 – Mar. 2022*
Research Assistant advised by Prof. Binghui (Alan) Wang Remote

◦ ***Pr. 1: Robust Node Injection Attack in Graph Neural Networks (Lead Researcher)***: Designed a node-injection attack with low inter-perturbation correlation using DeepWalk to filter correlated injected nodes, improving robustness while retaining comparable effectiveness against common defenses.

[🌐] School of Computing, National University of Singapore *Apr. 2021 – Oct. 2021*
Research Assistant advised by Prof. Anand Bhojan Singapore

◦ ***Pr. 1: NUS School of Computing Summer Workshop 2021 (Lead Researcher)***: Developed a multi-factor spatio-temporal GNN to predict stock market trends using Tushare and Yahoo data, and implemented web crawlers for sentiment and corporate relation data collection, enabling more accurate and explainable market forecasts.

Interesting Projects on Hardware

Bubble Bobble Game on Embedded Systems *Jan. 2024 – May 2024*
Tools: Verilog, DE1-SoC, Quartus Prime, ARM DS-5 Debugger, libusb, WM8731 Audio CODEC [🐙]

◦ Implemented a Bubble Bobble game on DE1-SoC using ARM for game logic and FPGA for video/audio; integrated VGA, USB controller, and audio codec. **Ranked 1st in CSEE4840 Embedded Systems at Columbia.**

5G Network Slicing System and Strategy for End Users *Apr. 2024 – Sep. 2024*
Tools: Android Studio, VMware, ICMP, Linux Traffic Control (tc)

◦ Developed a 5G network slicing framework with optimized strategy; validated on 12 Android devices, achieving +69.4% throughput and +82.2% document transfer efficiency. **National Second Prize (Top 3% of 1006 teams worldwide)** in China Collegiate Computing Contest.

Microprocessor without Interlocked Pipeline Stages (MIPS) CPU Design *Sep. 2021 – Nov. 2021*
Tools: Logisim, Verilog, MIPS Assembly

◦ Designed a MIPS-based CPU from scratch on Logisim, integrating pipeline stalling and branch history table for hazard resolution.

Honors and Awards

Columbia Engineering Research Highlight *2024*
Columbia University [🌐]

2024 Spring MS Honors Students (Top 3) *2024*
Columbia University [🌐]

Advanced Master Research Student *2024*
Columbia University

National Second Prize (Top 3%) in the China Collegiate Computing Contest-Network Technology Challenge (C4) *2023*
Computer Education Research Association of Chinese Universities

Additional Information

Languages: Chinese (Native), English (Proficiency)
Programming Languages: C/C++, Python, Java, SQL, Matlab, HTML/CSS
Packages: Pytorch, Huggingface, Tensorflow/Keras, WandB, Diffusers, OpenCV, Sklearn, Matplotlib, Seaborn