# Yizhou (Philip) Huang

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## Education

**University of Toronto** — Toronto, Canada
MSc. in Computer Science — Sept 2021 - January 2023

- Thesis Topic: Task and motion planning for autonomous vessels
- Supervisors: Florian Shkurti & Tim Barfoot

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

- Thesis: Improving regularization-based continual learning with hypernetworks
- Supervisor: Florian Shkurti, GPA: 3.88/4.00 (90.2%)

## Publications

1. **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]

2. 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* [pdf]

3. 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

**Robot Learning and Vision Lab, University of Toronto** — Toronto, Canada
Robotics Research Student — Jan 2020 - Current

- Working on probabilistic task and motion planning based on Stein Variational Gradient Descent in differentiable simulators
- Developed a hypernetwork-based, continual learning method used in model-based reinforcement learning setting which showed state-of-the-art performance compared to other continual learning strategies
- Demonstrated that regularizing past dynamics model with hypernetwork and learned task embeddings significantly **reduced catastrophic forgetting and achieved high overall performance**. Results are evaluated in three Panda robot arm experiments in the robosuite simulator. Website

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

- Developed and streamlined C++ test apps for Qualcomm's HTA neural network (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 network 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 Student May 2018 - Aug 2018

- Investigated the possibility of using Crazyflie nano-quadcopters to **artificially pollinate flowers**
- Designed a simple quadcopter location detection and tracking pipeline running at 30Hz from an RGB-D camera
- Re-trained Mask-RCNN to detect sunflowers using a custom dataset of 75 images
- Developed a demo for lab sponsors featuring a nano-quadcopter autonomously navigating between 2-4 sunflowers

**Dynamic Systems Lab, University of Toronto** Toronto, Canada
Undergraduate Research Student 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**. This includes modularizing different controller components, setting up communication protocols, and calibrating the onboard controller
- Built a simulation environment in Gazebo to debug controller and planning modules in ROS
- Developed an interactive "wave" demo with 6 quadcopters. Video available on Youtube
- Helped propose a neural-network-based approach for the learning of inter-robot coordination for swarm robotic system

## Teaching and Services

- **Teaching Assistant** for CSC477 Fall 2021
  *Introduction to Mobile Robotics (University of Toronto)*
- **Mentor** for PRISM Workshop Winter 2022
  *Preparation for Research through Immersion, Skills, and Mentorship (University of Toronto)*
- **Reviewer** for Workshop on Meta Learning (*@NeurIPS 2020*) 2020

## Extracurricular Activities

**You're Next Career Network** Toronto, Canada
Marketing Associate May 2020 - Current

- A student club that hosts the largest student-run career fair at 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** Toronto, Canada
Object Detection sub-team Co-Lead and Member Feb 2018 - Aug 2020

- Finished **1st place in three consecutive years** of SAE AutoDrive Challenge
- Led the object detection sub-team of 5+ students reproducing the 3D object detector (PointPillar) and developed custom frontend for accelerating inference on the Intel OpenVINO platform
- Improved the AP of our squeezeDet pedestrian detector from **41% to 85%** while maintaining runtime at 40ms
- Reproduced a lidar-based, birds-eye-view object detection algorithm (PIXOR) on the KITTI dataset. PyTorch code (>160 stars) available on GitHub

## Scholarships and Awards

- 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 programming, University of Toronto Engineering Programming Section 2019
- 3rd place programming, University of Toronto Engineering 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, Pyro, OpenCV, PCL, Electron.js, Pandas, NumPy, SciPy, Jupyter
- **Tools** Git/Gerrit, Docker, Slurm, Linux, OpenVINO, AWS