Malika Meghjani, Ph.D.

Director of Multi-Agent Robot Vision and Learning (MARVL) Lab,
Assistant Professor of Robotics and Intelligent Systems,
Computer Science and Design (CSD),
Singapore University of Technology and Design (SUTD)

CONTACT INFORMATION

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RESEARCH INTEREST

Mobile Robotics, Multi-Robot Coordination, Planning under Uncertainty, Fleet Management, Computer Vision, Machine Learning, Algorithm Design, Image and Signal Processing, Autonomous Underwater Vehicles (AUV) and Autonomous Surface Vehicles (ASV), Self-Driving Cars.

PROFESSIONAL PREPARATION

2010-2016 **Ph.D., Computer Science**, McGill University
Thesis Topic: *Multi-Agent Rendezvous*
Advisor: Prof. Gregory Dudek
Area of Study: Multi-robot exploration, mapping, planning and coordination

2007-2009 **M.Eng., Electrical and Computer Engineering**, McGill University
Thesis Topic: *Bimodal Information Analysis for Emotion Recognition*
Advisor: Prof. Frank P. Ferrie and Prof. Gregory Dudek
Area of Study: Computer Vision, Machine Learning, Pattern Recognition

2003-2007 **B.Eng., Electronics and Communication Engineering**, Osmania University
Thesis Topic: *JPEG Compression using MATLAB Platform*
Advisor: Dr. Suryakanth Gangashetty (IIIT, Hyderabad)
Area of Study: Image and Signal Processing, Communication Theory

ACADEMIC AND PROFESSIONAL APPOINTMENTS

- **Assistant Professor**, Singapore University of Technology and Design (SUTD), 2019-present.
- **Distinguished Lecturer**, IEEE Robotics and Automation Society, Multi-Robot Systems Technical Committee, 2023 - present
- **Principal Investigator**, Temasek Laboratories, SUTD, 2019-present.
- **Collaborating Faculty**, Singapore-MIT Alliance for Research and Technology, 2019-present.
- **Academic Board Advisor**, AI Business School, 2020-present.
- **Academic Board Advisor**, Singapore Women in Engineering (SWE), SUTD, 2020-present.
- **Lead Research Scientist**, Singapore-MIT Alliance for Research and Technology, 2018-2019.
- **Post Doctoral Scholar**, Singapore-MIT Alliance for Research and Technology, 2017-2019.

AWARDS AND HONORS

- **World's 50 Most Renowned Women in Robotics**, Analytics Insight, 2020.
- **Top 30 Women in Robotics** for 2019.
- **SMART Scholarship** for postdoctoral research, Singapore, Feb. 2017 - Feb. 2019.
- **Finalist for Best Paper Award on Safety Security and Resue Robotics**, at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Oct. 2016.
- **NSERC Canadian Field Robotics Network, Strategic Network Enhancement Initiative Award** for the best robotics start-up proposal, Canada, Jun. 2015 - Jun. 2016.
- **IEEE Larry K. Wilson Regional Student Activities Award** for excellent student leadership in Canada, IEEE Montreal Section Annual Banquet, Oct. 2015.
- **McGill Scarlet Key Award** for excellence in community leadership, Mar. 2015.
- **AAAI Robotics Fellowship** at the AAAI conference, USA, Jan. 2015.
- **IEEE Canada Women in Engineering Prize** for academic excellence and contributions to IEEE women in engineering programme, Nov. 2013.
- **Google Anita Borg Finalist and Scholar** for leadership and academic excellence at the Google Scholars' Retreat, Canada, Jul. 2012 and Jul. 2013.

- **IEEE Canada and Montreal Exemplary Students' Branch Award** as McGill IEEE Vice Chair at 75th Anniversary Banquet, Nov 2011 and Sep. 2012.
- **Best Technical Presentation Award** in Cognition and Brain Category at Interdisciplinary Graduate Student Research Symposium, McGill University, Mar. 2009.
- **McGill Graduate Studies Fellowship Award** for academic excellence from Graduate and Postdoctoral Studies Office, Canada, Sep. 2007.

