

Ali Harakeh

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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:** Kilian Q. Weinberger, Raquel Urtasun, Timothy D. Barfoot, 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:** D. Asmar and E. Shammass

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:** D. Asmar and E. Shammass

PROFESSIONAL APPOINTMENTS

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

- Funded by the [IVADO Postdoctoral Research Funding](#).
- Working as a part of the [Dependable and Explainable Learning \(DEEL\)](#) project.
- Advised by Liam Paull.

PEER-REVIEWED 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).

PEER-REVIEWED JOURNAL ARTICLES

- J1. 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”, *To appear in IEEE Transactions on Intelligent Transportation Systems*, (2021).
- J2. **A. Harakeh**, D. Asmar, and E. Shamma, “Self Supervised Free Space Estimation in Outdoor Terrain”, *Robotica*, pp 1-23 (2018).

MANUSCRIPTS IN SUBMISSION

- S1. J. Willes, J. Harrison, **A. Harakeh**, C. Finn, M. Pavone, and S. L. Waslander, “Bayesian Embeddings for Few-Shot Open World Recognition”, *Submitted to the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, (2021).

AWARDS AND HONORS

- **Molson Kenneth Fellowship Award** 2021
University of Toronto
 – 2900 CAD.

FELLOWSHIPS AND GRANTS

- **IVADO Postdoctoral Research Funding** 2021
MILA - Quebec AI Institute
 – 70000 CAD/year for two years.

SELECTED TALKS

1. RSS 2021 Pioneers Workshop **Virtual Event, 2021**
2. University of Toronto Robotics Institute AV Workshop **Virtual Event, 2021**
3. IROS 2019 Workshop on Uncertainty in Deep Learning **Macao, China, 2019**
4. UofT Robotics Institute Inaugural Fall Workshop **Toronto, Canada, 2019**
5. Toronto Machine Learning Summit **Toronto, Canada, 2018**
6. Vector Institute Endless Summer School **Toronto, Canada, 2018**

RESEARCH EXPERIENCE

Research Supervisor Current
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 and S2.

Perception Team Lead 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.

Research Intern 2016
King Abdullah University of Science and Technology, Thuwal, KSA

- Research on 3D object detection for autonomous driving at [IUVL](#) headed by [Bernard Ghanem](#).

Research Intern 2013
University Of Wisconsin, Madison, WI, USA

- Designed and built a cost efficient microfluidics chip using EWOD (Electrowetting) technology under the supervision of [John G. Webster](#).

INDUSTRY EXPERIENCE

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

- Designed tools to perform uncertainty estimation, out-of-distribution (OOD) detection, and active learning for 3D object detectors.

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

- Designed perception algorithms to be deployed as part of a real-time autonomous vehicle stack.

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](#).

STUDENT ADVISING

TRAILab

2018-2021

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

- Cody Reading, M.S.
- John Willes, M.S.

WAVELab

2016-2018

University Of Waterloo, Waterloo, ON, Canada

- Melissa Mozifian, M.S.
- Jason Ku, M.S.
- Jungwook Lee, M.S.
- Samin Khan, M.S.
- Matt Angus, M.S.
- Alex Pon, M.S.
- Sean Walsh, M.S.
- Cody Reading, B.E.
- Oles Andrienko, B.E.

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: *Teaching Assistant, 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: *Teaching Assistant, MECH 642 Computer Vision*, (~25 students)
- Spring 2015: *Teaching Assistant, MECH 650 Autonomous Mobile Robotics*, (~25 students)
- Fall 2015: *Lab Instructor, MECH 530 Mechatronics System Design*, (~60 students)
- Fall 2014: *Lab Instructor, MECH 430 Instrumentation and Measurements*, (~120 students)

SYNERGISTIC ACTIVITIES

- Reviewer for CVPR, ICCV, ACCV, ICRA, IROS, ITSC, and CRV conferences.
- Member, The Institute of Electrical and Electronics Engineers (IEEE). Joined in 2014.
- Member of Toronto Machine Learning Summit (TMLS) steering committee (2018 - 2019).

TRAINING AND CERTIFICATES

- 2021 Prospective Professor In Training [Program completion certificate](#).
- 2017 MILA Deep Learning Summer School [attendance certificate](#).
- [Certificate of competency](#) in the fundamentals of deep learning for multi-gpus.

LANGUAGES

Fluent in English and Arabic.

CITIZENSHIP

Permanent Resident of Canada, Lebanese.