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

Huazhong University of Science and Technology (U.S. News Global #91; Project 985)   *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]   Baohua Yan, **Qingyuan Liu**, Jennifer Kava, and Xuan Di. **InSPECT: Invariant Spectral Features Preservation of Diffusion Models**. In submission to *IEEE / CVF Computer Vision and Pattern Recognition Conference 2026* **(CVPR)**. 2026.

[S.2]   Yun-Yun Tsai, Ruijian Zha, **Qingyuan Liu**, Victoria Li, Yan To Preston Liang, Chengzhi Mao, Junfeng Yang. **REVEAL: Test-Time Knowledge Reasoning for Explainable AI-Generated Video Detection**. In submission to *IEEE / CVF Computer Vision and Pattern Recognition Conference 2026* **(CVPR)**. 2026.

[S.3]   **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. *Score (Nov. 23): 8884; Top 2/551 submissions (Transfer/Meta Learning track)*

[S.4]   **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, GenAI Workshop* **(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

[] NLPLAB, University of California, Los Angeles   *Jan. 2025 – Present*
Research Assistant working with 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 hyperspherical subspaces to preserve uniformity and editing stability with rigorous proof, achieving +16.4% higher editing capability while best 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 working with 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 800+ public datasets with 170,000 scans (billions slices); 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 – May 2025*
Research Assistant working with 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.**

- *Pr. 3: Spectral Feature Preservation in Diffusion Models via Fourier Transform (Contributor)*: Proposed a Fourier-domain diffusion framework that explicitly models frequency consistency across classes and diffusion timesteps to mitigate information loss in standard DDPMs. Implemented frequency-aware denoising and adaptive spectral regularization to stabilize the generative process and improve cross-domain generalization. **Second-Author Paper submission to CVPR 2026**

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

- *Pr. 1: Turns Out I'm Not Real: Towards Robust Detection of AI-Generated Videos (Lead Researcher)*: Developed a Diffusion Reconstruction Error (DIRE) method for AI-generated video detection, leveraging video generation models with temporal cues to achieve up to 93.7% accuracy on Stable Video Diffusion, Sora, Pika, and Gen-2 datasets. **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 LVLM-based framework integrating external tools (e.g. SAM) for AI-generated video detection, boosting F1 scores by 6.2%–30.2% across GPT-4o, Gemini-1.5-Pro, Qwen-VL, and LLaVA. **First-Author Preprint with ICCV 2025 score: 442.**

- *Pr. 3: Test-Time Reasoning for Explainable AI-Video Detection (Contributor)*: Developed REVEAL, a self-evolving VLM framework for AI-generated video detection that dynamically composes external tools to mimic human System-2 reasoning, improving F1 scores by 9.1%–30.2% across SOTA LVLMs.**Third-Author Paper submission to CVPR 2026**

[🌐] Department of Computer Science, Illinois Institute of Technology   *May 2021 – Mar. 2022*
Research Assistant worked with 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