PUBLICATIONS[1]

- S. V. Thengane, Y. X. Tan, M. B. Prasetyo, **M. Meghjani**, "Using Semantic Features for Online Video Summarization in Underwater Context", IEEE/MTS OCEANS, 2023
- Y. X. Tan, M. B. Prasetyo, M. A. Daffa, D. S. Nitin, **M. Meghjani**, "Evaluating Visual Odometry Methods for Autonomous Driving in Rain", IEEE International Conference on Automation Science and Engineering (CASE), 2023
- Y. Loo, G. Chen, **M. Meghjani**, "A Hierarchical Approach to Population Training for Human-AI Collaboration", International Joint Conferences on Artificial Intelligence, 2023.
- M. Kouzeghar, Y. Song, **M. Meghjani**, R. Bouffanais, "Multi-Target Pursuit by a Decentralized Heterogeneous UAV Swarm using Deep Multi-Agent Reinforcement Learning", IEEE International Conference on Robotics and Automation (ICRA), 2023.
- G. Chen*, D. Nguyen-Nam*, **M. Meghjani***, P. M. Tri, M. B. Prasetyo, M. A. Daffa, T. Q. S. Quek, "Astralis: A High-Fidelity Simulator for Heterogeneous Robot and Human-Robot Teaming", IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), 2022.
- Y. W. Sui, K. X. Ming, **M. Meghjani**, N. Raghavan, C. Jegourel, K. Kang, "An Automated Data Processing Pipeline for Coral Reef Monitoring", IEEE/MTS OCEANS, 2022.
- P. Wang, **M. Meghjani**, G. Chen, "Marine Trash Collection", IEEE/MTS OCEANS, 2022.
- N. Shrivasatava*, **M. Meghjani***, "Congestion-Aware Routing for Multi-Class Mobility-on-Demand Service", IEEE International Conference on Automation Science and Engineering (CASE), 2022.
- D. Kondor, X. Zhang, **M. Meghjani**, P. Santi, J. Zhao, C. Ratti, "Estimating the potential for shared autonomous scooters", IEEE Transactions on Intelligent Transportation Systems, 2021.
- Y. Luo*, **M. Meghjani***, Q. H. Ho*, D. Hsu, D. Rus, "Interactive Planning for Autonomous Urban Driving in Adversarial Scenarios", IEEE International Conference on Robotics and Automation (ICRA), 2021.
- N. M. Bunger*, S. Panjwani*, **M. Meghjani***, Z. Huang, M. H. Ang Jr., D. Rus, "Context and Orientation Aware Path Tracking", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
- P. Wang, **M. Meghjani**, "Lost at Sea: Multi-Searcher, Multi-Target Search", IEEE/MTS OCEANS, 2020.
- M. Kouzehgar, **M. Meghjani**, R. Bouffanais, "Multi-Agent Reinforcement Learning for Dynamic Ocean Monitoring by a Swarm of Buoys", IEEE/MTS OCEANS, 2020.
- **M. Meghjani***, Y. Luo*, Q. H. Ho, P. Cai, S. Verma, D. Rus, D. Hsu, "Context and Intention Aware Planning for Urban Driving", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
- H. Guo, Z. Meng, Z. Huang, W. Leong, Z. Chen, **M. Meghjani**, M. H Ang Jr, D. Rus, "Safe Path Planning with Gaussian Process Regulated Risk Map", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
- **M. Meghjani**, H. Guo, Z. Meng, S. Hao, F. Mengdan, W. K. Leong, K. Chaudhary, M. H. Ang Jr., D. Rus, "Mobility-on-Demand using Autonomous Vehicles: Systems, Solutions and Challenges", Cooperative Intelligent Transport Systems: Towards High-Level Automated Driving, The Institution of Engineering and Technology (IET), 2019.
- **M. Meghjani**, S. D. Pendleton K. Marczuk, Y. H. Eng, X. Shen, D. Rus, M. H. Ang Jr., "Multiclass Fleet Sizing and Mobility-on-Demand Service", Complex Systems Design & Management (CSD&M), 2018.
- **M. Meghjani**, Y. H. Eng, S. Verma, D. Rus, M. H. Ang Jr., "Context-Aware Intention and Tra-

[1] *Authors contributed equally.

jectory Prediction for Urban Driving Environment", International Symposium on Experimental Robotics (ISER), 2018.

