

# Aaron Hao Tan, MASc, PhD

Robotics Institute, Mechanical Engineering  
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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	<b>Sourabh Prasad</b> , Master of Engineering Student at University of Toronto <ul style="list-style-type: none"><li>- Project: Cross Embodiment Navigation</li></ul>
2023-24	<b>Daniel Choi</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Trajectory Prediction and LLM Reward Tuning for Robot Social Navigation with Deep Reinforcement Learning (<a href="#">view</a>)</li><li>- Currently: MASc Student at University of Toronto</li></ul>
2022-23	<b>Yuhan Zhu</b> , Master of Engineering Student at University of Toronto <ul style="list-style-type: none"><li>- Paper: Voxel-based Neural Implicit Mapping of Human Centric Environments via Contrastive Learning (under review)</li><li>- Currently: PhD Student at University of California, Riverside</li></ul>
2022-23	<b>Haitong Wang</b> , Master of Engineering Student at University of Toronto <ul style="list-style-type: none"><li>- Paper: NavFormer: Transformer Architecture for Robot Target-Driven Navigation in Unknown and Dynamic Environments</li><li>- Currently: PhD Student at University of Toronto</li></ul>
2022-23	<b>Yuntao Cai</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Decentralized Multi-Robot Exploration (<a href="#">view</a>)</li><li>- Currently: MASc Student at University of Toronto</li></ul>
2022-23	<b>Siddarth Narasimhan</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Using Contrastive Learning for Map Prediction in 3D Environments via Trajectory Map Pretraining (<a href="#">view</a>)</li><li>- Currently: MASc Student at University of Toronto</li></ul>
2021-22	<b>Yuhan Zhu</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: A Realistic Simulator in Search and Rescue (<a href="#">view</a>)</li><li>- Currently: PhD Student at University of California, Riverside</li></ul>
2021-23	<b>Fraser Robinson</b> , MASc Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: An Intelligent Social Robot for Assisting with Multiple Daily Activities (<a href="#">view</a>)</li><li>- Currently: Mechatronics Engineer at Revolve Surgical</li></ul>
2021-22	<b>Giro Ele</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Investigation of Multi-object Tracking Techniques for Robotic Application (<a href="#">view</a>)</li></ul>
2021-22	<b>Richard Ren</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Benchmarking Deep Reinforcement Learning Methods for Decentralized Multi-robot Exploration (<a href="#">view</a>)</li><li>- Currently: Software Engineer at Amazon</li></ul>
2020-21	<b>Federico Pizzaro Bejarano</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Research and Implementation of Decentralized Multi-Robot Coordination Methods Applied to Urban Search and Rescue (<a href="#">view</a>)</li><li>- Currently: PhD Student at University of Toronto</li></ul>
2020-21	<b>Ge Lin</b> , Undergraduate Student at University of Toronto <ul style="list-style-type: none"><li>- Thesis: Simulator for Search and Rescue (<a href="#">view</a>)</li><li>- Currently: Robotics Engineer at Zebra Technologies</li></ul>
2018-19	<b>Undergraduate Capstone Project Supervision</b> , Ontario Tech University <ul style="list-style-type: none"><li>- Supervised 4 cross functional teams (<a href="#">view</a>)</li></ul>
2017-18	<b>Undergraduate Capstone Project Supervision</b> , Ontario Tech University <ul style="list-style-type: none"><li>- Supervised 2 cross functional teams</li></ul>

## 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](https://www.youtube.com/watch?v=WCD9Q_Y4WIA)

## REFERENCES

PhD Supervisor: Dr. Goldie Nejat, [goldie.nejat@utoronto.ca](mailto:goldie.nejat@utoronto.ca)

MASc Supervisor: Dr. Haoxiang Lang, [haoxiang.Lang@ontariotechu.ca](mailto:haoxiang.Lang@ontariotechu.ca)

Collaborator: Dr. Edward Margolin, [Edward.Margolin@uhn.ca](mailto:Edward.Margolin@uhn.ca)

## PERSONAL INFORMATION

Languages: English, Python, Mandarin

Hobbies: Basketball, Photography, Music, Food

Citizenship: Canadian