

Karthik Mahadevan, *Postdoctoral Associate*

Department of Aeronautics and Astronautics
Massachusetts Institute of Technology
Email: mahade0@mit.edu
Website: karthikmahadevan.ca
Citizenship: Canadian

Research Interests

My research interests lie in Human–Robot Interaction, with a focus on building interactive systems and computational techniques that support mutual intelligibility between people and robots.

Appointments

2026 - Present **MIT–Amazon Future of Work Postdoctoral Fellow**
Mentors: Dr. Julie Shah, Dr. Ben Armstrong

Education

2019-2025 **Ph.D., Computer Science**
University of Toronto
Advisor: Dr. Tovi Grossman
Committee: Dr. Tony Tang, Dr. Daniel Wigdor, Dr. Alex Mariakakis, Dr. Carman Neustaedter

2019 **M.Sc., Computer Science**
University of Calgary
Advisors: Dr. Ehud Sharlin, Dr. Sowmya Somanath


2016 **B.Sc., Electrical Engineering (with Distinction)**
University of Alberta
Advisor: Dr. Douglas Barlage


Honors & Awards

2025 **NSERC Postdoctoral Fellowship (Declined)**
Awarded by the Natural Sciences and Engineering Research Council of Canada (NSERC). Acceptance rate 21% (164 / 751 applicants). Rank: 3/70 in Computing Sciences. CAD \$140 000 (\$70 000 x 2 years).

2025 **Best Technical Paper (Top 1%)**
ACM/IEEE International Conference on Human-Robot Interaction (HRI).

2024 **Best Technical Paper (Top 1%)**
ACM/IEEE International Conference on Human-Robot Interaction (HRI).

2022-2025 **Google PhD Fellowship **
Awarded to support innovative research in areas relevant to computer science (one of 74 global recipients and the only one from Canada). CAD \$144 000 (\$48 000 x 3 years). Mentor: Dr. Carolina Parada.

- 2021 **Best Paper Honorable Mention (Top 5%)**
ACM Conference on Human Factors in Computing Systems (CHI).
- 2020-2023 **NSERC Canada Graduate Scholarship (CGS-D)** 
Awarded by the Natural Sciences and Engineering Research Council of Canada (NSERC) to promote continued excellence in Canadian research by rewarding and retaining high-calibre doctoral students at Canadian institutions. Application ranked 18 of 166 applicants in the Computing Sciences committee. Acceptance rate 17% (326 / 1878 applicants). CAD \$105 000 (\$35 000 x 3 years).
- 2020 **Entrance Scholarship**
Awarded by the Department of Computer Science. CAD \$10 000 over the academic year.
- 2019 **Doctoral Recruitment Award**
Awarded by the Faculty of Arts and Sciences. CAD \$15 000 over the academic year.
- 2018 **HRI Pioneer** 
Selected for the highly competitive Pioneers Workshop at HRI 2018, where top student researchers present and discuss their work with distinguished peers and senior scholars.
- 2018 **Departmental Research Award**
Awarded based on faculty nomination to pursue M.Sc. research. CAD \$4 800 over the academic year.
- 2018 **Queen Elizabeth II Graduate Scholarship**
Awarded by the Government of Alberta to pursue M.Sc. research at the University of Calgary. CAD \$10 800 over the academic year.
- 2016 **Graduation with Distinction (Rank 3 out of 116)**
Awarded for maintaining Engineering Graduation Average (EGA) of 3.5 or greater during undergraduate program.
- 2016 **Dean's Research Award**
Awarded to pursue research in thin-film nanoengineering.
- 2014 **Louise McKinney Post-Secondary Scholarship**
Awarded based on standing over the academic year (declined to pursue industrial internship). CAD \$2 500.
- 2014, 2013 **Jason Lang Scholarship**
Awarded based on standing over the academic year. CAD \$1 000.

