

Jerry (Qilong) Cheng

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Education

University of Toronto, Ph.D. in Robotics (Incoming) <i>University of Toronto Institute for Aerospace Studies (UTIAS)</i>	Sep. 2026 – Aug. 2030
New York University, Ph.D. in Mechanical Engineering <i>Major in Robotics - Reinforcement Learning, Dexterous Manipulation, Robot Learning</i>	Sep. 2025 – Aug. 2026 GPA: 4.00/4.00
University of Toronto, M.Eng. in Computer Engineering <i>Major in Robotics</i>	Sep. 2023 – Aug. 2025 GPA: 3.92/4.00
University of Toronto, B.A.Sc in Mechanical Engineering <i>Major in Mechanical Engineering, Minor in Robotics & Business</i>	Aug. 2017 – Jun. 2023 Senior GPA: 3.94/4.00

Research Interest

I aim to integrate **Universal Manipulation Interface-scale perception** with **torque-level reinforcement learning** to handle contact, embodiment, and whole-body loco-manipulation in real-world settings.

I am also a strong believer in Steve Jobs' idea that *"those who are truly serious about software should design their own hardware."*

Publications

- [1] IRIS: Learning-Driven Task-Specific Cinema Robot Arm for Visuomotor Motion Control**
Q. Cheng, M. Mackay, and A. Bereyhi
The 23rd Conference on Robots and Vision (CRV), 2026
- [2] Evolution of Humanoid Locomotion Control**
Y. Gu, G. Shi, F. Shi, I. Chang, Y. Wang, Q. Cheng, Z. Olkin, I. Lopez-Sanchez, Y. Feng, J. Zhang, A. D. Ames, H. Su, and K. Sreenath
Science Robotics (Under Review), 2025
- [3] A Certifiably Correct Algorithm for Generalized Robot-World and Hand-Eye Calibration**
E. Wise, P. Kaveti, Q. Cheng, W. Wang, H. Singh, J. Kelly, D. M. Rosen, and M. Giamou
International Journal of Robotics Research, 2025
- [4] VibraForge: A Scalable Prototyping Toolkit for Creating Spatialized Vibrotactile Feedback Systems**
B. Huang, S. Ren, Y. Luo, Q. Cheng, H. Cai, Y. Sang, M. Sousa, P. H. Dietz, and D. Wigdor
ACM CHI Conference on Human Factors in Computing Systems (CHI), 2025
- [5] AeroHaptix: A Wearable Vibrotactile Feedback System for Enhancing Collision Avoidance in UAV Teleoperation**
B. Huang, Z. Wang, Q. Cheng, S. Ren, H. Cai, A. A. Valdivia, K. Mahadevan, and D. Wigdor
IEEE Robotics and Automation Letters (RA-L), 2025
- [6] Extrinsic Calibration of 2D Millimetre-Wavelength Radar Pairs Using Ego-Velocity Estimates**
Q. Cheng, E. Wise, and J. Kelly
IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), 2023
- [7] Spatiotemporal Calibration of 3D Millimetre-Wavelength Radar-Camera Pairs**
E. Wise, Q. Cheng, and J. Kelly
IEEE Transactions on Robotics (TRO), 2023
- [8] Weakly Supervised Semantic and Attentive Data Mixing Augmentation for Fine-Grained Visual Categorization**
M. He, Q. Cheng, and G. Qi
IEEE Access, 2022
- [9] Generative Design for Self-Balancing Unicycle Robot in Additive Manufacturing**
J. Chen, Q. Cheng, and M. Han
International Conference on Automation Control, Algorithm, and Intelligent Bionics (ACAIB), 2022

Research Experience

Machine in Motion Lab 🔗 Ph.D. Research Fellowship — Prof. Ludovic Righetti and Prof. Katsuo Kurabayashi	Sep. 2025 – Now New York University, Tandon School of Engineering
• Research Topics: dexterous manipulation, diffusion policies, RL-based control, robot learning, sim-to-real, musculoskeletal simulation. • Key Contributions: 1) Developed <i>GeoDEX</i>, a geometric diffusion-transformer policy for 26-DOF dexterous pick-and-place mapping dual-vision RGBD and proprioception to action chunks with geodesic SO(3) and contact-aware fingertip losses, trained on Vision Pro demonstrations retargeted into MuJoCo via SE(3)-preserving optimization. 2) Developing Mixture-of-Experts RL controllers for user-adaptive hip exoskeletons in musculoskeletal simulation.	
MABEL: Mobile Anthropomorphic Bimanual Embodiment 🔗 Independent Researcher — Open-Source Mobile Manipulation Platform (RA-L 2026, in preparation)	Apr. 2026 – Now New York
• Topics: mechatronic design, whole-body compliant control, teleoperation, digital twins, imitation learning. • Key Contributions: 1) Designed and built MABEL, a sub-\$10k open-source anthropomorphic mobile bimanual robot with 56 DOF: holonomic swerve base, vertical lift and pitching torso, dual 7-DOF arms with 17-DOF tendon-driven hands, and a 3-DOF head. 2)	

Developed a nested compliant whole-body controller (Cartesian admittance, self-collision barriers, disturbance-observer impedance) with a ZMP tip-over filter shared by teleoperation and learned policies. 3) Built an Apple Vision Pro teleoperation stack where one networked server drives both the MuJoCo digital twin and the robot.

