Mellon M. Zhang

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Education

Georgia Institute of Technology — Atlanta, GA
PhD in Machine Learning — *Aug 2023 - Expected May 2028*

- **Advisor:** Prof. Glen Chou
- **Coursework:** Advanced Programming Techniques, Mathematical Foundations of Machine Learning, Statistical Machine Learning, Probabilistic Graphical Models, Deep Learning, Conversational AI

University of California, Berkeley — Berkeley, CA
B.A. in Computer Science — *Aug 2019 – May 2023*

- **Coursework:** Linear Algebra & Differential Equations, Data Science, Database Systems, Algorithms, Data Structures, Robotics, Optimization, Artificial Intelligence, Computer Architecture, Discrete Mathematics, CS Theory, Operating Systems, Deep Learning, Machine Learning

Refereed Workshop Papers

- M. M. Zhang and G. Chou. **Polar Hierarchical Mamba: Towards Streaming LiDAR Object Detection with Point Clouds as Egocentric Sequences**, *Workshop on 4D Vision: Modeling the Dynamic World @ CVPR 2025*

Preprints

- M. M. Zhang, G. Chou, and S. Mukhopadhyay. **Polar Hierarchical Mamba: Streaming LiDAR Object Detection with Point Clouds as Egocentric Sequences**. *Under Review at NeurIPS 2025.* [arXiv]
- M. M. Zhang, H. Kumawat, and S. Mukhopadhyay. **DFDNet: Directional Feature Diffusion for Efficient Fully-Sparse LiDAR Object Detection**. *Under Review at ICCV 2025.* [Paper]

Research Experience

Georgia Institute of Technology — Atlanta, GA
Graduate Research Assistant - Advisor: Prof. Glen Chou — *Aug 2023 – Current*

- **Visual reasoning of vision-language-action models**
- **Uncertainty-aware temporal LiDAR perception**
- **Streaming LiDAR Object Detection**
  - **Keywords:** Pytorch, Mamba, DDP, LiDAR, HPC
  - Developed a novel streaming neural network for real-time processing of LiDAR sectors, achieving 10% improvement over existing SOTA and 2x throughput
  - Implemented in Pytorch and trained on HPC SLURM cluster using Distributed Data Parallel (DDP)
  - Under preparation for NeurIPS 2025, accepted to 4DV @ CVPR 2025
- **Efficient Fully-Sparse LiDAR Object Detection**
  - **Keywords:** Pytorch, convnets, DDP, self-driving, SLURM, HPC
  - Proposed a novel neural network for efficient point cloud object detection achieving SOTA performance with 2x reduction in computational cost (floating point operations)
  - Designed and implemented in Pytorch, trained on HPC cluster using SLURM and Distributed Data Parallel (DDP)
  - First-author manuscript under review at TMLR

Knight Lab — Berkeley, CA
Undergraduate Research Assistant - Advisor: Prof. Robert T. Knight — *Aug 2021 – Aug 2022*

- **Explaining Large Language Models from Neuroscience Perspective**
- **Keywords:** Prompt engineering, fine-tuning, dataset creation, explainable AI

- Designed a novel dataset from neuroscience logic puzzles and finetuned T5 model.
- Awarded UC Berkeley Rose Hills Fellowship for independent research.

Gigascale Reliable Energy-Efficient Nanosystem (GREEN) Lab Atlanta, GA

Gatech SURE Research Intern - Advisor: Prof. Saibal Mukhopadhyay *May 2021 – Aug 2021*

- **Associative Memories for Robust Image Classification**
- **Keywords:** hopfield networks, Tensorflow, image classification, network design
- Novel multilayer perceptron model with an associative memory layer for image retrieval and denoising, outperforms convnets on MNIST dataset with 10x reduction in training samples.
- 2nd place of 50 in Georgia Tech SURE Symposium

Personal Projects

- **spkan - Sparse Convolutions with Kolmogorov-Arnold Networks:** Custom C++/CUDA kernels with Pybind11 for fast sparse convolutions with trainable activation functions inspired by the Kolmogorov-Arnold representation theorem. First sparse Kanvolution PyPI package and features 7x speedup from previous Kanvolution implementation.
- **Turtlecups - Maze-solving Mobile Robot:** Mobile robot designed to traverse mazes constructed from SOLO cups. End-to-end with perception (Canny edge detection), planning (RRT*), control (PID), and intercommunication (ROS).

Honors and Awards

- **Berkeley Rose Hills Fellowship (One of 45 recipients selected university-wide)** 2022
- **Georgia Tech SURE Fellowship (One of 50 recipients selected nationally)** 2021

Professional Activities

- **Program Committee:** CoRL ('25)
- **Informal Reviewer:** CVPR ('25), ICCV ('25), NeurIPS ('25)
- **Project ENGAGES** 2025 - 2026
  - One-on-one research mentorship with high school student from Atlanta area.
  - Best presentation runner-up at Project ENGAGES summer finale.

Invited Talks

- **Project ENGAGES Mentor Lecture Series.** Securing Modern Robotics. June 2025

Presentations

- **CVPR Workshop on 4D Vision, 2025.** Polar Hierarchical Mamba: Towards Streaming LiDAR Object Detection with Point Clouds as Egocentric Sequences. *Poster presentation.* June 2025
- **Gatech SURE Symposium.** Integrating Unsupervised and Supervised Techniques for Robust Image Classification. *Oral presentation*, **Best presentation runner-up (#2/50)**. July 2021

Skills

Programming: Python (PyTorch, Tensorflow, Scikit-learn etc.), C++, CUDA, LaTeX, Java, Javascript, C, RISC-V

Development: Linux, bash, Git, SLURM, HPC

Hobbies: Volleyball, tennis, hiking, piano