Publications

Conference

Note: In human-computer interaction (HCI), conference proceedings are the preferred publication venue since they are timelier and typically have the greatest impact. Top-tier conferences are very selective with rigorous multi-stage reviews of full manuscripts creating high-quality, fully archival, proceedings. All paper titles include hyperlinks to PDF versions.

- [C.12] **Karthik Mahadevan**, Anthony Tang. TeleProxy: Physical Proxies for Remote Robot Teleoperation. *In Preparation for IROS 2026.*
- [C.11] Luigi Vazquez, **Karthik Mahadevan**, Ludwig Sidenmark, Tovi Grossman. Direct Interaction and User-Defined Saliency For 360° Video Navigation in Virtual Reality. *In Preparation for UIST 2026.*

- [C.10] **Karthik Mahadevan**, Blaine Lewis, Jiannan Li, Bilge Mutlu, Anthony Tang, Tovi Grossman. ImageInThat: Manipulating Images to Convey User Instructions to Robots. In *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2025. **Acceptance Rate: 25%.**
Best Technical Paper (Top 1%).
- [C.9] **Karthik Mahadevan**, Jonathan Chien, Noah Brown, Zhuo Xu, Carolina Parada, Fei Xia, Andy Zeng, Leila Takayama, Dorsa Sadigh. Generative Expressive Robot Behaviors using Large Language Models. In *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2024. **Acceptance Rate: 25%.**
Best Technical Paper (Top 1%).
- [C.8] **Karthik Mahadevan**, Qian Zhou, George Fitzmaurice, Tovi Grossman, Fraser Anderson. Tesseract: Querying Spatial Design Recordings by Manipulating Worlds in Miniature. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2023. **Acceptance Rate: 28%.**
- [C.7] Jiannan Li , Mauricio Sousa, **Karthik Mahadevan**, Bryan Wang, Paula Akemi Aoyagui, Nicole Yu, Angela Yang, Ravin Balakrishnan, Anthony Tang, Tovi Grossman. Stargazer: An Interactive Camera Robot for Capturing How-To Videos Based on Subtle Instructor Cues. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2023. **Acceptance Rate: 28%.**
- [C.6] Rachel Phinnemore, Mohi Reza, Blaine Lewis, **Karthik Mahadevan**, Bryan Wang, Michelle Annett, Daniel Wigdor. Creepy Assistant: Development and Validation of a Scale to Measure the Perceived Creepiness of Voice Assistants. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2023. **Acceptance Rate: 28%.**
- [C.5] **Karthik Mahadevan**, Yan Chen, Maya Cakmak, Anthony Tang, and Tovi Grossman. Mimic: In-Situ Recording and Re-Use of Demonstrations to Support Robot Teleoperation. In *Proceedings of the ACM Symposium on User Interface Software and Technology (UIST)*, 2022. **Acceptance Rate: 26%.**
- [C.4] **Karthik Mahadevan**, Mauricio Sousa, Anthony Tang, Tovi Grossman. “Grip-that-there”: An Investigation of Explicit and Implicit Task Allocation Techniques for Human-Robot Collaboration. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2021. **Acceptance Rate: 26%.**
Best Paper Honorable Mention (Top 5%).
- [C.3] Ming Hou, **Karthik Mahadevan**, Sowmya Somanath, Lora Oehlberg, Ehud Sharlin. Autonomous Vehicle-Cyclist Interaction: Peril and Promise. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2020. **Acceptance Rate: 24%.**
- [C.2] **Karthik Mahadevan**, Elaheh Sanoubari, Sowmya Somanath, James E Young, Ehud Sharlin. AV-Pedestrian Interaction Design Using a Pedestrian Mixed Traffic Simulator. In *Proceedings of the ACM Conference on Designing Interactive Systems Factors (DIS)*, 2019. **Acceptance Rate: 25%.**
- [C.1] **Karthik Mahadevan**, Sowmya Somanath, Ehud Sharlin. Communicating Awareness and Intent in Autonomous Vehicle-Pedestrian Interaction. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2018. **Acceptance Rate: 25%.**

Journal

- [J.2] Yoshiaki Shiokawa, **Karthik Mahadevan**, Michael Hedderich, Jason Alexander, Adwait Sharma. Fallible Domestic Robots: A Systematic Corpus of Domestic Robot Failure and an Interactive Failure Mitigation Design Toolkit. In *Preparation for Science Robotics*.

