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 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 **Ontario Graduate Scholarship ($15k Prize)**, University of Toronto *Toronto, Ontario*
2022 **Undergraduate Teaching Assisstant 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*