

Aaron Hao Tan

PhD Candidate (Expected December 2024)
Robotics Institute, Mechanical Engineering
University of Toronto, Canada

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Updated: *July 2024*

BIO

I am driven by the idea of giving robots the ability to anticipate the intentions of their collaborators (other robots, or humans) and the environment to enhance task completion in human-centered applications.

EDUCATION

- | | |
|--------------|---|
| 2019-Present | Doctor of Philosophy, Robotics Institute, University of Toronto, Canada
Specialization: Enhancing Robot Task Completion through Environment and Task Inference
CGPA (4.0/4.0)
Advisor: Goldie Nejat (Link) |
| 2017-2019 | Master of Applied Science, Ontario Tech University, Canada
Specialization: Mechatronics Option with Internship
President's List, CGPA (4.3/4.3)
Advisor: Haoxiang Lang, Moustafa El-Gindy |
| 2012-2017 | Bachelor of Engineering with Highest Distinction, Ontario Tech University, Canada
Specialization: Mechatronics Option with Internship
President's List, CGPA (4.0/4.3) |

PUBLICATIONS

Forthcoming Contributions

*Notable Work

- | | |
|-------|--|
| 2024* | A. H. Tan , S. Narasimhan, G. Nejat, "4CNet: A Confidence-aware, Contrastive, Conditional, Consistency Model for Robot Map Prediction in Multi-robot Environments", IEEE Transaction on Robotics
(<i>Under Review</i>) |
| 2024* | Y. Zhu, A. H. Tan , A. Fung, "Voxel-based Neural Implicit Mapping of Human Centric Environments via Contrastive Learning", IEEE Robotics and Automation Letters
(<i>Submitted</i>) |

Contributions in Progress

- | | |
|-------|--|
| 2024* | A. H. Tan , A. Fung, H. Wang, G. Nejat, "A Good Sketch is All You Need to Drive Any Mobile Robot", IEEE Robotics and Automation Letters
(<i>In Preparation</i>) |
| 2024* | A. Fung, A. H. Tan , H. Wang, B. Benhabib, G. Nejat, "A Zero-Shot Approach to Find Any Person in Any Environment using Multimodal Large Language Models", IEEE Robotics and Automation Letters
(<i>In Preparation</i>) |

- 2024* H. Wang, **A. H. Tan**, A. Fung, G. Nejat, “Cross-embodiment Navigation using Consistency Policy Distillation”, IEEE Robotics and Automation Letters
(In Preparation)
- 2024* D. Choi, A. Fung, H. Wang, **A. H. Tan**, “Visual Language Navigation for Multi-Object Search”, IEEE International Conference on Robotics and Automation
(In Preparation)
- 2024* S. Narasimhan, D. Choi, **A. H. Tan**, G. Nejat, “OLiViLa: An Online Lifelong Vision Language Approach for Mobile Robot Social Navigation”, IEEE International Conference on Robotics and Automation
(In Preparation)

Peer Reviewed Contributions

- 2024* H. Wang, **A. H. Tan**, G. Nejat, “NavFormer: Transformer Architecture for Robot Target-Driven Navigation in Unknown and Dynamic Environments”, IEEE Robotics and Automation Letters, 2024
- 2024 Y. Zhang, M. Effati, **A. H. Tan**, G. Nejat, “Robust Face Mask Detection by a Socially Assistive Robot Using Deep Learning,” Computers, 2024
- 2023* **A. H. Tan**, F. P. Bejarano, Y. Zhu, R. Ren, G. Nejat, “Deep Reinforcement Learning for Decentralized Multi-Robot Exploration with Macro Actions,” IEEE Robotics and Automation Letters + ICRA, 2023
- 2023 C.H. Cheung, **A. H. Tan**, A. Goldenberg, “Development of a Pillow Placement Process for Robotic Bed-Making”, IEEE/ASME MESA, 2023
- 2022* **A. H. Tan**, G. Nejat, “Enhancing Robot Task Completion Through Environment and Task Inference: A Survey from the Mobile Robot Perspective,” Journal of Intelligent & Robotic Systems, 2022
- 2022 **A. H. Tan**, L. Donaldson, L. Moolla, A. Pereira, E. Margolin, “A Deep Learning Model to Identify Homonymous Defects on Automated Perimetry,” British Journal of Ophthalmology, 2022
- 2022 **A. H. Tan**, A. Al-Shanoon, H. Lang, Y. Wang, “Mobile Robot Docking with Obstacle Avoidance and Visual Servoing”, International Journal of Robotics and Automation, 2022
- 2021* **A. H. Tan**, M. Peiris, M. El-Gindy, H. Lang, “Design and Development of a Novel Autonomous Scaled Multi-Wheeled Vehicle,” Robotica, 2021
- 2021* H. Hu, K. Zhang, **A. H. Tan**, M. Ruan, C. Agia, G. Nejat, “A Sim-to-Real Pipeline for Deep Reinforcement Learning for Autonomous Robot Navigation in Cluttered Rough Terrain,” IEEE Robotics and Automation Letters + IROS, 2021
- 2019 **A. H. Tan**, H. Lang, M. El-Gindy, “A Novel Autonomous Scaled Electric Combat Vehicle,” in ASME International Design Engineering Technical Conferences, Anaheim, USA, 2019
- 2018 **A. H. Tan**, A. Al-Shanoon, H. Lang, M. El-Gindy, “Mobile Robot Regulation with Image Based Visual Servoing,” in ASME International Design Engineering Technical Conferences, Quebec City, Canada, 2018
- 2018 A. Al-Shanoon, **A. H. Tan**, H. Lang, Y. Wang, “Mobile Robot Regulation with Position Based Visual Servoing,” in IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications, Ottawa, Canada, 2018