- [J.1] Bingjian Huang, Zhecheng Wang, Qilong Cheng, Siyi Ren, Hanfeng Cai, Antonio Alvarez Valdivia, **Karthik Mahadevan**, Daniel Wigdor. AeroHaptix: A Wearable Vibrotactile Feedback System for Enhancing Collision Avoidance in UAV Teleoperation. *IEEE Robotics and Automation Letters*, 2025. Presented at IROS 2025.

Workshop and Extended Abstracts

- [W.3] **Karthik Mahadevan**, Sowmya Somanath, Ehud Sharlin. Enabling Pedestrian Communication with Autonomous Vehicles. In CHI 2018 Workshop *Interacting with Autonomous Vehicles: Learning from other Domains*, 2018. (Position Paper).
- [W.2] **Karthik Mahadevan**, Sowmya Somanath, Ehud Sharlin. Can Interfaces Facilitate Communication in Autonomous Vehicle-Pedestrian Interaction? In *Companion Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2018. (Pioneers Workshop). **Acceptance Rate: 31%**.
- [W.1] **Karthik Mahadevan**, Sowmya Somanath, Ehud Sharlin. "Fight-or-Flight": Leveraging Instinctive Human Defensive Behaviors for Safe Human-Robot Interaction. In *Companion Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2018. (Late-Breaking Report).

Patents

- [P.2] **Karthik Mahadevan** Lucas Gadani, Tanya Jonker, Ting Zhang, Frances Lai, Anna Martinez, Ruta Desai, Yan Xu. System and method for learning and recognizing object-centered routines, 2024.
- [P.1] **Karthik Mahadevan**, Tovi Grossman, Fraser Anderson, George William Fitzmaurice, Qian Zhou. Active and passive querying of spatial recordings, 2024.

Industry Experience

- May-Aug 2023 **Student Researcher**
Google Deepmind Robotics. Mountain View, United States.
Mentors: Dr. Dorsa Sadigh, Dr. Leila Takayama, Dr. Carolina Parada.
Led independent research on human-robot interaction, culminating in a publication and best-paper award at HRI 2024 [C.9].
- May-Dec 2022 **Research Scientist Intern**
Meta Reality Labs. Toronto, Canada.
Mentors: Lucas Gadani, Dr. Brad A. Myers.
Conducted novel research on augmented reality, contributing to a patent [P.2] and the internal codebase.
- May-Sept 2021 **Research Intern**
Autodesk Research. Remote.
Mentors: Dr. Qian Zhou, Dr. Fraser Anderson, Dr. George Fitzmaurice.
Conducted novel research on virtual reality interactions, leading to a publication at CHI [C.8] and a patent [P.1].
- Jan-June 2019 **Research Intern**
Honda Research Institute. San Jose, United States.
Mentor: Dr. Teruhisa Misu.

Conducted research on autonomous vehicle-driver interactions, contributing to internal knowledge and codebase.

Feb-Dec 2017 **Machine Awareness and Vision Development Researcher**
Alberta Centre for Advanced MNT Products. Calgary, Canada.
Pursued computer vision project on autonomous wildlife detection.