Space and Terrestrial Autonomous Robotic Systems Lab

Sep. 2021 – Aug. 2025

Robotics Researcher — Prof. Jonathan Kelly

University of Toronto Institute for Aerospace Studies

- **Topics:** sensor extrinsic calibration, optimization, continuous-time trajectory estimation, robot-world and hand-eye calibration.
- **Key Contributions:** 1) Developed a certifiably globally optimal robot-world & hand-eye calibration method [3]. 2) Created a 2D radar ego-velocity-based extrinsic calibration pipeline requiring no overlapping fields of view [6] (video). 3) Proposed targetless 3D radar-camera spatiotemporal calibration using continuous-time B-splines [7].

Dynamic Graphics Project Lab

Sep. 2022 – Aug. 2025

HCI Researcher — Prof. Daniel Wigdor

University of Toronto, Department of Computer Science

- **Topics:** haptics, teleoperation, multisensory interfaces, wearable haptic feedback systems, CBF-based safety control.
- **Key Contributions:** 1) Built VibraForge, a 128-actuator high-bandwidth spatialized vibrotactile toolkit [4] (video). 2) Developed AeroHaptix, a wearable haptic teleoperation system with multi-CBF UAV collision avoidance [5] (video).

Desktop-Level Cinema Robot Arm (IRIS)

Sep. 2024 – Aug. 2025

M.Eng Researcher — Prof. Matthew Mackay and Prof. Ali Bereyhi

University of Toronto Robotics Institute

- **Topics:** Task-specific robot-arm design, quasi-direct-drive actuation, impedance control, ROS-based sim-to-real, visuomotor imitation learning.
- **Key Contributions:** 1) Designed and built IRIS, a low-cost 6-DOF 3D-printed cinema robot arm using quasi-direct-drive actuation. 2) Implemented a vertically integrated ROS stack with a MuJoCo digital twin for sim-to-real deployment. 3) Developed a goal-conditioned ACT-CVAE imitation learning policy for smooth, object-aware cinematic camera motion from expert demonstrations [1] (video).

Neural Robotics Lab

Sep. 2023 – Aug. 2024

Robotics Researcher — Prof. Brokoslaw Laschowski

KITE Research Institute

- **Topics:** adaptive exoskeleton control, VHC locomotion, monocular depth estimation, stair perception.
- **Key Contributions:** 1) Integrated monocular perception with VHC-based control for adaptive stair-walking. 2) Implemented Metric3D-based depth pipeline with enhanced normal-map reasoning for stair geometry extraction.

Industry Experience

GouPals Inc.

Aug. 2024 – Apr. 2025

Cofounder / CEO

Toronto

- Founded GouPals, a peer-to-peer international logistics platform connecting travelers with buyers seeking overseas goods; led design, engineering, marketing and investor outreach.
- Built and launched an iOS MVP in under two month using Swift, React, and Firebase, delivering real-time order tracking with a scalable backend architecture.

ONE800 Inc.

Apr. 2023 – Dec. 2023

Software Engineer / ML Engineer

Toronto

- Built an Apple-approved iMessage integration that enabled seamless LLM access for older demographics, including text, image, and memo support.
- Developed multilingual LLM pipelines (transcription, translation, OCR, generation) and a LangChain + Redis memory system for persistent conversational agents.

China State Shipbuilding Corporation

Sep. 2020 – Apr. 2021

Mechanical Engineer Intern

Shanghai

- Designed HVAC subsystems for China's first domestically built 12-deck cruise ship using CADMATIC and Bentley.
- Patented a high-efficiency spray-nozzle fire pipeline system achieving 80% water savings (patent).

Autodesk Inc.

Sep. 2019 – Jun. 2020

Student Ambassador

Toronto

- Founded and led the Fusion Design Association, training students in Fusion 360 (CAD/CAM/Generative Design) and modern manufacturing workflows.
- Mentored 30+ students and organized an annual 3D-printed glider competition with a custom engineered launch system.

Academic Service

Reviewer: IEEE ICRA, IEEE/RSJ IROS, IEEE AIM, IEEE BioRob, Nature Publishing Group journals. (Since 2023)

Teaching Assistant: MIE443 – Mechatronics Systems (University of Toronto), 2023 & 2024.

Technical Skills

Software: Python, C++, MATLAB, ROS (1/2), PyTorch, NumPy, OpenCV, Ceres Solver, MuJoCo, Isaac Sim, IsaacLab, Linux, Docker

Hardware: Intel RealSense, Microsoft Kinect, mmWave Radar, Raspberry Pi, NVIDIA Jetson Nano, STM32/ESP32, Arduino, BLDC/FOC Actuators, xArm Lite6, TurtleBot2, PND Adam Robot, Booster Robot