Non-Refereed Contributions

- 2024 H. M. McDonald, **A. H. Tan**, L. Donaldson, E. Margolin, “Deep Learning Model for the Radiological Diagnosis of Typical and Antibody-Mediated Optic Neuritis”, North American Neuro-Ophthalmology Society Annual Meeting, Waikiki, USA, 2024 (Poster)
- 2022 **A. H. Tan**, L. Donaldson, L. Moolla, E. Margolin, “A Deep Learning Model to Identify Homonymous Defects on Automated Perimetry”, North American Neuro-Ophthalmology Society Annual Meeting, Austin, USA, 2022 (Poster)
- 2021 **A. H. Tan**, A. Fung, M. P. Hung, C. Getson, “Jeeves, the Ethically Designed Interface”, Technical Report, Talk at RO-MAN: Roboethics Competition, McGill University (Online), 2021
- 2021 **A. H. Tan**, A. Fung, S. Sauderson, G. Nejat, “Socially Assistive Service Robots at the Autonomous Systems and Biomechatronics Lab,” University of Toronto Engineering Research Days, Toronto, ON, Canada, June, 2021 (Poster)
- 2021 **A. H. Tan**, L. Moolla, A. Pereira, “A Deep Learning Model to Predict Postoperative Refraction in Cataract Surgery”, University of Toronto Resident Research Day, Toronto, ON, Canada, June, 2021 (poster)
- 2019 **A. H. Tan**, “Design and development of an autonomous scaled electric combat vehicle”, MSc Thesis, University of Ontario Institute of Technology, Oshawa, Canada, 2019 (Master’s thesis)

RECOGNITION

Click Each for Reference

- 2024 Ontario Graduate Scholarship – University of Toronto (\$15k)
- 2024 LocalHost Fellowship (Acceptance)
- 2024 Teaching Excellence Award (Nominated)
- 2023 Microsoft Startup Hub Program (up to \$150k)
- 2023 Ontario Graduate Scholarship - University of Toronto (\$15k)
- 2022 William Dunbar Memorial Scholarship - University of Toronto (\$6k)
- 2022 Apple AI/ML Scholar Nominee - University of Toronto (1 of 3 selected across the university)
- 2022 Ontario Graduate Scholarship - University of Toronto (\$15k)
- 2022 MIE Teaching Assistant Award - University of Toronto (\$500) (Certificate)
- 2022 DiDi Graduate Awards - University of Toronto (\$10k)
- 2022 COS: Awards of Excellence in Ophthalmic Research - 2nd Place Collaborator
- 2022 MIE Fellowship - University of Toronto (\$12k)
- 2021 IEEE RO-MAN: The Roboethics Competition, McGill University - 1st Place (\$1k)
- 2021 IROS: Outstanding Service as Chair of Technical Session
- 2021 Best Ophthalmology and Vision Sciences Research Day Paper - University of Toronto
- 2021 MIE Fellowship - University of Toronto (\$12k)
- 2020 COVID-19 ...
- 2020 MIE Fellowship - University of Toronto (\$12k)
- 2019 Outstanding Thesis Award Nomination - Ontario Tech University (MSc)
- 2019 MIE Fellowship - University of Toronto (\$12k)
- 2018 FEAS Graduate Scholarship - Ontario Tech University (\$5k)
- 2018 Appeared in an international documentary commissioned by Korean Broadcasting System
- 2017 Capstone project video commissioned by Ontario Tech University for future students
- 2017 1st Place Senior Engineering Design Competition - Ontario Tech University (\$500)
- 2017 Team GM Recognition Award
- 2016 General Motors Assembly Plant Award (\$2.5k)
- 2016 NSERC Undergraduate Student Research Awards (\$8.6k)
- 2012-2017 President's List

