Ziyong Ma

ziyongm@andrew.cmu.edu | (412) 286-8490 | https://ziyongma.github.io/ | linkedin.com/in/ziyong-ma-720yong/

EDUCATION

Carnegie Mellon University, Pittsburgh, PA May 2026
Bachelor of Science in Mathematics and Computer Science

- **GPA:** 3.66/4.0, **Honor:** Dean's List (Spring 2023, Fall 2023, Spring 2024, Fall 2024, Spring 2025)
- **Coursework:** Machine Learning, Algorithm Design, Computer Systems, Software Engineering, Theoretical Computer Science, Probability, Algebra, Operations Research
- **Academic Services: Tutor,** Introduction to Machine Learning (Spring 2023)
  Reviewer, IEEE International Conference on Robotics and Automation (ICRA)

PUBLICATIONS

Published & Preprint

- **Ziyong Ma,** Richard D Boyce, Adam Perer, Venkatesh Sivaraman,. "*TempoQL: A Readable, Precise, and Portable Query System for Electronic Health Record Data*" In *Proceedings of the Machine Learning for Healthcare (ML4H 2025)*
- Weiming Zhi**, Ziyong Ma,** Tianyi Zhang, Matthew Johnson-Roberson. "*From Single Images to Motion Policies via Video-Generation Environment Representations*" In *Proceedings of the 39th Conference on Neural Information Processing Systems (NeurIPS 2025).*
- Sagar Bharadwaj, **Ziyong Ma**, Ivan Liang, Michael Farb, Anthony Rowe, Srinivasan Seshan. "*OpenFLAME: A Federated Spatial Naming Infrastructure*" *arXiv:2411.04271v2*, 2025.
- Venkatesh Sivaraman, Anika Vaishampayan, Xiaotong Li, Brian R Buck, **Ziyong Ma**, Boyce, Richard D Boyce, Adam Pere. "*Tempo: Helping Data Scientists and Domain Experts Collaboratively Specify Predictive Modeling Tasks*" In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems(CHI 2025)*.
- Chasz Griego, Cheng Zhang, Wenchao Hu, **Ziyong Ma**, Andy Ouyang. "*Introducing Students to Research and Reproducibility with Open Science Tools*". In *Proceedings of the 2024 ASEE Annual Conference & Exposition*

Under Review

- Hongzhe Cheng*, Tianyou Zhang*, **Ziyong Ma***, Tianyi Zhang, Matthew Johnson-Roberson, Weiming Zhi. "*DOSE3: Diffusion-based Unified Out-Of-Distribution Detection on SE(3) Trajectories*" Under review at *IEEE Robotics and Automation Letter (RA-L)*. (*Equal Contribution)

EXPERIENCES

WiSE Lab at CMU Computer Science Department Jun 2024 - Present
Research Assistant, Supervisor: Prof. Srinivasan Seshan, Prof. Anthony Rowe
Building Large-Scale Federated Localization and Mapping System: *OpenFLAME*, a system that organizes the world into smaller maps hosted on map servers maintained by disparate parties through the following projects:

- Built the Interactive 3D Map platform, where users can discover both outdoor and indoor maps hosted on different map servers and display 3D tiles using CesiumJS(a JavaScript library for creating 3D maps) and Google 3D Tiles
- Built the 3D Tile Service that delivers 3D tiles for use with the interactive map application using Docker and Django
- Implemented search engine on the interactive 3D map platform, enabling scalable indoor object search through multimodal large language model (3D MLLM)

RoBot Intelligence Group at CMU Robotics Institute
Research Assistant, Supervisor: Prof. Jean Oh Jun 2025 – Present
Working on building world models for soft robots:

- Collected a multiview dataset of soft fingers in more than 2,000 deformation states
- Reconstructed time-series 3D representations of soft fingers using VGGT and trained a neural network model to predict the 3D geometry from servo commands

DROP Lab at CMU Robotics Institute
Research Assistant, Supervisor: Prof. Matthew Johnson-Roberson, Dr. Weiming Zhi Jan 2025 – Sep 2025
Proposed a framework **Video-Generation Environment Representation(VGER):**

