

# Qingyuan Liu

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## EDUCATION

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### Columbia University in the City of New York

Master of Science in Computer Engineering

Sep. 2023 – May 2025

New York, USA

◦ Overall GPA: 3.92/4.00 (Ranked Top 3/30 [🌐])

### Huazhong University of Science and Technology (Ranked #91 Globally, U.S. News 2025)

Bachelor of Engineering in Computer Science and Technology

Sep. 2019 – Jul. 2023

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. **Spectral Feature Preservation in Diffusion Models via Fourier Transform**. 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. **Test-Time Reasoning for Explainable AI-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. 11): 8864; Top 10/551 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

### 🌐 PLUSLAB, University of California, Los Angeles

Research Assistant working with Prof. **Nanyun (Violet) Peng**

Jan. 2025 – Present

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

Research Assistant working with Prof. **Yuyin Zhou**

May 2025 – Present

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, equipping the model with transferable visual representations, cross-modal reasoning, and robust instruction-following capabilities.

### 🌐 DitecT Lab, Columbia University

Research Assistant working with Prof. **Xuan (Sharon) Di**

Sep. 2023 – Present

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 paper 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