

GENPEI ZHANG

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Chengdu, Sichuan - 610000, China

EDUCATION

• University of Electronic Science and Technology of China

Sep. 2021 - Jun. 2025

B.E. in Electronic Information Engineering

Chengdu, China

◦ GPA: 3.66/4.00

WORK IN PROGRESS

- [1] Runmin Jiang*, Genpei Zhang*, et al. (2025). **CryoCCD: Conditional Cycle-consistent Diffusion with Biophysical Modeling for Cryo-EM Synthesis**. (Under review of NeurIPS 2025 Datasets Benchmarks Track, * denotes equal contribution)
- [2] Runmin Jiang, Wanyue Feng, Yuntian Yang, Shriya Pingulkar, Hong Wang, Xi Xiao, Xiaoyu Cao, Genpei Zhang, et al. (2025). **Synthesis-driven Equivariant and Noise-Robust Representation Learning for Cryo-ET Subtomograms**. (Under review of NeurIPS 2025 Main Track)

PUBLICATIONS

- [1] Dazhou Yu, Genpei Zhang, Liang Zhao. (2025). **PolyhedronNet: Representation Learning for Polyhedra with Surface-attributed Graph**. In *Proceedings of the International Conference on Learning Representations (ICLR 2025)*, Poster. 2025.
- [2] Yijiang Li, Genpei Zhang, et al. (2025). **EgoPrivacy: What Your First-Person Camera Says About You?** In *Proceedings of the International Conference on Machine Learning (ICML 2025)*, Poster. 2025.

RESEARCH ASSISTANTSHIP

• Cryo-EM Data Synthesis with Cycle-consistent Diffusion

Carnegie Mellon University, Pittsburgh, PA

Prof. Min Xu | Xu Lab | Computational Biology Department

Mar. 2025 - Present

- Built CryoCCD, a physics-guided, conditional cycle-consistent diffusion pipeline that generates cryo-EM micrographs with realistic biophysical variability and spatially adaptive noise;
- Integrated biophysical simulation and mask-aware contrastive learning to preserve structural fidelity across synthetic/real domains;
- Achieved superior FID and downstream gains in particle picking and pose estimation; open-sourced a flexible toolkit to accelerate cryo-EM algorithm development.

• Egocentric Vision and Privacy Attack Research

University of California San Diego, Remote

Prof. Nuno Vasconcelos | SVCL | Electrical and Computer Engineering Department

Nov. 2024 - Present

- Co-developed EgoPrivacy, a 819-wearer, 131-scene benchmark that quantifies demographic, individual, and situational privacy risks in first-person video;
- Invented the Retrieval-Augmented Attack (RAA) pipeline that links egocentric clips to third-person footage, sharply boosting attribute inference and exposing identity and location privacy;
- Led large-scale evaluations showing off-the-shelf vision-language models breach wearer privacy, highlighting the urgency of privacy-preserving camera solutions.

• Graph Learning and 3D Shape Representation Learning

Emory University, Remote

Prof. Liang Zhao | Department of Computer Science

May. 2024 - Oct. 2024

- Studied graph learning techniques and 3D shape representation learning methodologies, gaining a comprehensive understanding of the core principles and applications;
- Conducted research on 3D shape representation learning, including data processing, experimental design, and result analysis to enhance the understanding and performance of models in this domain;
- Proposed PolyhedronNet, a novel representation-learning framework that converts any 3-D polyhedron into a surface-attributed graph (SAG), then leverages a rigid, rotation-/translation-invariant local encoding and a hierarchical graph neural network to capture both geometric structure and face semantics.

• Deep Passport Ensemble for Multi-Model IP Protection (Undergraduate Thesis)

UESTC, Chengdu, China

Prof. Le Zhang | School of Communication and Information Engineering

Nov. 2024 - Jun. 2025

- Devised Co-Passport Ensemble (CPE), the first system-level passport scheme that shards a master passport across all sub-models;

- Integrated trapdoor normalization, distributed validators, and dynamic regularization.

- **Self-reward Optimization for Diffusion Model**

University of North Carolina at Chapel Hill, Remote

Prof. Huaxiu Yao | School of Communication and Information Engineering

Jun. 2024 - Nov. 2024

- Utilized and improved Direct Preference Optimization methods to fine-tune diffusion models for improved performance;
- Key Contributions in data processing, method design, experiment design, coding, result analysis and method improvement to enhance model performance;
- A version1 model has been developed, which proves the effectiveness of our method and improves the accuracy of generated images.

- **Tongue Body Segmentation Based on Swin Transformer and U-Net**

UESTC, Chengdu, China

Prof. Qian He | School of Communication and Information Engineering

Jun. 2023 - Mar. 2024

- Conducted research on the state-of-the-art computer vision techniques for Segmentation and classified all literature reviewed;
- Transformer-based methods have been applied to the field of tongue segmentation, and various classic transformer-based models have been tested for their accuracy in tongue segmentation;
- Multi-scale feature fusion was integrated into the transformer model, and the U-shaped encoder-decoder structure was utilized effectively to improve the accuracy of tongue segmentation, demonstrating the model's versatility in experiments.

- **Lightweight Model Pre-training and Self-supervised Learning Frameworks**

UESTC, Chengdu, China

Prof. Jingkuan Song | School of Computer Science and Engineering

Mar. 2023 - Jun. 2023

- Self-supervised learning frameworks, such as DINO, CLIP, and MAE, have been studied, with an understanding gained of the core principles of Contrastive Learning and Masked Image Modelling;
- Research has been conducted on upstream pre-training methods for lightweight self-supervised learning frameworks, and a framework is being developed that can effectively handle various types of downstream tasks related to the human body.

- **Machine Learning-based 3D Reconstruction for Bacteria Microscopy**

UESTC, Chengdu, China

Prof. Kun Zhao | Institute of Fundamental and Frontier Sciences

Dec. 2023 - Mar. 2024

- Performed literature review of the 3D reconstruction techniques commonly used for spatial information understanding;
- Utilized CNN-Model to restructure the spatial information from multiple images of cyanobacteria and get the pose of cyanobacteria.

INTERNSHIP

- **Harvard University**

Remote

Prof. Pavlos Protopapas | Institute for Applied Computational Science

Aug. 2023 - Nov. 2024

- Curated and pre-processed the 20k-image Stanford Dogs dataset, then applied targeted augmentations to curb over-fitting and diversify training data;
- Fine-tuned ResNet-50/101 backbones, beating DenseNet121, VGG-16, and AlexNet on the same protocol.

- **National University of Singapore**

Singapore

Prof. LEK Hsiang Hui | Department of Information Systems and Analytics

Jul. 2023 - Aug. 2023

- Investigated the recommend system methodologies and built a recommendation algorithm for the NBA player recommendation;
- Employed Python to complete a graphical user interface embedded with the recommend system feature for the enhanced user experience.

SKILLS

- **Research Interests:** Generative AI, AI4Sci, MLLMs, Graph Learning, LLM Agents
- **Programming Languages:** Python, C, Matlab, Latex
- **Other Tools & Technologies:** ChimeraX, COMSOL, Notion, GitHub