Invited Talks

- Aug 2025 [T.18] **Autodesk Research**
Title: Beyond the Prompt: Designing Intent-Aware Interfaces for Generative AI.
- July 2025 [T.17] **AXL labs**
Title: Enhancing the Interaction Capabilities of Robots.
- Apr 2025 [T.16] **McGill University — ECE**
Title: Enhancing the Interaction Capabilities of Robots.
- Apr 2025 [T.15] **University of Illinois Chicago — CS**
Title: Enhancing the Interaction Capabilities of Robots.
- Mar 2025 [T.14] **The University of Texas at Austin — CS**
Title: Enhancing the Interaction Capabilities of Robots.
- Mar 2025 [T.13] **Toronto Metropolitan University — CS**
Title: Enhancing the Interaction Capabilities of Robots.
- Mar 2025 [T.12] **Naver Labs Europe**
Title: Enhancing the Interaction Capabilities of Robots.
- Feb 2025 [T.11] **Dartmouth College — CS**
Title: Enhancing the Interaction Capabilities of Robots.
- Jan 2025 [T.10] **University of Wisconsin-Madison — CS**
Title: Enhancing the Interaction Capabilities of Robots.
- Nov 2024 [T.9] **Princeton University — COS 597U**
Title: Intro to Human-Robot Interaction.
- Nov 2023 [T.8] **The University of British Columbia — CS**
Title: End-User Robot Programming.
- Oct 2023 [T.7] **Google DeepMind Robotics**
Title: Generative Expressive Robot Behaviors using Large Language Models.
- Dec 2022 [T.6] **Meta Reality Labs**
Title: Augmented Reality for Recognizing User Routines.
- Aug 2021 [T.5] **Autodesk Research**
Title: Querying Spatial Recordings using Virtual Reality.
- May 2020 [T.4] **University of Victoria — SENG 310**
Title: Human Interaction with Autonomous Vehicles.
- Feb 2018 [T.3] **University of Calgary — CPSC 684**
Title: Autonomous Vehicle-Pedestrian Interactions.

- Dec 2017 [T.2] **Alberta Centre for Advanced MNT Products**
Title: Autonomous Vehicle-Pedestrian Interactions.
- May 2017 [T.1] **University College London — UCLIC**
Title: Autonomous Vehicle-Pedestrian Interactions.

Press Coverage

- 2024 Teaching Robots Manners.
 2024 DeepMind's GenEM uses LLMs to generate expressive behaviors for robots.
 2023 Researchers develop interactive 'Stargazer' camera robot that can help film tutorial videos.
 2022 Karthik Mahadevan receives 2022 Google PhD Fellowship in HCI.
 2022 Announcing the 2022 PhD Fellows.
 2018 Autonomous Cars: Eyes to Signify, Not to See.
 2018 Robot Hugs and Cars that Communicate: How Smart Machines and Humans Interact.

Student Mentoring

- 2025-Present **Yoshiaki Shiokawa.** Computer Science (Ph.D.), University of Bath.
Thesis: TBD
- 2024-2025 **Luigi Vazquez.** Engineering Science (B.Sc.), University of Toronto.
Thesis: Direct Manipulation for 360 Video and VR Media Navigation.
- 2023-2024 **Courtney Amm.** Computer Science (B.Sc.), University of Toronto.
Thesis: Combining Classical Planning with LLMs for Human-Robot Interaction.
 Now: M.Sc. student at University of Toronto.
- 2023-2024 **Amy Chen.** Engineering Science (B.Sc.), University of Toronto.
Thesis: Leveraging LLMs for Human to Robot Object Handovers.
 Now: Software Engineer at Google.
- 2023-2024 **Qihan Gao.** Engineering Science (B.Sc.), University of Toronto.
Thesis: Implicit Human Response Detection in Human-Robot Interaction.
 Now: M.Sc. student at Simon Fraser University.
- 2022-2023 **Jeannie Jiyun Yoo.** Cognitive Science & Computer Science (B.Sc.), University of Toronto.
Thesis: Leveraging Subtle Visual Social Cues for Optimized Human-Robot Interaction.
 Now: AI Engineer & Consultant at IBM.
- 2020-2022 **Rachel Phinnemore.** Computer Science (M.Sc.), University of Toronto.
Thesis: Creepy Assistant: Development and Validation of a Scale to Measure the Perceived Creepiness of Voice Assistants.
 Now: Product Manager at Google.
- 2020-2021 **Qian (Philip) Chen.** Engineering Science (B.Sc.), University of Toronto.
Thesis: Sketch Composition Assistance Through Dynamic Thumbnail Sketch Manipulation.
 Now: Machine Learning Engineer at Shopify.
- 2019 **Ming Hou.** Electrical & Computer Engineering (B.Sc.), University of Calgary.
 Now: Software Engineer at Fortinet.