- Integrated the pretrained video generation models with 3D foundation models to produce multi-view videos and dense 3D reconstruction from a single RGB image
- Introduced a multi-scale noise approach to train an implicit representation of the environment structure and build a motion generation model that complies with the geometry of the representation
- Published second-author paper at ***NeurIPS 2025*** "*From Single Images to Motion Policies via Video-Generation Environment Representations*"

Other projects:

- Implemented the diffusion-based Out-of-Distribution detection on the robot arm trajectories, the paper "*DOSE3: Diffusion-based Unified Out-Of-Distribution Detection on SE(3) Trajectories*" is submitted to RA-L under review
- Trained and implemented the diffusion-based policy for continuous robot arm control
- Designed and implemented a vision-based teleoperation system integrating 3D hand pose estimation with robot kinematics, achieving substantial gains in data collection efficiency

Data Interaction Group at CMU Human-Computer Interaction Institute

Research Assistant, Supervisor: Prof. Adam Perer Jun 2024 – Sep 2025

Worked on building Machine Learning system for healthcare:

Co-authored paper *"Tempo: Helping Data Scientists and Domain Experts Collaboratively Specify Predictive Modeling Tasks,"* published at CHI 2025:

- Implemented models section of an interactive systems to design and build predictive models including Dense Layer, LSTM and transformer
- Integrated SHAP-based interpretability and Ray Tune for automated hyperparameter optimization during model training

First-authored paper, *"TempoQL: A Readable, Precise, and Portable Query System for Electronic Health Record Data,"* published at ML4H 2025:

- Designed and Built TempoQL, a Python-based toolkit that provides a simple, human-readable language for temporal queries; support for multiple EHR data standards, including OMOP, MEDS, and others; and an interactive notebook-based query interface with large language model (LLM) authoring assistance

Tartan Ambassador, CMU Data Analytics Science Immersion Experience Program June 2023

- Collaborated with professors to organize classes in teaching machine learning, data structures, databases, and modern uses of Artificial Intelligence
- Guided 20+ students through the implementation of Artificial Intelligence to help underprivileged countries remotely access laboratory equipment through Cloud Computing

Intern, Soterea Automotive Technology Co., Ltd., Tianjin, China July 2022

- Contributed to a deep learning-based driver assistance project developing an in-vehicle danger-detection system to help prevent accidents
- Collected and processed real-world driving data, tested and trained the model of the system in python

PROJECTS

Distributed Bitcoin Miner Sep 2025 – Oct 2025

- Implemented the Live Sequence Protocol (LSP) in Go to provide reliable and fault-tolerant communication over UDP
- Built a distributed Bitcoin mining system on top of LSP, coordinating clients, miners, and a central server for job scheduling, fault recovery, and load balancing
- Designed a fair and efficient task scheduler to allocate mining workloads dynamically across unreliable nodes, minimizing response time while ensuring fairness

Cupid Dating, Mobile Application Mar 2024 – Aug 2024

- Developed an AI-based dating application with functions of AI chatbot, pair-matching, user chat and photo sharing
- Responsible for both frontend and backend development, maintaining the dataset after the app release
- Deployed on Cloud Service Platform and receives 300+ users

Designer, Fundamentals of Programming Final Term Project Dec 2022

- Designed and programmed an interactive 2-D soccer game that supports 2 players or 1 player with an AI opponent in a span of 3 weeks in Python
- Video Demo: https://www.youtube.com/watch?v=V6DfPd9IELI

Memory Allocator, Computer Systems Jul 2023

- Implemented a 64-bit struct-based memory allocator from scratch by a modified segregated list designed with 75% utilization of memory with a throughput of 10K+ kilo-ops/s

Concurrent Proxy Server, Computer System Project Aug 2023

- Designed a caching HTTP proxy server to handle multiple concurrent connections between the client and real servers with a memory cache, maintained using a Least Recently Used(LRU) policy

SKILLS

Computer Skills: C, C++, Python, CUDA, OpenCV, Pytorch, HTML, CSS, JavaScript, TypeScript, React, Jupyter, MatPlotLib

Operating Systems: Linux, Mac OS, Windows

Software: LaTex, Final Cut Pro, Photoshop, Premier, Lightroom