- S. Verma, Y. H. Eng, H. X. Kong, H. Andersen, **M. Meghjani**, W. K. Leong, X. Shen, C. Zhang, M. H. Ang Jr. and D. Rus, "Vehicle Detection, Tracking and Behavior Analysis in Urban Driving Environments using Road Context", IEEE International Conference on Robotics and Automation (ICRA), 2018.
- S. D. Pendleton, H. Andersen, X. Du, X. Shen, **M. Meghjani**, Y. H. Eng, et al., D. Rus, and M. H Ang Jr., "Perception, Planning, Control, and Coordination for Autonomous Vehicles", in Machines, 2017.
- **M. Meghjani**, K. Marczuk, "A Hybrid Approach to Matching Taxis and Customers", IEEE Region Ten Conference (TENCON) - Technologies for Smart Nation, Nov. 2016.
- **M. Meghjani**, S. Manjanna and G. Dudek, "Fast and Efficient Rendezvous in Street Networks", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Oct. 2016.
- **M. Meghjani**, S. Manjanna and G. Dudek, "Multi-Target Search Strategies", IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), Oct. 2016.
- **M. Meghjani**, S. Manjanna and G. Dudek, "Multi-Target Rendezvous Search", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Oct. 2016. **[Finalist for Best Paper Award on Safety Security and Resue Robotics]**.
- S. Manjanna, N. Kakodkar, **M. Meghjani** and G. Dudek, "Efficient Terrain Driven Coral Mosaic Synthesis Using Gaussian Processes", 13th Canadian Conference on Computer and Robot Vision (CRV), June, 2016.
- **M. Meghjani** and G. Dudek, "Multi-Agent Rendezvous on Street Networks", IEEE International Conference on Robotics and Automation (ICRA), May, 2014.
- **M. Meghjani**, F. Shkurti, J. C. G. Higuera, A. Kalmbach, D. Whitney and G. Dudek, "Asymmetric Rendezvous Search at Sea", 11th Canadian Conference on Computer and Robot Vision (CRV), May, 2014.
- **M. Meghjani** and G. Dudek, "Multi-Robot Exploration and Rendezvous on Graphs", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2012.
- F. Shkurti, A. Xu, **M. Meghjani**, J. C. G. Higuera, Y. Girdhar, P. Giguere, B. B. Dey, J. Li, A. Kalmbach, C. Prahacs, K. Turgeon, I. Rekleitis and G. Dudek, "Multi-Domain Monitoring of Marine Environments using a Heterogeneous Robot Team", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Oct. 2012.
- Y. Girdhar, A. Xu, B. B. Dey, **M. Meghjani**, F. Shkurti, I. Rekleitis and G. Dudek. "MARE: Marine Autonomous Robotic Explorer", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Sep. 2011.
- **M. Meghjani** and G. Dudek, "Combining Multi-Robot Exploration and Rendezvous", 8th Canadian Conference on Computer and Robot Vision (CRV), May 2011.
- **M. Meghjani**, F. Ferrie, G. Dudek, "Bimodal Information Analysis for Emotion Recognition", IEEE Workshop on Applications of Computer Vision (WACV), Dec. 2009.

INVITED TALKS AND PANELS

- **Keynote Speaker**, ICRA workshop on "Heterogeneity in Multi-Robot Systems", 2023
- **Keynote Speaker**, RSS workshop on "Inference and Decision Making for Autonomous Vehicles", 2023
- **Invited talk**, AIRS in AIR, Multi-robot Systems (IV), 2023
- **Opening Keynote Speaker**, International Women in Engineering Day, Singapore, 2023
- **Guest Speaker**, Mobile Robotics Course, Fall 2021, McGill University, Canada.
- **Invited Speaker**, World Engineers' Summit, 2021.
- **Invited Panelist**, Workshop on Active Perception in Marine Robotics, ICRA, 2021.
- **Invited Speaker and Panelist**, Global reflections on women & work challenges, opportunities & lessons for the future, Auckland University of Technology, 2021.
- **Invited Speaker and Panelist**, IEEE/MTS Women in Engineering, OCEANS, 2020.
- **Invited Speaker**, Community Bots, Women in STEM Podcast, 2020.
- **Invited Speaker**, Intelligent Transportation Systems, World Congress, 2019.
- **Invited Panelist**, Rockets, Autonomous Vehicles and Future of Transport, SGInnovate, 2019.
- **Invited Speaker**, Women Who Code, Talks.Dev#4, 2019.

- **Invited Speaker**, nVIDIA-National University of Singapore Autonomous Vehicles workshop, 2019
- **Invited Speaker**, TUMCREATE Symposium, 2018.
- **Keynote Speaker**, IEEE Women in Engineering Leadership Summit, 2018.

