

Ali Harakeh

612-1550 Rue Saint-Louis
Saint-Laurent, QC, Canada
H4L 0A3

Phone: +1 (519) 504-0469
Email: ali.harakeh@mila.quebec
Web: www.aharakeh.com

EDUCATION

Ph.D. Aerospace Science & Engineering 2021
University Of Toronto Institute for Aerospace Studies (UTIAS), Toronto, ON, Canada

- **Thesis Title:** [Estimating and Evaluating Predictive Uncertainty In Deep Object Detectors.](#)
- **Thesis Advisor:** Steven L. Waslander
- **Doctoral Examination Committee:** Raquel Urtasun, Kilian Q. Weinberger, Timothy D. Barfoot, and Angela Schoellig

M.Eng. Mechanical Engineering (Thesis Option, Mechatronics Track) 2016
American University of Beirut, Beirut, Lebanon

- **Thesis Title:** [Towards Fully Self-Supervised Free Space Estimation For Unmanned Ground Vehicles.](#)
- **Thesis Advisors:** Daniel Asmar and Elie Shammas

B.Eng. Mechanical Engineering (Mechatronics Track) 2014
American University of Beirut, Beirut, Lebanon

- **Thesis Title:** [Retrofitting an 1983 IBM 7540 SCARA Robot Through a Full Controller Overhaul.](#)
- **Final Project Advisors:** Daniel Asmar and Elie Shammas

PROFESSIONAL APPOINTMENTS

IVADO Postdoctoral Research Fellow Current
Mila - Quebec AI Institute, Montreal, QC, Canada

- Currently leading 3 research projects by managing the theoretical development and Python implementation of multiple novel continual learning, few-shot learning, and uncertainty estimation algorithms.
- Developing machine learning algorithms for real-world deployment by working closely with industry partners to solve problems in network communications, financial management, and people counting in retail.
- Funded research projects by acquiring more than 80,000 CAD in research grants through partnerships with the public and private sectors.
- Advised by Liam Paull.

REFEREED JOURNAL ARTICLES

- J1. J. Willes, J. Harrison, **A. Harakeh**, C. Finn, M. Pavone, and S. L. Waslander, “[Bayesian Embeddings for Few-Shot Open World Recognition](#)”, *To appear in the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, (2022).
- J2. D. Feng*, **A. Harakeh*** (*co-first authors), S. L. Waslander and K. Dietmayer, “[A Review and Comparative Study on Probabilistic Object Detection in Autonomous Driving](#)”, *The IEEE Transactions on Intelligent Transportation Systems*, pp 1-20 (2021).
- J3. **A. Harakeh**, D. Asmar, and E. Shammas, “[Self Supervised Free Space Estimation in Outdoor Terrain](#)”, *Robotica*, pp 1-23 (2018).

REFEREED CONFERENCE ARTICLES

- C1. **A. Harakeh** and S. L. Waslander, “Estimating and Evaluating Regression Predictive Uncertainty in Deep Object Detectors”, *International Conference on Learning Representations* , (**ICLR 2021**).
- C2. C. Reading, **A. Harakeh**, N. Chae, and S. L. Waslander, “Categorical Depth Distribution Network for Monocular 3D Object Detection”, *2021 Conference on Computer Vision and Pattern Recognition* , (**CVPR 2021**, Oral Presentation).
- C3. **A. Harakeh**, M. Smart and S. L. Waslander, “BayesOD: A Bayesian Approach for Uncertainty Estimation in Deep Object Detectors”, *2020 IEEE International Conference on Robotics and Automation* , (**ICRA 2020**).
- C4. J. Ku, M. Mozifian, J. Lee, **A. Harakeh**, and S. L. Waslander, “Joint 3D Proposal Generation and Object Detection From View Aggregation”, *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems* , (**IROS 2018**).
- C5. M. Angus, M. ElBalkini, S. Khan, **A. Harakeh**, O. Andrienko , C. Reading, S. L. Waslander, and K. Czarnecki, “Unlimited Road-scene Synthetic Annotation (URSA) Dataset”, *The 21st IEEE International Conference on Intelligent Transportation Systems* , (**ITSC 2018**).
- C6. J. Lee, S. Walsh, **A. Harakeh**, and S. L. Waslander, “Leveraging Pre-Trained 3D Object Detection Models For Fast Ground Truth Generation”, *The 21st IEEE International Conference on Intelligent Transportation Systems* , (**ITSC 2018**).
- C7. J. Ku, **A. Harakeh**, and S. L. Waslander, “In Defense of Classical Image Processing: Fast Depth Completion on the CPU”, *15th Conference on Computer and Robot Vision* , (**CRV 2018**).
- C8. A. Pon, A. Adrienko, **A. Harakeh**, and S. L. Waslander, “A Hierarchical Deep Architecture and Mini-Batch Selection Method For Joint Traffic Sign and Light Detection”, *15th Conference on Computer and Robot Vision* , (**CRV 2018**).
- C9. **A. Harakeh**, D. Asmar, and E. Shamma, “Identifying Good Training Data for Self-Supervised Free Space Estimation”, *2016 Conference on Computer Vision and Pattern Recognition* , (**CVPR 2016**).
- C10. **A. Harakeh**, D. Asmar, and E. Shamma, “Ground Segmentation and Occupancy Grid Generation Using Probability Fields”, *2015 IEEE/RSJ International Conference on Intelligent Robots and Systems* , (**IROS 2015**).

WORKSHOP ARTICLES

- W1. J. Willes, J. Harrison, **A. Harakeh**, C. Finn, M. Pavone, and S. L. Waslander, “Open-Set Incremental Learning via Bayesian Prototypical Embeddings”, *Workshop on Meta-Learning* , (**NeurIPS 2020 Workshops**).
- W2. **A. Harakeh** and S. L. Waslander, “How Should We Evaluate Probabilistic Object Detectors?”, *Workshop on The Importance of Uncertainty in Deep Learning for Robotics* , (**IROS 2019 Workshops**).

MANUSCRIPTS IN SUBMISSION

- S1. **A. Harakeh**, J. S. Hu, N. Huang, S. L. Waslander, and L. Paull, “Estimating Predictive Distributions with OT-regularized Sample Networks”, *Submitted to the Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS)* , (2022).

AWARDS AND HONORS

- **G. N. Patterson Student Award** 2021
University of Toronto
 - Awarded to **one** most outstanding Ph.D. candidate to have finished their degree at the University of Toronto Institute for Aerospace Studies in the academic year of 2020-2021.
- **Molson Kenneth Fellowship Award** 2021
University of Toronto
 - Awarded to Ph.D. candidates with the highest academic standing at the University of Toronto Institute for Aerospace Studies.

SUCCESSFUL GRANTS AND FELLOWSHIPS

- **Samsung AI Research Grant** 2022
Mila - Quebec AI Institute
 - Co-written with Liam Paull and Glen Berseth.
 - **56,000 CAD** for one year.
- **Compute Canada Resource Allocation Competition** 2022
Mila - Quebec AI Institute
 - Co-written with Liam Paull.
 - Compute resources valued at **24,601 CAD**.
- **IVADO Postdoctoral Research Funding** 2021
Mila - Quebec AI Institute
 - **70,000 CAD/year** for two years.

INVITED TALKS

1. Carrefour DEEL Seminar on Uncertainties for Object Detection **Virtual Event, 2022**
2. RSS 2021 Pioneers Workshop (Selected as an [RSS 2021 Pioneer](#)) **Virtual Event, 2021**
3. University of Toronto Robotics Institute AV Workshop **Virtual Event, 2021**
4. IROS 2019 Workshop on Uncertainty in Deep Learning **Macao, China, 2019**
5. UofT Robotics Institute Inaugural Fall Workshop **Toronto, Canada, 2019**
6. Toronto Machine Learning Summit **Toronto, Canada, 2018**
7. Vector Institute Endless Summer School **Toronto, Canada, 2018**

INDUSTRY EXPERIENCE

Machine Learning Research Engineer Apr-Jun 2021
RydeSafely, Toronto, ON, Canada

- Contributed to the company's core product for certifying and testing autonomous driving 3D perception stacks by designing and implementing uncertainty estimation, out-of-distribution (OoD) detection, and active learning algorithms using Python and ROS.

Associate Researcher May-Dec 2019
Noah's Ark Labs (Huawei Technologies), Markham, ON, Canada

- Worked as part of the R&D team to design and implement an uncertainty-aware feedback network for 3D object detection using Python, leading to the submission of a patent application.

Subject Matter Expert

May-Oct 2018

Coursera, Toronto, ON, Canada

- Created slides, video scripts, and coding projects for the massive open online course (MOOC) titled [Visual Perception for Self-Driving Cars](#).

RESEARCH EXPERIENCE

Research Supervisor

2021-Current

University of Montreal, Montreal, QC, Canada

- Supervising six research projects on Robot Perception and Planning.

Research Supervisor

2019-2021

University Of Toronto Institute for Aerospace Studies (UTIAS), Toronto, ON, Canada

- Supervising two Master's students working on monocular 3D object detection and incremental learning for image classification.
- Lead to publications C2, W1, and J1.

Perception Team Lead

2017-2018

Autonomoose Project, University Of Waterloo, Waterloo, ON, Canada

- Supervised a group of 9 undergraduate and Master's students working on the following topics: 3D Object Detection, Semantic Segmentation, Synthetic Data Generation, Human-In-The-Loop 3D Data Labeling.
- Provided perception algorithms for several autonomous driving demos in [CES 2017](#) and [VTC 2017](#).
- Lead to publications C4, C5, C6, C7, and C8.

TEACHING EXPERIENCE

University of Waterloo

Department of Mechanical and Mechatronics Engineering

- Spring 2018, Spring 2017: *Tutorial Instructor, MTE 203 Advanced Calculus*, (~100 students)
- Winter 2018: *Lab Instructor, ME 640 Autonomous Mobile Robotics*, (~30 students)
- Fall 2017: *Lab Instructor, MTE 544 Autonomous Mobile Robotics*, (~60 students)
- Spring 2017: *Course Instructor, ME 780 Perception for Autonomous Driving*, (~10 students)

American University of Beirut

Department of Mechanical Engineering

- Spring 2016: *Tutorial Instructor, MECH 642 Computer Vision*, (~50 students)
- Fall 2015: *Lab Instructor, MECH 530 Mechatronics System Design*, (~60 students)
- Fall 2014: *Lab Instructor, MECH 430 Instrumentation and Measurements*, (~120 students)

CONFERENCE/WORKSHOP ORGANIZATION

[AAAI Conference on Artificial Intelligence 2023](#), S.P. PC member

2022

New York City, NY, USA

[Robotics Science and Systems \(RSS\) 2022](#), Pioneers Chair

2022

New York City, NY, USA

ACADEMIC SERVICES

- Guest Editor for [Frontiers in Computer Vision Journal](#).
- Reviewer for CVPR, ICCV, ECCV, ACCV, ICRA, IROS, ICLR, and NeurIPS conferences.
- Member of Toronto Machine Learning Summit ([TMLS](#)) steering committee (2018 - 2019).

REFEREES

Liam Paull

Assistant Professor, Département d'informatique et de recherche
opérationnelle (DIRO)

Director, Montreal Robotics and Embodied AI Lab

Université de Montréal

Pavillon Andre Aisenstadt rm. 3341

Montreal, QC, Canada

H3T 3J4

Email: paull@iro.umontreal.ca

Steven L. Waslander

Professor, Institute for Aerospace Studies

Director, Toronto Robotics and AI Laboratory

University of Toronto

4925 Dufferin St.

North York, ON, Canada

M3H 5T6

Email: stevenw@utias.utoronto.ca

Krzysztof Czarnecki

Professor, Electrical and Computer Engineering

Director, Waterloo Intelligent Systems Engineering Lab

University of Waterloo

200 University Ave W

Waterloo, ON, Canada

N2L 3G5

Email: kczarnec@gsd.uwaterloo.ca

Daniel Asmar

Associate Professor, Mechanical Engineering

Director, Vision and Robotics Lab

American University of Beirut

Riad El-Solh, Beirut, Lebanon

1107 2020

Email: da20@aub.edu.lb