Aaron Hao Tan, MASc, PhD

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BIO

I'm an incoming postdoctoral fellow at Stanford Robotics. I'm interested in robotic theory of mind to help robots predict their environment, understand collaborators' intentions, and make teamwork more efficient.

PUBLICATIONS

Forthcoming Contributions

*Notable Work

2024* **A. H. Tan**, S. Narasimhan, G. Nejat, "4CNet: A Diffusion Approach to Map Prediction for Decentralized Multi-Robot Exploration", IEEE Transaction on Robotics (*Under Review*)

2024* S. Narasimhan, D. Choi, **A. H. Tan**, G. Nejat, "OLiVia-Nav: An Online Lifelong Vision Language Approach for Mobile Robot Social Navigation", IEEE International Conference on Robotics and Automation (*Under Review*), CoRL 2024 (*Workshop*)

2024* D. Choi, A. Fung, H. Wang, **A. H. Tan**, "Find Everything: A General Vision Language Model Approach to Multi-Object Search", IEEE International Conference on Robotics and Automation, (*Under Review*), CoRL 2024 (*Workshop*)

Contributions in Progress

2024* **A. H. Tan**, A. Fung, H. Wang, G. Nejat, "Mobile Robot Navigation with Hand-drawn Maps: A Vision Language Model Approach", IEEE Robotics and Automation Letters
(*In Preparation*)

2024* A. Fung, **A. H. Tan**, H. Wang, B. Benhabib, G. Nejat, "MLLM-Search A Zero-Shot Approach to Find Any Person in Any Environment using Multimodal Large Language Models", IEEE Robotics and Automation Letters
(*In Preparation*)

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* Y. Zhu, **A. H. Tan**, A. Fung, G. Nejat, "Voxel-based Neural Implicit Mapping of Human Centric Environments via Contrastive Learning", IEEE Robotics and Automation Letters
(*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", MASc Thesis, University of Ontario Institute of Technology, Oshawa, Canada, 2019)

Recognition/Scholarships/Grants/Awards

Click Each Award for Reference

2024	PRISM Corhort - Stanford University
2024	Doctoral Completion Award - University of Toronto ($4k)
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 (MASc)
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

Click Each Eval for Reference

2024 F	MIE1517: Introduction to Deep Learning Tutorial TA, University of Toronto
2024 F	ROB301: Introduction to Robotics Tutorial TA, University of Toronto
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: University of Toronto (Eval/Certificate), Ontario Tech University (view 1/ view 2)

MENTORING

Click View and **Name** for Reference

2024-Now **Sourabh Prasad**, Master of Engineering Student at University of Toronto
- Project: Cross Embodiment Navigation

2023-24 **Daniel Choi,** Undergraduate Student at University of Toronto
- 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
- 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
- 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
- Thesis: Decentralized Multi-Robot Exploration (view)
- Currently: MASc Student at University of Toronto

2022-23 **Siddarth Narasimhan,** Undergraduate Student at University of Toronto
- 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
- 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
- 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
- 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

Click Each Item for Reference

2024 F	Spotlight Presentation @ CoRL 2024 (Invite, Talk)
2024 S	Keynote Speaker at The Future of Construction (Picture/Talk)
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)

ACADEMIC TRAINING

2025 Postdoctoral Fellow, Stanford University, USA
Assistive Robotics and Manipulation Laboratory
Advisor: Monroe Kennedy

2019-2024 Doctor of Philosophy, Robotics Institute, University of Toronto, Canada
Specialization: Development of Inference-driven Decision Making for Mobile Robot Navigation and Exploration
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)

PROFESSIONAL EXPERIENCE

Click Each Item for Reference

Syncere
Founder
2024 Q4 – Now
- Building robots for modern hospitality.
- Website: https://www.syncereai.com

Scholarply
Founder
2023 Q3 – Q4
- An LLM agent that accelerate the scholarship application process for students.
- Selected by Microsoft Startup Hub, receiving grants worth $150k.
- Article / Newsletter / TikTok / Demo
- Website: https://www.scholarply.com

ONE800
Founder
2023 Q1 – Q2
- A personalized assistant integrated in to iMessage.
- Led a team of 10 across engineering, design and operations.
- Twitter / Instagram / Demo / Team (Pic1 / Pic2)
- Website: http://3.230.3.191/

Toronto Eye
AI Researcher
2022 – Now
- 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
- 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
- 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

REFERENCES

PhD Supervisor: Dr. Goldie Nejat, goldie.nejat@utoronto.ca
MASc Supervisor: Dr. Haoxiang Lang, haoxiang.Lang@ontariotechu.ca
Collaborator: Dr. Edward Margolin, Edward.Margolin@uhn.ca

PERSONAL INFORMATION

Languages: English, Python, Mandarin
Hobbies: Basketball, Photography, Music, Food
Citizenship: Canadian