TEACHING

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2024 S	MIE1070: Intelligent Robots for Society Head TA, University of Toronto
2024 W	MIE 443: Mechatronics Systems: Design & Integration Head TA, University of Toronto
2023 F	ROB301: Introduction to Robotics Tutorial TA, University of Toronto
2023 S	MIE1070: Intelligent Robots for Society Head TA, University of Toronto
2023 W	MIE443: Mechatronics Systems: Design & Integration Tutorial TA, University of Toronto
2022 F	ROB301: Introduction to Robotics Head TA, University of Toronto
2022 F	ECE1724: Bio-inspired Algorithms for Smart Mobility Tutorial TA, University of Toronto
2022 S	MIE1070: Intelligent Robots for Society Head TA, University of Toronto
2022 W	MIE443: Mechatronics Systems: Design & Integration Tutorial TA, University of Toronto
2022 W	ENH610: Parasitology and Pest Control Lab TA, Toronto Metropolitan University
2021 W	MIE443: Mechatronics Systems: Design & Integration Tutorial TA, University of Toronto
2020 W	MIE443: Mechatronics Systems: Design & Integration Lab TA, University of Toronto
2019 W	MECE3390U: Mechatronics Head TA, Ontario Tech University
2018 F	MECE2230U: Statics Head TA, Ontario Tech University
2018 W	MECE3390U: Mechatronics Head TA, Ontario Tech University
2017 F	MECE3350U Control Systems Head TA, Ontario Tech University

Course Evaluations: Ontario Tech University ([view 1/](#) [view 2](#)), University of Toronto ([view](#))

MENTORING

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2024-Now	Sourabh Prasad , Master of Engineering Student at University of Toronto <ul style="list-style-type: none">- Project: Cross Embodiment Navigation
2023-24	Daniel Choi , Undergraduate Student at University of Toronto <ul style="list-style-type: none">- Thesis: Trajectory Prediction and LLM Reward Tuning for Robot Social Navigation with Deep Reinforcement Learning (view)- Currently: MAsC Student at University of Toronto
2022-23	Yuhan Zhu , Master of Engineering Student at University of Toronto <ul style="list-style-type: none">- Paper: Voxel-based Neural Implicit Mapping of Human Centric Environments via Contrastive Learning (under review)- Currently: PhD Student at University of California, Riverside
2022-23	Haitong Wang , Master of Engineering Student at University of Toronto <ul style="list-style-type: none">- Paper: NavFormer: Transformer Architecture for Robot Target-Driven Navigation in Unknown and Dynamic Environments- Currently: PhD Student at University of Toronto
2022-23	Yuntao Cai , Undergraduate Student at University of Toronto <ul style="list-style-type: none">- Thesis: Decentralized Multi-Robot Exploration (view)- Currently: MAsC Student at University of Toronto
2022-23	Siddharth Narasimhan , Undergraduate Student at University of Toronto <ul style="list-style-type: none">- Thesis: Using Contrastive Learning for Map Prediction in 3D Environments via Trajectory Map Pretraining (view)- Currently: MAsC Student at University of Toronto
2021-22	Yuhan Zhu , Undergraduate Student at University of Toronto <ul style="list-style-type: none">- Thesis: A Realistic Simulator in Search and Rescue (view)- Currently: PhD Student at University of California, Riverside
2021-23	Fraser Robinson , MAsC Student at University of Toronto <ul style="list-style-type: none">- Thesis: An Intelligent Social Robot for Assisting with Multiple Daily Activities (view)- Currently: Mechatronics Engineer at Revolve Surgical
2021-22	Giro Ele , Undergraduate Student at University of Toronto <ul style="list-style-type: none">- Thesis: Investigation of Multi-object Tracking Techniques for Robotic Application (view)
2021-22	Richard Ren , Undergraduate Student at University of Toronto

