Philip (Yizhou) Huang

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Education

Carnegie Mellon University — Pittsburgh, USA
Ph.D. in Robotics — Aug 2023 - Current

- Research Topic: Multi-robot task and motion planning
- Advisor: Jiaoyang Li, GPA: 4.12/4.33

University of Toronto — Toronto, Canada
M.Sc. in Computer Science — Sept 2021 - August 2023

- Thesis: Planning and navigation for autonomous surface vessels
- Advisors: Florian Shkurti and Tim Barfoot, cGPA: 4.00/4.00

University of Toronto — Toronto, Canada
BASc. in Engineering Science (Machine Intelligence Major) — Sept 2016 - June 2021

- Thesis: Improving regularization-based continual learning with hypernetworks [pdf]
- Advisor: Florian Shkurti, cGPA: 3.88/4.00 (90.2%)

Publications

1. Ruixuan Liu*, **Philip Huang***, Ava Pun, Kangle Deng, Shobhit Aggarwal, Kevin Tang, Michelle Liu, Deva Ramanan, Jun-Yan Zhu, Jiaoyang Li, and Changliu Liu, "Prompt-to-Product: Generative Assembly via Bimanual Manipulation", *IEEE Robotics and Automation Magazine (RAM), Special Issue on Arts and Robotics*, 2026 [pdf] [website] [video]

2. **Philip Huang**, Chenrui Gao, Jiaoyang Li, "VAMP-MR: Vector-Accelerated Motion Planning and Execution for Multi-Robot-Arms", in proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2026 [pdf] [website] [code]

3. **Philip Huang**, Yorai Shaoul, and Jiaoyang Li, "Benchmarking Shortcutting Techniques for Multi-Robot-Arm Motion Planning", in proceedings of *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025 [pdf] [website] [video] [code]

4. **Philip Huang***, Ruixuan Liu*, Shobhit Aggarwal, Changliu Liu, and Jiaoyang Li, "APEX-MR: Multi-Robot Asynchronous Planning and Execution for Cooperative Assembly", in proceedings of *Robotics: Science and Systems (RSS)*, 2025 [pdf] [website] [video] [code]

5. Yewon Lee, Andrew Z. Li, **Philip Huang**, Eric Heiden, Krishna Murthy Jatavallabhula, Fabian Damken, Kevin Smith, Derek Nowrouzezahrai, Fabio Ramos, and Florian Shkurti, "STAMP: Differentiable Task and Motion Planning via Stein Variational Gradient Descent", *IEEE Robotics and Automation Letters (RA-L)*, 2025 [doi] [pdf] [website] [video]

6. **Philip Huang**, Tony Wang, Florian Shkurti, and Timothy D. Barfoot, "Field Testing of a Stochastic Planner for ASV Navigation Using Satellite Images", *IEEE Transactions on Field Robotics (T-FR)*, 2024, vol. 1, pp. 131-160. [doi] [pdf] [video]

7. **Yizhou Huang**, Hamza Dugmag, Timothy D. Barfoot, and Florian Shkurti, "Stochastic Planning for ASV Navigation Using Satellite Images", in proceedings of *IEEE International Conference on Robotics and Automation (ICRA)*, 2023 [pdf] [website] [video] [code]

8. **Yizhou Huang**, Kevin Xie, Homanga Bharadhwaj, and Florian Shkurti, "Continual Model-Based Reinforcement Learning with Hypernetworks", in proceedings of *IEEE International Conference on Robotics and Automation (ICRA)*, 2021 [pdf] [website] [video] [code]

9. Keenan Burnett, Jingxing Qian, Xintong Du, Linqiao Liu, David J. Yoon, Tianchang Shen, Susan Sun, Sepehr Samavi, Michael J. Sorocky, Mollie Bianchi, Kaicheng Zhang, Arkady Arkhangorodsky, Quinlan Sykora, Shichen Lu, **Yizhou Huang**, Angela P. Schoellig, and Timothy D. Barfoot, "Zeus: A System Description of the Two-Time Winner of the Collegiate SAE AutoDrive Competition", *Journal of Field Robotics*, 2021 [doi] [pdf] [video]

Preprints

1. Peiqi Yu*, **Philip Huang***, Chaitanya Chawla*, Guanya Shi, Jiaoyang Li, Changliu Liu, "Autonomous Integration and Improvement of Robotic Assembly using Skill Graph Representations", *arXiv:2603.12649*, 2026 [pdf]

2. Qiyang Li, Xintong Du, **Yizhou Huang**, Quinlan Sykora, and Angela P. Schoellig, "Learning of Coordination Policies for Robotic Swarms", *arXiv:1709.06620*, 2017 [pdf]

Professional Experience

NVIDIA Corporation — Seattle, USA
Research Scientist Intern — May 2026 – August 2026

- Developing a GPU-accelerated, general-purpose algorithm for scheduling and planning multiple robot arms
- Research on applications of multi-robot systems in manufacturing, such as assembling NVIDIA's Blackwell GPU

Artificial Intelligence for Robot Coordination at Scale Lab, CMU — Pittsburgh, USA
Ph.D. Student — August 2023 - Current

- Developed a safe, efficient, and scalable multi-robot planning and asynchronous execution framework for long-horizon (**250+ steps**) tasks; reduced the execution time by **48%** compared to sequential planning and **36%** compared to synchronous planning on average
- Led the development of a **multi-level** reasoning pipeline for automated LEGO assembly system with two Yaskawa GP4 industrial robots; integrated physics reasoning, assembly planning, task planning, and online action generation with real-time monitoring
- Proposed an ontology and skill graph for autonomous multi-robot assembly in collaboration with the DoD-funded ARM (Advanced Robotics for Manufacturing) Institute
- Developing efficient and high-performance multi-robot motion planning and postprocessing algorithms

Robot Learning and Vision Lab, University of Toronto — Toronto, Canada
Graduate Research Assistant — Sept 2021 - Aug 2023

- Conducted **field tests** of an autonomous surface vessel (ASV) on multiple **km-scale missions** in Northern Ontario; developed the GPS-, vision-, and sonar-enabled perception and local motion planning system in ROS
- Proposed and implemented a novel robust mission-planning algorithm using satellite images; simulated on a dataset of **1000+** lakes and reduced the expected travel time by up to **15%** compared to baselines
- Developed a hypernetwork-based, **continual learning** algorithm for model-based reinforcement learning; demonstrated state-of-the-art performance in multiple robotic simulations, including a door-opening experiment

Qualcomm Inc. — Toronto, Canada
Machine Learning Engineering Intern — May 2019 - May 2020

- Developed and streamlined C++ test apps for Qualcomm's HTA neural networks (NN) compiler on Snapdragon devices; reduced test time by **20% for a team of 15+** engineers
- Created a compiler profiling tool capable of reducing NN inference latency by **>15%**
- Developed a GUI application with Electron.js for visualizing neural networks in custom representation and running different test apps, which significantly improved the efficiency of day-to-day development

Civil, Environmental, Agricultural and Learning Lab, Technion Haifa, Israel
Undergraduate Research Assistant May 2018 - Aug 2018

- Designed a depth-camera-based quadcopter localization and tracking pipeline in C++ running at 30Hz
- Re-trained a Mask-RCNN network in Keras to detect sunflowers using a custom dataset of 75 images
- Developed a ROS-based demo where a **Crazyflie** nano-quadcopter autonomously navigates between 2-4 sunflowers to perform artificial pollination. [video]

Dynamic Systems Lab, University of Toronto Toronto, Canada
Undergraduate Research Assistant May 2017 - Aug 2017

- Designed and implemented a software framework (with ROS, C++, and Python) capable of flying **a swarm of 9 Crazyflie nano-quadcopters indoors**
- Built a simulation environment in Gazebo to debug controller and planning modules in ROS
- Developed an interactive demo with six quadcopters flying a synchronized "wave" motion. [video]

Teaching and Services

- **Teaching Assistant** for 16-811 Fall 2025
  Math Fundamentals for Robotics (Carnegie Mellon University)
- **Teaching Assistant** for CSC384 Spring 2023
  Introduction to Artificial Intelligence (University of Toronto)
- **Teaching Assistant** for CSC317 Fall 2022
  Computer Graphics (University of Toronto)
- **Teaching Assistant** for CSC477 Fall 2021
  Introduction to Mobile Robotics (University of Toronto)
- **Mentor** for RISS Program Summer 2024, 2025
  CMU Robotics Institute Summer Scholars (RISS) program
- **Mentor** for Undergraduate Students 2023-2025
  Conducting AI and Robotics Research at CMU
- **Mentor** for PRISM Workshop Spring 2022
  Preparation for Research through Immersion, Skills, and Mentorship (University of Toronto)
- **Reviewer** for IEEE Robotics and Automation Magazine, *RAM* 2025
- **Reviewer** for IEEE Robotics and Automation Letters, *RA-L* 2025
- **Reviewer** for IEEE International Conference on Robotics and Automation, *ICRA* 2023-2026
- **Reviewer** for IEEE/RSJ International Conference on Intelligent Robots and Systems, *IROS* 2023, 2025
- **Reviewer** for International Workshop on Multi-Agent Path Finding, *AAAI* 2026
- **Reviewer** for Workshop on World Models, *ICML* 2025
- **Reviewer** for International Workshop on the Algorithmic Foundations of Robotics, *WAFR* 2024
- **Reviewer** for Workshop on Meta Learning, *NeurIPS* 2020

Scholarships and Awards

- Best Poster Award Finalist in ICRA Workshop on Language and Semantics of Task and Motion Planning 2025
- Alan Guisewite Memorial Fellowship from CMU Robotics Institute 2024
- 3rd place, UofT Robotics Institute Three Minute Thesis Competition 2022
- Canada Graduate Scholarships-Master's (CGS-M) award - CAD $17000 2021
- Vector Scholarship in Artificial Intelligence - CAD $17000 2021

- 2nd place, Engineering Science Select Equity Den - CAD $1000 2020
- University of Toronto Excellence Award - CAD $6,000 2020
- William V. Hull Scholarship - CAD $520 2019
- 1st place, Engineering Science Roshambo In-class Tournament 2019
- 2nd place, University of Toronto Engineering Kompetitions (UTEK), Programming Section 2019
- 3rd place, University of Toronto Engineering Kompetitions (UTEK), Programming Section 2018
- Sullivan Memorial Scholarship - CAD $3,415 2017
- The Wallberg Undergraduate Scholarships - CAD $1,500 2017
- Engineering Science Research Opportunities Program - CAD $6,000 2017
- President's Entrance Scholarships - CAD $2000 2016
- 1st place, Engineering Science Matboard Bridge Design and Build Challenge 2016
- 2nd place, Engineering Science Pong AI vs. AI Competition 2016

Skills

- **Programming Languages**: Python, C++, MATLAB, Javascript, HTML, Bash, LaTeX, Java, Verilog
- **Libraries**: PyTorch, ROS, Tensorflow, OpenCV, PCL, Pyro, Electron.js, Pandas, NumPy, SciPy, Jupyter
- **Tools**: Linux, Git, LLM/VLM, Gerrit, Docker, Slurm, Illustrator, OpenVINO

Media Coverage

- Featured in CMU Article on BrickGPT. 2025
- Featured in Modern Machine Shop article on our Multi-arm Lego Assembly Testbed. 2024