SELECTED RESEARCH GRANTS

Minitry of Education, Singapore – Principal Investigator (PI), (2022–2025)
- "Autonomous Urban Driving using Road Context, Driver Intent and Driving Styles" - $640K

AI Singapore – Co-Investigator (Co-PI), (2021–2025)
- "The Other Me": Human-Centered AI Assistance in Situ - $400K

ASTAR – Co-Investigator (Co-PI), (2021–2024)
- Collaborative Human Robot Inspection & Intervention System for Challenging Underwater Environments - $500K

Maritime and Port Authority of Singapore – Co-Investigator (PI), (2020–2023)
- Mobile collaborative robot platforms for coning/de-coning wharf operations. - $4.5M

SUTD, Human-AI Interaction Thrust, Principal Investigator (PI), (2020–2023)
- Robot-aided adaptive architecture for disruption management - $1.4M

DSO, National Laboratories – Task-PI, (2019–2022)
- Human-Multi-Robot Teaming with Augmented Intelligence - $2.9M

Singapore-MIT Alliance for Research and Technology (SMART), PI, (2020–2021)
- Autonomous Urban Driving using Road Context, User Intents and Behaviours - $50K

REPORT OF INVENTIONS

- **Rendezvous on Street Networks**, M. Meghjani, G. Dudek, 13th Nov. 2014.
- **Smart Mobility**, M. Meghjani, J. Li, N. Patermichelakis, G. Dudek, 28th Sep. 2015.
- **Human Interactions with Field Robots Using Overlays on Cached Maps in internet-denied Environments**, J. Li, M. Meghjani, G. Dudek, 1st Oct. 2015.

ADVISING AND MENTORING

Undergraduate Advisee (Selective)

- Sunny Deshpande, SUTD
- Shivam Kumar, Plaksha University
- Amol Harsh, Plaksha University
- Hatsumi Kanashima, SUTD
- Yee Wang Sui, SUTD
- Mohammad Alif Daffa Bin Mohammad Yusof, SUTD
- Jing Jie Pheh, SUTD
- Hasumi Kanashima, SUTD
- Niharika Shrivastava, IIIT Allahabad
- Madelin Wang, MIT
- Shui Song, NUS
- Qi Heng Ho, NUS
- Zefan Huang, NUS
- Nicholas Buenger, ETHZ

Graduate Advisee

- EnYi Leong, SUTD, M.Eng.
- Gong Chen, SUTD, M.Eng
- Claas Ehmke, ETHZ, MS
- Loo Yi, SUTD, Ph.D.
- Yu Xiang Tan, SUTD, Ph.D.
- Pamela Wang, SUTD, Ph.D.

Graduate Advising Committee

- Joel Ong Wei Jie, "Portfolio Construction From Mean-Variance to Structured Prediction"
- Pamela Wang, "Multi-Agent Cooperation"

- Nikolaj Horsevad SÃžrensen, "Understanding Collective Behaviors Through Network Topology"
- Hitesh Bhardwaj, "Design, Optimization and Control of Agile Multi-Actuator Monocopters Capable of Multiple Flight Envelopes"
- Jia Yin, "Table Cleaning Task by Human Support Robot Using Deep Learning Technique"
- Huang Xia, "Analysis and application of information theory to machine learning"
- Kwa Hian Lee, "Swarm Strategies for Search and Tracking of Fast Moving Targets"
- Karkulali Pugalenthi, "A Hybrid Model and Data-Driven Approach to Remaining Useful Life Prediction of Electronic Devices and Systems"

Mentoring/Career Advising

- Anushka Parmanand, Singapore American School.
- Pratyush Ashoka Anand, Global Indian International School.

TEACHING EXPERIENCE

Singapore University of Technology and Design, Singapore - Instructor

- **Robotics for Professionals** (graduate course), Fall 2021.
- **Machine Learning** (undergraduate course), Fall 2019-present.
- **Capstone** (undergraduate course), Winter & Summer 2020.
- **Artificial Intelligence** (undergraduate course), Summer 2020.

McGill University, Canada - Teaching Assistant

- **COMP 417:** Introduction to Robotics and Intelligent Systems, Fall 2013.
- **COMP 250:** Introduction to Computer Science, Fall 2010 and Fall 2011.
- **COMP 322:** Introduction to C++, Winter 2015 and Winter 2009.

