# Aaron Hao Tan

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# **Education**

University of Toronto Toronto, Canada

Doctor of Philosophy, Robotics Institute

September. 2019 - Present

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

Ontario Tech University Oshawa, Canada

Master of Applied Science May. 2017 - May. 2019

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

Ontario Tech University Oshawa, Canada

Bachelor of Engineering with Highest Distinction 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 Al 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
- Sentiment Prediction Implemented various classical and DL models using Twitter data and optimized with AutoML techniques
- Salary Classification Feature engineering, model training\validation\tuning for ML & DS Challenge on Kaggle
- Fake News Detection Cross referenced claims with articles from a database using Scikit-Learn and Doc2Vec
- 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
- 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	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
2018	Photograhy for Apple's Shot on iPhone Campaign, Apple	California, USA
2017	1st Place at Senior Engineering Design Competition, Ontario Tech University	Oshawa, Ontario

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