

Christopher Grebe

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Education

MASc Institute for Aerospace Studies, Robotics

September 2019 – August 2021 (Expected)

[University of Toronto, Toronto, Canada](#)

- Researcher in [Space and Terrestrial Autonomous Robotic Systems \(STARS\) Lab](#) under supervision of Dr. Jonathan Kelly
- **Research Areas:** sensor fusion, active calibration, tracking and prediction for robotics and autonomous systems
- **Coursework:** State Estimation for Aerospace Vehicles, Perception for Robotics, Motion Planning, Control for Robotics
- **Awards:** Ontario Graduate Scholarship (OGS), University of Toronto Fellowship, Centre for Aerial Robotics Research and Education (CARRE) Fellowship

BASc Electrical and Computer Engineering Co-op

September 2014 – August 2019

[University of Windsor, Windsor, Canada](#)

- **Involvement:** Unmanned Systems Team, Graduate Automation and Control Lab, MicroNano Mechatronic Lab, TA
- **Awards:** Dean's Scholarship, Natural Science and Engineering Research Council of Canada (NSERC) Experience Award, Frederick Atkins Scholarship, Ontario Hockey Federation Bursary

Experience

Graduate Researcher

September 2019 – Present

[STARS Lab, Toronto, Canada](#)

- Using observability and noise awareness to improve estimation performance and robustness for mobile robots^[1]
- In collaboration with [Neptec Technologies](#), developed a lidar-based, multi-UAV tracking system through filter-based state estimation, data association and outlier rejection
- Contributed to the development of a 3D radar to camera calibration method that does not use specialized radar reflectors^[4]
- Worked with coauthors to develop a learning-based slip detection pipeline for robotic manipulators using tactile sensors^[3]

Research and Development Intern

September 2017 – August 2019

[Neptec Technologies, Ottawa, Canada](#)

- Improved lidar sensor performance for the automotive market through novel contributions made to lidar design^[5]
- Reduced development time for next generation lidar sensor by modelling prototypes to determine sensor performance, power requirements, optical feasibility, mechanical feasibility and eye safety
- Enabled performance quantification for security market through simulation development and experimental verification^[6]
- Led regular R&D meetings to collaborate with other teams, present results and propose ideas related to sensor development
- Performed point cloud processing for multi-object tracking in security and marine applications

Software Defined Networking Intern

January 2017 – May 2017

[Nokia, Ottawa, Canada](#)

- Delivered ahead of schedule a large-scale software development project for the Optical Networking Unit involving Nokia's Photonic Service Switch (PSS) and open source Open Network Operating System (ONOS)
- Collaborated with R&D and software development teams throughout Europe to determine and implement optimal solution

- Increased adoption and insights into development and production processes through the development of a data management system permitting manipulation from multiple plant locations
- Collaborated with colleagues throughout the automotive manufacturing process from advanced engineering to automated painting and assembly

Publications

- [1] C. Grebe, E. Wise, J. Kelly. **Observability-Aware Trajectory Optimization: Theory, Viability & State of the Art.** IEEE International Conference on Multisensor Fusion and Integration (MFI), 2021 **Submitted*
- [2] J. Kelly, C. Grebe, M. Giamou. **A Question of Time: Revisiting the Application of Recursive Filtering to Temporal Calibration of Multisensor Systems.** IEEE International Conference on Multisensor Fusion and Integration (MFI), 2021 **Submitted*
- [3] A. Grover, C. Grebe, P. Nadeau, J. Kelly. **Under Pressure: Learning to Detect Slip with Barometric Tactile Sensors.** arXiv Preprint, 2021
- [4] E. Wise, J. Persic, C. Grebe, I. Petrovic and J. Kelly. **A Continuous-Time Approach for 3D Radar to Camera Extrinsic Calibration.** IEEE International Conference on Robotics and Automation (ICRA), 2021
- [5] D. Butler, P. Church, C. Grebe and M. Sekerka-Bajbus. **Monostatic Scanning Lidar Using a Multi-Faceted Polygon Mirror as One of Dual Redirecting Elements.** International Patent Application PCT/IB2019/053041, 2019
- [6] P. Church, C. Grebe, J. Matheson, and B. Owens. **Aerial and Surface Security Applications Using Lidar.** Laser Radar Technology and Applications XXIII, 2018.
- [7] J. Zhang, H. Gao, Q. Liu and C. Grebe. **A New Real-Time Signal Processing Approach for Frequency-Varying Machinery.** Journal of Vibration and Control, 2018.