

George Jiayuan Gao

CONTACT INFORMATION	3025 John F. Kennedy Blvd, Philadelphia, PA 19104	gegao@seas.upenn.edu - Email +1 314-536-0564 - Phone ggao22.github.io - Personal Website
EDUCATION	University of Pennsylvania M.S. in Robotics, GPA: 3.9/4.0 <ul style="list-style-type: none">Thesis Research Advisors: Dr. Nadia Figueroa, Dr. Dinesh JayaramanThesis Topic: <i>Robustifying Vision-Based Imitation Learning: Recovery, Data-Augmentation, and Convergence</i>. (In progress) Washington University in St. Louis B.S. in Computer Science and Mathematics, GPA: 3.9/4.0 <ul style="list-style-type: none">Graduated Magna Cum Laude in Three Years.Undergrad Research Advisor: Dr. Yevgeniy VorobeychikResearch Area: <i>Real-time lane-following for autonomous vehicles</i>.	Philadelphia, PA August 2023 - Present St. Louis, MO August 2020 - May 2023
PEER-REVIEWED PUBLICATIONS	Gao, GJ., Li, T., Figueroa, N. Out-of-Distribution Recovery with Object-Centric Keypoint Inverse Policy For Visuomotor Imitation Learning. [PDF] [Web] [Code] <ul style="list-style-type: none">Published as Oral Spotlight at CoRL 2024 Workshop on Lifelong Learning for Home Robots.Presented at CoRL 2024 Workshop on Lifelong Learning for Home Robots. [Video]Improved and under review for IROS 2025.	
ONGOING RESEARCH	Eureka for Manipulation: Real-World Dexterous Agent via Large-Scale Reinforcement Learning <i>Research Assistant under Prof. Dinesh Jayaraman</i> <ul style="list-style-type: none">Training a skilled manipulation agent with RL in simulation that can zero-shot transfer to the real world is hard. The question is: does this get any easier when we add LLM in the loop and utilize ginormous levels of computing power, such as hundreds of Nvidia's latest generation of data-center GPUs? Stable Visuomotor Policy from a Single Demo: Elastic Action Synthesis Data Augmentation <i>Research Assistant under Prof. Nadia Figueroa</i> <ul style="list-style-type: none">We propose a methodology that uses our in-house Elastic-Motion-Policy, enabling the training of visuomotor policies with full spatial generalization from only a single demonstration. VLMgineer: Vision-Language-Model Driven Gripper Add-Ons for Universal Manipulation <i>Research Assistant under Prof. Nadia Figueroa and Prof. Dinesh Jayaraman</i> <ul style="list-style-type: none">Can we give robots the ability to design and use tools to solve problems? This project proposes a pipeline leveraging Vision-Language Models (VLMs) to autonomously generate gripper add-ons, enhancing robots' capabilities to handle infinitely diverse and complex objects and scenarios. Preliminary results can be found in this Progress Report.	March 2025 - Present December 2024 - Present February 2024 - Present
PAST PROJECT	Novel Environmental Transfer of Visuomotor Policy via Object-Centric Domain Randomization [PDF] <ul style="list-style-type: none">Proposed GDN-ACT, a novel and scalable approach enabling zero-shot generalization of visuomotor policies across unseen environments using a pre-trained state-space mapping for object localization. Achieved a 61.6% success rate on complex bimanual grasping tasks across five unseen simulated environments. Modular Gait Optimization: From Unit Moves to Multi-Step Trajectory in Bipedal Systems [PDF] [Code] <ul style="list-style-type: none">Developed the Gait Modularization and Optimization Technique (GMOT), leveraging modular unit gaits as initialization for Hybrid Direct Collocation (HDC), reducing constraint sensitiv-	January 2024 - May 2024 August 2023 - December 2023

ity, enhancing computational stability across various gaits (walking, running, hopping), and achieving **time-efficiency gains of up to 80%**.

Miniature City Lane-Following Autonomous Driving Platform Development [Code]

Research Assistant under Prof. Yeogeniy Vorobeychik October 2021 – May 2023

- Developed the driving stack for Washington University’s inaugural miniature city autonomous driving platform by creating a vision-based lane-following pipeline.
- Resolved key reliability issues arising from CPU hardware limitations by implementing an innovative DBSCAN–K-Means cycle, resulting in a **21% reduction** in total pipeline latency and significantly improving system responsiveness.

Computational Fluid Dynamics (CFD) Simulation Project

Research Assistant under Prof. Agarwal Ramesh May 2021 – October 2021

- Implemented turbulence simulations using Prof. Ramesh Agarwal’s Wray–Agarwal turbulence model with OpenFOAM and C++, recorded results and developed optimization plans for run-time improvements and garbage collection, which were subsequently executed.

Motion Capture-Based Real-Time Teleoperation Pipeline for Visuomotor Policy Learning

[Code] August 2024 – November 2024

- Developed a real-time (~100Hz) visuomotor-learning teleoperation pipeline to control robotic manipulators using motion capture and to record high-quality frame-to-action datasets.

TEACHING EXPERIENCE

McKelvey School of Engineering, Washington University in St. Louis, St. Louis, MO, USA

Head Teaching Assistant August 2021 - May 2023

CSE-247 Data Structures & Algorithms: Managed 350 students, and 90 teaching assistants; Held weekly review lectures, office hours, and bi-semester exam review sessions.

Penn Engineering, University of Pennsylvania, Philadelphia, PA, USA

Graduate Teaching Assistant January 2024 - May 2024

MEAM-5200 Introduction to Robotics, 200 students: Held weekly office hours and real-robot studios.

INDUSTRY EXPERIENCE

Megvii Technology Limited, Beijing, China

Full-Stack Software Development Intern May 2021 - August 2021

- Designed and deployed an interactive web module to visualize work-hour data with dynamic histograms, pie charts, and trend graphs, facilitating effective analysis and discussion in departmental meetings.

AWARDS

Antoinette Frances Dames Award, administered by WashU, for 4.0 GPA sophomores. 2022

Dean’s List, administered by WashU, all semesters. 2020-2023

SERVICES

Reviewer for CoRL Workshop on Lifelong Learning for Home Robots 2024

Volunteer Science Instructor for a Rural High School, Tongzhou, China 2020

ACTIVITIES

Member of the **Penn Robotics Entrepreneurship Club** 2023 - Present

Member of the **WashU Sensasians Acapella Club** 2021 - 2023

COMPUTER SKILLS

Languages: Python, C++, Java, Javascript, HTML/CSS, \LaTeX

Technologies/Frameworks: Linux, ROS1 & 2, PyTorch, Tensorflow, AutoCAD, Solidworks

Developer Tools: GitHub, Docker, IDEs, Miniconda