

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

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** Multi-robot cooperation with centralized training for decentralized execution
- **Convolutional Neural Network** CNN with Keras for traversability estimation with heightmap images for rough terrain navigation
- **Sequential Decision Making** MDP, DDQRN, A2C/A3C, PPO 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
- **Collaboration** Supervised by Dr. Matt Schlenker and Dr. Edward Margolin in a multi-disciplinary research group

Machine Learning Engineer

Toronto, Ontario

Graduate Courses & Personal Projects, University of Toronto

Sept. 2019 - Present

- **AuToronto: Self-driving Car Team** Worked with the Perception team to implement object detection (YOLO) and traffic sign labelling
- **Machine Learning** Completed several projects using classical ML (log. reg., k-NN, Naive Bayes, SVM, Decision Trees and ensembles)
- **Deep Learning** Implemented various deep learning architectures (CNNs, RNNs) and optimized with AutoML techniques
- **SmartARM** Collaborated with a Microsoft funded startup to develop AI powered features for prosthetics

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

Awards

2022	Undergraduate Teaching Assistant Award (\$500 Prize) , University of Toronto	Toronto, Ontario
2022	DiDi Graduate Scholarship (\$10k Prize) , University of Toronto	Toronto, Ontario
2021	1st Place at RO-MAN: The Roboethics Competition (\$1k Prize) , McGill University	Montreal, Quebec
2021	Best Research Day Paper in Dept. of Ophthalmology and Vision Sciences , University of Toronto	Toronto, Ontario
2019	Outstanding Thesis Award & Dean's Graduate Scholarship (\$5k Prize) , Ontario Tech University	Oshawa, Ontario