Teaching

At University of Toronto




- Jan-Apr 2024 **Course Moderator**
CSC2524 - Topics in Interactive Computing.
Developed course materials for 3/12 weeks, with a focus on Human-Robot Interaction (HRI), and facilitated discussions during those sessions.
- 2020-2025 **Teaching Assistant**
CSC404 - Video Game Design.
Served as the lead TA for ten iterations of the course, providing technical and coding support for game development using the Unity3D engine. Regularly met with project teams to discuss progress and offer guidance on advancing their work.
- Jan-Dec 2020 **Teaching Assistant**
CSC2536 - Topics in Computer Science and Education.
Served as the TA for two iterations of the course. Assisted with grading reports and meeting students to discuss course projects.

At University of Calgary

- Jan-Apr 2018 **Teaching Assistant**
CPSC 203 - Introduction to Problem Solving with Applications.
Taught weekly tutorials covering computing fundamentals, including spreadsheets, databases, and programming.

Service

Organizing

- 2025 **Associate Chair, Full Papers**
Graphics Interface (GI) 
- 2024-Present **Associate Chair, Full Papers**
ACM CHI Conference on Human Factors in Computing Systems (CHI) 
- 2023-2024 **Associate Chair, Late Breaking Work**
ACM UIST Symposium on User Interface Software and Technology (UIST)
- 2021-2024 **Associate Chair, Late Breaking Work**
ACM CHI Conference on Human Factors in Computing Systems (CHI)
- 2022 **Student Volunteer Chair**
ACM International Conference on Mobile Human-Computer Interaction (MobileHCI) 

Reviewing

Conference

- 2024 *IEEE International Conference on Intelligent Robots and Systems (IROS)*
- 2021-Present *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*
2 x Special Recognition for Outstanding Review.
- 2020-Present *ACM/IEEE International Conference on Human-Robot Interaction (HRI) Pioneers*

- 2020-Present *ACM UIST Symposium on User Interface Software and Technology (UIST)*
2 x Special Recognition for Outstanding Review.
- 2019-Present *ACM CHI Conference on Human Factors in Computing Systems (CHI)*
2 x Special Recognition for Outstanding Review.
- 2023 *ACM Conference on Designing Interactive Systems (DIS)*
- 2019 *ACM International Conference on Tangible, Embedded and Embodied Interaction (TEI)*
- 2019 *ACM International Conference on Interactive Surfaces and Spaces (ISS)*
- 2019 *ACM Graphics Interface Conference (GI)*
- 2018 *ACM Nordic Conference on Human-Computer Interaction (NordiCHI)*

Journal

- 2021-Present *ACM Transactions on Human-Robot Interaction (THRI)*
- 2021 *IEEE Transactions On Human Machine Systems (THMS)*
- 2020 *ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*
- 2019 *Transportation Research Part F: Traffic Psychology and Behaviour*

Volunteering and Mentoring

- 2024 - Present **Graduate Application Assistance Program**
Mentored prospective students through the application process at the Department of Computer Science.
- 2021, 2018 **Student Volunteer**
ACM CHI Conference on Human Factors in Computing Systems (CHI)
- 2020 **Her Code Camp**
Supported a team of high school students in building a Python game as part of a coding camp.
- 2018 **Student Volunteer**
ACM/IEEE International Conference on Human-Robot Interaction (HRI)
- 2015 **Engineering Tour Guide**
University of Alberta Open House.
Facilitated campus tours for prospective students and their families, providing insights into the undergraduate program and addressing their inquiries.
- 2012 **Electrical Engineering Advisor**
University of Alberta Open House.
Provided support and guidance for inquiries regarding admissions to the undergraduate program.

References

Available upon request.