Yazhou (Harry) Zhang

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EDUCATION

Stanford University — Stanford, U.S.
Master of Science in Mechanical Engineering — *Expected 06/2026*
Focus Areas: Robotics and Kinematics (Depth), Automatic Controls and Dynamics (Breadth) — *GPA: 4.0*

University of Toronto — Toronto, Canada
Bachelor of Applied Science in Mechanical Engineering — *09/2019 – 05/2024*
Minors: Robotics and Mechatronics, Engineering Business — *GPA: 3.9*

INTERNSHIP EXPERIENCES

XPENG Humanoid | Dexterous hand manipulation — Shenzhen, China
Embodied Intelligence Intern — *06/2025 – 09/2025*

- Designed and deployed an admittance-controlled dexterous hand, enabling safe manipulation of fragile objects (e.g., balloons, chips) and compliant reverse-bending behavior under rigid contact.
- Reduced control latency from 40 ms to 0.2 ms by replacing NLopt-based optimization with a direct qpos formulation, and developed a retargeting similarity analysis pipeline enabling 30+ pose evaluations in 5 minutes for rapid tuning and iteration.
- Implemented and evaluated state-of-the-art dexterous manipulation pipelines (DexGen, ManipTrans), including any-grasp-to-any-grasp generation, PPO-based trajectory optimization, diffusion-based retargeting filtering, and object-aware imitation + reinforcement learning.

AGS Automotive | Leading automotive supplier in the U.S. and Canada — Toronto, Canada
Mechanical Engineering Intern — *05/2022 – 05/2023*

- Managed and contributed to 5+ engineering projects spanning infrastructure, energy, and manufacturing operations, ensuring 100% on-time delivery aligned with business objectives.
- Defined project scope, developed technical requirements and proposals, and coordinated with plant managers, vendors, and consultants to align stakeholders and ensure smooth execution across multiple concurrent engineering projects.

Mindray Medical | China's largest medical device manufacturer — Shenzhen, China
Mechanical Engineering Intern — *05/2021 – 08/2021*

- Supported the design and prototyping of the probe for the Resona 7 medical imaging system, collaborating with the engineering team to address essential requirements for signal transmission, imaging quality, and mechanical performance while ensuring compliance with industry standards.
- Conducted 20+ hardware-focused tests to assess the assembly capability, manufacturing feasibility, functionality, and reliability of medical systems; successfully identified potential errors prior to production.
- Analyzed customer feedback to identify improvements, collaborating with suppliers and engineers to refine designs and update prototypes.

RESEARCH EXPERIENCES

Salisbury Lab | Tendon Actuated Robotic Arm — Stanford, U.S.
Research Assistant — *01/2025 – 03/2025*

- Developed real-time impedance-based position and torque controllers for a tendon-actuated robotic arm, achieving stable trajectory tracking and on-the-fly compliance adjustment on 1-DOF and 3-DOF hardware systems.
- Implemented stiffness perception from motor position and torque feedback to infer material properties, enabling adaptive interaction with objects exhibiting linear and nonlinear (stiffening) compliance.

Decisionics Lab | Gait Monitoring Device — Toronto, Canada
Research Assistant — *05/2023 – 09/2023*

- Designed and implemented a controlled obstacle-course evaluation protocol to systematically assess sensing and gait performance across diverse terrains, supporting repeatable benchmarking of prototype reliability.
- Validated gait parameters from a wearable sensing prototype by cross-comparing against a commercial insole system, identifying sampling rate mismatches and timing offsets that improved signal reliability and consistency across trials.
- Refactored data processing pipelines and integrated SQLite3 for structured storage and repeatable analysis, improving robustness of experimental evaluation workflows.

RELEVANT ENGINEERING PROJECTS

Perception for Robotic Pick-and-Place: Modular vs End-to-End Approaches — *09/2025 – 12/2025*

- Built a full pose-based pick-and-place pipeline in PyBullet (UR5 + RGB-D), integrating U-Net segmentation, point-cloud generation, ICP pose estimation, IK-based motion, and grasp execution with success checking.
- Implemented an end-to-end affordance learning approach using dense spatial action maps over 8 discrete rotation bins, improving cluttered pick success from 8/15 to 15/15 objects via failure-aware suppression.

Mobile Manipulation System for Autonomous Kitchen Tasks — *03/2025 – 06/2025*

- Built a full sim-to-real mobile manipulation pipeline using MuJoCo and OpenSai, validating perception and full-stack control for safe deployment on a mobile manipulator.
- Designed a hierarchical finite-state machine integrating vision, motion planning, and force/trajectory control to execute 10+ multi-stage kitchen tasks (e.g., grasping, pouring, compliant button pressing) with centimeter-level accuracy and stable contact transitions.

Dynamic-Horizon Action Chunking with Transformers (ACT) — *03/2025 – 06/2025*

- Extended Action Chunking with Transformers (ACT) by introducing an on-policy PPO-trained action horizon selector that dynamically chooses execution length from discrete chunk sizes, enabling phase-aware temporal abstraction without retraining the frozen low-level policy.
- Designed and tuned a multi-term reward function balancing task success, progress, and horizon efficiency; demonstrated up to 20.8% relative success rate improvement over fixed-horizon ACT on noisy ALOHA manipulation tasks with human demonstrations.

Frontier Exploration on TurtleBot — *09/2024 – 12/2024*

- Developed a ROS2-based autonomous frontier exploration system integrating EKF-based SLAM, ICP scan matching for pose refinement, online occupancy grid mapping, and A* planning for frontier-driven navigation; achieved 100% mapping accuracy in simulation and 82% area coverage on hardware.
- Designed a modular ROS2 node architecture enabling efficient communication between perception, state estimation, planning, and control modules, and extended the pipeline with vision-based stop sign detection to demonstrate semantic perception integration for object-aware navigation.

SKILLS & INTERESTS

Programming & Systems: C++, Python, MATLAB; Linux (Ubuntu), Git, Docker
Robotics & Simulation: MuJoCo, Isaac Gym; ROS2 (tf2, MoveIt, rviz, Gazebo)
Learning & Controls: PPO, DQN, DDPG, SAC; PID, LQR, MPC
Hardware: Motor control, encoders, IMUs, force/torque sensing
CAD & Analysis: SolidWorks, ANSYS, AutoCAD, Creo

ACHIEVEMENT & CERTIFICATION

Awarded the Dean's Honor List — *2019 – 2024*
MIE Summer Research Award (1 of 24 nominees in UofT) — *2023*
Remotely Piloted Aircraft System (RPAS) Pilot Certificate - Basic Operations — *2022*
Certified SOLIDWORKS Associate in Mechanical Design (CSWA) — *2020*
University of Toronto Scholar (awarded to the most outstanding secondary school student on admission) — *2019*