SERVICE

International Service

- **Distinguished Lecturer**, IEEE Robotics and Automation Society, Multi-Robot Systems Technical Committee, 2023
- **Area Chair** for Robotics: Science and Systems, 2023
- **Co-Organizer** for the inaugural AAAI Summer Symposium on "Building Connections: From Human to Human-AI Collaboration", 2023
- **Associate Editor** for Multiple and Distributed Systems, IEEE Robotics and Automation Letters, 2020-present.
- **Publicity Chair** for Advanced Robotics and its Social Impact (ARSO), 2022.
- **Special Session Co-Chair** for IEEE International Conference on Autonomous Systems (ICAS), 2021.
- **Associate Editor** for IEEE/RSJ IROS 2019 and IROS 2020.
- **Robotics Track Progamme Committee member** for AAMAS 2019.
- **Publicity Co-Chair** for The Singapore Autonomous Underwater Vehicle Challenge (SAUVC), 2019.
- **Chair** for IEEE ICRA Social Media, 2017 and 2019.
- **Chair** for IEEE ICRA Workshop on Robotics and Vehicular Technologies for Self-driving cars, 2017.
- **Chairing committee** for the McGill Undergrad Computer Science Research Symposium 2014.
- **Founder and Chapter Chair** at IEEE Montreal Robotics and Automation Chapter, 2012-2015.
- **Students' Activities Representative** at IEEE Montreal Section, 2011-2013.
- **Vice Chair** at McGill IEEE Student Branch, 2011-2012.
- **Lead and Volunteer** at McGill Robotics Summer Camp for High School Students, 2011-2014.

Service to University

- Outreach chair, 2023 - present.
- Undergraduate committee member, 2019-present.
- Global Exchange Program committee member, 2020-2021.
- Admissions committee member, 2021.
- Computer Science and Design, PhD seminar series, 2021.

- Faculty advisor for SUTD, AI-SG Student Chapter, 2021.
- Faculty advisor for SUTD-Singapore Women in Engineering Chapter, 2021.
- Faculty advisor Singapore Women in Engineering, INWED conference launch for SUTD, 2021.
- Designed and executed SUTD Programming with robots, Outreach workshop for high school students, 2021
- Faculty advisor for SUTD Women x Tech & Design, Exclusive Admission, 2020-present.
- Faculty instructor SUTD Python programming workshop, 2020-present.
- Faculty instructor SUTD Outreach for Catholic High School, 2020
- Representing SUTD for Ministry of Education, Science Mentorship Programme as poster presentation judge, 2020.

MEDIA CONTRIBUTIONS

- Featured work on use of Autonomous Underwater Vehicles for marine environment monitoring for **Deputy Prime Minister, Mr. Heng Swee Keat at the 20th anniversary of the Singapore National Marine Laboratory**, 2022.
- Featured work on use of 5G for robotics and remote monitoring for **Minister for Communications and Information, Mrs. Josephine Teo at the launch of the Future Communications Connectivity (FCC) Lab and SUTD Drone Arena**, 2022.
- Featured work on multi-robot systems for **Minister for Communications and Information, Mrs. Josephine Teo at the United Women in Singapore STEM fest**, 2022.
- Featured work for SUTD, Singapore Water Week, 2021.
- Featured article for the launch of SUTD AI Mega Centre, Robotics cluster, 2021.
- **Pioneering scientists formulate plans for a better world**, The Ismaili, Feb 10 2021.
- Featured post for United Women Singapore, Inspire Series, 2020.
- **Dr. Malika Meghjani, Women In Engineering Panel**, Global OCEANS 2020.
- **Analytics Insight, World's 50 Most Renowned Women in Robotics**, Jun 24, 2020.
- **Nine IEEE RAS Members selected for the annual "Women in Robotics You Need to Know About"**, IEEE Robotics and Automation Society, 2019.
- **30 Women in Robotics you need to know about**, Robohub, Oct 8, 2019.
- **Data Dialogue: Transforming Cities of the future**, SG Innovate, Jun 26, 2019.
- **Ep: 12: Taking Over Control**, Money Mind, Channel News Asia, Jun 24, 2019.
- **Rockets, Autonomous Vehicles and the Future of Transport**, SG Innovate, Arp 2, 2019.
- **A quick demo on how Autonomous Scooters work**, IMDA Singapore, May 3 2017.
- **Robot invasion: Engineers testing out their gadgets**, iNFO news.ca, Jun 20, 2015.
- **STEMSpark: Meet Malika Meghjani, Roboticist and Anita Borg Fellow**, hErVOLUTION, Apr 8, 2015.
- **McGill University's robotics program gets $5M grant**, CBC News, Feb 8, 2013.
- **Robotic Airplane, Boat, and Submarine Team Up to Monitor Coral Reefs**, IEEE Spectrum, Oct 2012.
- **The Aqua project Demo**, Experience Canada media event at G8/G20 summits, Toronto, Canada. Jun 2010.

REFERENCES

Available on request.