

VASSILI KOROTKINE

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Canadian Citizen, eligible for TN visa.

Summary

Robotics researcher and engineer completing a PhD in state estimation for mobile robots. Expertise in multi-sensor fusion (LiDAR, IMU, Camera), factor graph optimization, and Lie group-based estimation, with C++ and Python implementations. Four first-authored or co-authored publications in RA-L and IROS, plus three months of on-site industry collaboration with Denso Corporation as well as a yearlong research collaboration with Provectus Robotics. Seeking to apply graduate research experience to autonomous systems in various applications.

Education

Ph.D. in Mechanical Engineering

Expected October 2026

McGill University — Montreal, Canada

- Thesis: *Sensor Fusion Optimization Algorithms With Multi-Modal Measurement Models*
- Advisor: James Richard Forbes
- Industry Collaborations: Denso Corporation and Provectus Robotics. Focus on state estimation and sensor calibration for ground vehicles.

M.Sc. in Mechanical Engineering

2022

McGill University — Montreal, Canada

- Thesis: *State Estimation on Matrix Lie Groups Using Iterative Filters*

B.Eng. in Mechanical Engineering

2020

McGill University — Montreal, Canada

Technical Skills

State Estimation:	EKF, UKF, factor graph optimization (Ceres), particle filters
Sensor Fusion:	LiDAR-IMU calibration, visual-inertial odometry, wheel odometry
Mathematics:	Lie groups (SO(3), SE(3)), manifold optimization, Bayesian inference, nonlinear least squares
Languages:	C++, Python
Libraries/Tools:	Eigen, Sophus, PCL, ROS, Linux, Git, Docker

Research Experience

Graduate Research Assistant

2022 – Present

Dynamics, Estimation, and Control in Aerospace and Robotics (DECAR), McGill University

- Developed a method for LiDAR-IMU targetless calibration for ground vehicles on tilted ground. Validated method on data collected from a Husky ground vehicle, as well data collected from Provectus vehicles. Manuscript submitted to Robotics & Automation Letters.
- Developed the first polynomial-time globally optimal method for landmark-based localization with unknown data associations.

- Developed a scheme for using Gaussian mixture measurement likelihoods in nonlinear least-squares solvers that addresses uncertainty characterization and convergence issues in existing methods.

Industry Experience

Research Collaboration — Denso Corporation

Fall 2023 (three months on-site)

Tokyo, Japan

- Collaborated on-site with Denso engineers prototyping visual-inertial navigation systems for assisted driving.
- Diagnosed and resolved calibration issues in a stereo camera and IMU sensor rig, delivering a working prototype.

Publications

1. **V. Korotkine**, M. Cohen and J. R. Forbes, “Globally Optimal Data-Association-Free Landmark-Based Localization Using Semidefinite Relaxations,” *IEEE Robotics and Automation Letters*, vol. 10, no. 10, pp. 10250–10257, Oct. 2025.
2. **V. Korotkine**, M. Cohen and J. R. Forbes, “A Hessian for Gaussian Mixture Likelihoods in Nonlinear Least Squares,” *IEEE Robotics and Automation Letters*, vol. 9, no. 9, pp. 7891–7898, