

# Philip (Yizhou) Huang

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## EDUCATION

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### Carnegie Mellon University

Ph.D. in Robotics

Pittsburgh, USA

August 2023 - Current

- Research Topic: Multi-robot coordination for manipulation and assembly
- Advisor: [Jiaoyang Li](#)

### University of Toronto

MSc. in Computer Science

Toronto, Canada

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

BASc. in Engineering Science (Machine Intelligence Major)

Toronto, Canada

Sept 2016 - June 2021

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

## PUBLICATIONS

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1. **Philip Huang**, Tony Wang, Florian Shkurti, and Timothy D. Barfoot, “Field Testing of a Stochastic Planning for ASV Navigation Using Satellite Images”, Submitted to *Field Robotics (FR)*, Manuscript FR-23-00012 [\[preprint\]](#) [\[video\]](#)
2. Yewon Lee, **Philip Huang**, Krishna Murthy Jatavallabhula, Andrew Z. Li, Fabian Damken, Eric Heiden, Kevin Smith, Derek Nowrouzezahrai, Fabio Ramos, Florian Shkurti, “STAMP: Differentiable Task and Motion Planning via Stein Variational Gradient Descent”, Submitted to *Learning Effective Abstractions for Planning (LEAP) Workshop at CoRL 2023* [\[preprint\]](#)
3. **Yizhou Huang**, Hamza Dugmag, Timothy D. Barfoot, and Florian Shkurti, “Stochastic Planning for ASV Navigation Using Satellite Images”, *IEEE International Conference on Robotics and Automation (ICRA 2023)* [\[pdf\]](#) [\[video\]](#)
4. **Yizhou Huang**, Kevin Xie, Homanga Bharadhwaj, and Florian Shkurti, “Continual Model-Based Reinforcement Learning with Hypernetworks”, *IEEE International Conference on Robotics and Automation (ICRA 2021)* [\[pdf\]](#) [\[blog\]](#) [\[video\]](#)
5. 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, Timothy D. Barfoot, “Zeus: A System Description of the Two-Time Winner of the Collegiate SAE AutoDrive Competition”, *Journal of Field Robotics*, 2021 [\[pdf\]](#) [\[video\]](#)
6. Qiyang Li, Xintong Du, **Yizhou Huang**, Quinlan Sykora, Angela P. Schoellig, “Learning of Coordination Policies for Robotic Swarms”, *arXiv preprint arXiv:1709.06620*, 2017 [\[pdf\]](#)

## PROFESSIONAL EXPERIENCE

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### Robot Learning and Vision Lab, University of Toronto

Robotics Researcher

Toronto, Canada

Jan 2020 - 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 demo in ROS featuring a **Crazyflie** nano-quadcopter autonomously navigating between 2-4 sunflowers for artificially pollinating sunflowers. [\[video\]](#)

## 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

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|---|-------------|
| • <b>Teaching Assistant</b> for CSC384<br><i>Introduction to Artificial Intelligence (University of Toronto)</i>                        | Spring 2023 |
| • <b>Teaching Assistant</b> for CSC317<br><i>Computer Graphics (University of Toronto)</i>  | Fall 2022   |
| • <b>Teaching Assistant</b> for CSC477<br><i>Introduction to Mobile Robotics (University of Toronto)</i>                                | Fall 2021   |
| • <b>Mentor</b> for PRISM Workshop<br><i>Preparation for Research through Immersion, Skills, and Mentorship (University of Toronto)</i> | Spring 2022 |
| • <b>Reviewer</b> for IEEE International Conference on Robotics and Automation, <i>ICRA 2024</i>  | 2023        |
| • <b>Reviewer</b> for IEEE/RSJ International Conference on Intelligent Robots and Systems, <i>IROS 2023</i>                             | 2023        |
| • <b>Reviewer</b> for IEEE International Conference on Robotics and Automation, <i>ICRA 2023</i>  | 2022        |
| • <b>Reviewer</b> for IEEE/RSJ International Conference on Intelligent Robots and Systems, <i>IROS 2022</i>                             | 2022        |
| • <b>Reviewer</b> for Workshop on Meta Learning, <i>NeurIPS 2020</i>  | 2020        |

## EXTRACURRICULAR ACTIVITIES

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### You're Next Career Network

Marketing Associate

Toronto, Canada

May 2020 - March 2021

- Worked for a student club that hosts the largest student-run career fair at the University of Toronto, connecting over **3000 students** and **100 companies** a year
- Designed event graphics for different social media platforms
- Analyzed event participant data and created a dashboard with Google Data Studio

### University of Toronto Self-Driving Car Team

Object Detection Sub-Team Co-Lead and Member

Toronto, Canada

Feb 2018 - Aug 2020

- Finished **1st place in three consecutive years** of SAE AutoDrive Challenge
- Led the object detection sub-team of 5+ students in reproducing a 3D object detection network (PointPillar) and developed custom software for accelerating inference on the Intel OpenVINO platform
- Improved the performance of our squeezeDet pedestrian detector from **41% to 85%** average precision while maintaining runtime at 40ms
- Reproduced a lidar-based, birds-eye-view object detection algorithm (PIXOR) on the KITTI self-driving dataset; PyTorch code (**>260 stars**) is available on [GitHub](#)

## SCHOLARSHIPS AND AWARDS

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- 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

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- **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, Gerrit, Docker, Slurm, Illustrator, OpenVINO