- Thesis: Benchmarking Deep Reinforcement Learning Methods for Decentralized Multi-robot Exploration ([view](#))
- Currently: Software Engineer at Amazon
- 2020-21 **Federico Pizzaro Bejarano**, Undergraduate Student at University of Toronto
 - Thesis: Research and Implementation of Decentralized Multi-Robot Coordination Methods Applied to Urban Search and Rescue ([view](#))
 - Currently: PhD Student at University of Toronto
- 2020-21 **Ge Lin**, Undergraduate Student at University of Toronto
 - Thesis: Simulator for Search and Rescue ([view](#))
 - Currently: Robotics Engineer at Zebra Technologies
- 2018-19 **Undergraduate Capstone Project Supervision**, Ontario Tech University
 - Supervised 4 cross functional teams ([view](#))
- 2017-18 **Undergraduate Capstone Project Supervision**, Ontario Tech University
 - Supervised 2 cross functional teams

ACADEMIC SERVICE

- 2020-Now **Conference Reviewer**
- IEEE International Conference on Robotics and Automation (ICRA)
 - Conference on Robot Learning (CoRL)
 - IEEE International Conference on Intelligent Robots and Systems (IROS)
 - Robotics: Science and Systems (RSS)
- Journal Reviewer**
- IEEE Robotics and Automation Letters (RA-L)
 - International Journal of Intelligent and Robotic Systems
 - Machine Learning (Springer Nature)
 - Scientific Reports (Springer Nature)

NEWS & ACTIVITIES

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- 2023 S Placed 3rd in the prestigious Shot on iPhone Photography Award hosted by [IPPAWARDS \(Picture\)](#)
- 2023 W Won 1st place in Toronto's competitive men's basketball league ([Picture](#))
- 2022 F Won 1st place in Toronto's competitive men's basketball league ([Picture](#))
- 2022 F Designed billboards using DALL-E for Grammy Award recipient Sean Leon ([Pic1/ Pic2](#))
- 2022 S Organized paintball social event for Robotics Institute at the University of Toronto ([Picture](#))
- 2022 S Won 1st place in Toronto's competitive men's basketball league ([Pic 1/Pic 2](#))
- 2021 F Won 2nd place in Toronto's recreational men's basketball league ([Picture](#))
- 2019 S Photographer of the Local Organization Committee for the [14th IEEE ICCSE Conference](#)
- 2018 S Featured in Apple's Shot on iPhone photography campaign ([Pic 1/Pic 2](#))

PROFESSIONAL EXPERIENCE

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| Syncere AI
Founder
2024 Q2 – Now | <ul style="list-style-type: none">- An augmented reality platform for remote control and automation of humanoid robots in service settings.- YC Interview with Diana Hu and Jared Friedman.- Website: https://www.syncereai.com |
| Scholarply
Founder
2023 Q3 – Q4 | <ul style="list-style-type: none">- An LLM agent that accelerate the scholarship application process for students.- Selected by Microsoft Startup Hub, receiving grants worth \$150k.- Successfully raised at \$1.5M valuation.- Website: https://www.scholarply.com |
| ONE800
Founder
2023 Q1 – Q2 | <ul style="list-style-type: none">- A personalized assistant integrated in to iMessage.- Led a team of 10 across engineering, design and operations.- YC Interview with Garry Tan and Harj Taggar. |
| Mount Sinai Hospital
AI Researcher
2022 – Now | <ul style="list-style-type: none">- Working with neuro-ophthalmologists in developing AI tools to support early disease detection and enhance cataract surgery.- Published medical papers. |
| SmartARM
ML Consultant
2021 Summer | <ul style="list-style-type: none">- I worked closely with founders and engineers to develop core business processes, identified key operational metrics, and led design reviews.- Website: https://www.smartarm.ca |
| General Motors
Internship
2 Appointments
2016/2017 | <ul style="list-style-type: none">- Designed wearable hardware and developed ML models to predict driver behavior based on vital signs.- Designed an adjustable camera system for trailers to provide drivers with greater awareness.- Project Video: https://www.youtube.com/watch?v=WCD9Q_Y4WIA |

PERSONAL INFORMATION

Languages: English, Mandarin
Hobbies: Basketball, Photography
Citizenship: Canadian