

# Aaron Hao Tan

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## Education

### University of Toronto

Doctor of Philosophy, Robotics Institute

Toronto, Canada

September, 2019 - Present

**Specialization** Multi-Robot Inference for Decentralized Cooperation, CGPA (4.0/4.0)

### Ontario Tech University

Master of Applied Science, Mechanical Engineering

Oshawa, Canada

May, 2017 - May, 2019

**Specialization** Vision Based Control for Mobile Robots and Manipulators, CGPA (4.3/4.3)

### Ontario Tech University

Bachelor of Engineering with Highest Distinction

Oshawa, Canada

Sep. 2012 - Apr. 2017

**Specialization** Mechatronics Option with Internship, Dean's List, CGPA (4.0/4.3)

## Experience

### Deep Learning and Robotics Researcher, Ph.D. Thesis

Toronto, Ontario

Autonomous System and Biomechatronics Lab, University of Toronto

Sept. 2019 - Present

- **Deep Multi-agent Reinforcement Learning** Centralized training for decentralized execution to address multi-robot task inference
- **Convolutional Neural Network** CNN with Keras for traversability estimation with heightmap images for rough terrain navigation
- **Sequential Decision Making** Dec-POMDP, DDQRN, A2C/A3C with PyTorch to learn sophisticated multi-robot cooperation strategies
- **Sim 2 Real** Successfully transferred robot navigation policy from simulation to the real world using domain randomization
- **Publication** Completed papers in DRL for navigation, D-MARL for coordination and AI for healthcare

### Applied AI Researcher

Toronto, Ontario

Department of Ophthalmology and Vision Sciences, University of Toronto

May, 2021 - Present

- **Healthcare** Developed deep learning models with ophthalmologist to enhance cataract surgery and early disease detection
- **Data Collection** Automated data collection w/ Optical Character Recognition (OCR) to extract patient test data from PDFs
- **Postoperative Refraction** Built an imbalanced regression model and outperformed current standard of care
- **Disease Detection** Developed a CNN model to identify homonymous deficits from Humphry Visual Field tests

### Machine Learning Engineer

Toronto, Ontario

Robotics and ML Projects, University of Toronto

Sept. 2019 - Present

- **Music** Working with 2x Grammy Award Recipient, Sean Leon, using Stable Diffusion and GPT-3 to empower creators globally.
- **AuToronto: Self-driving Car Team** Worked with the Perception team to implement object detection (YOLO) and traffic sign labelling
- **SmartARM** Collaborated with a Microsoft funded startup to develop AI powered features for prosthetics
- **Deep Learning** Implemented various classical and DL models and optimized with AutoML techniques

### Robotics Researcher, MASc Thesis

Oshawa, Ontario

General Robotics & Autonomous Systems and Processes Lab, Ontario Tech University

May, 2017 - May, 2019

- **Mobile Robot** Designed and developed a novel multi-terrain robot including digital signal processing for various autonomy sensors
- **Electrical Systems** Designed PCBs and implemented hardware architecture for robot sensing, data acquisition and motion control
- **Computer Vision** Position and image based visual servoing of mobile manipulators for autonomous robot inspection

### Engineering Specialist/Advanced Technology Specialist Intern

Oshawa, Ontario

General Motors of Canada Company - Active Safety Advanced Development

2 Terms (2016/2017)

- **Wearable Technology** Designed wearable hardware and developed ML models to predict driver behavior based on vital signs
- **Camera System** Designed an adjustable camera system for trailers to provide drivers with greater awareness

## Recognition

2022	<b>Apple AI/ML Scholar Nominee (1 of 3 selected across university)</b> , University of Toronto	Toronto, Ontario
2022	<b>Ontario Graduate Scholarship (\$15k Prize)</b> , University of Toronto	Toronto, Ontario
2022	<b>Undergraduate Teaching Assistant Award (\$500 Prize)</b> , University of Toronto	Toronto, Ontario
2022	<b>DiDi Graduate Scholarship (\$10k Prize)</b> , University of Toronto	Toronto, Ontario
2021	<b>1st Place at RO-MAN: The Roboethics Competition (\$1k Prize)</b> , McGill University	Montreal, Quebec
2021	<b>Best Research Day Paper in Dept. of Ophthalmology and Vision Sciences</b> , University of Toronto	Toronto, Ontario
2018	<b>Photography for Apple's Shot on iPhone Campaign</b> , Apple	California, USA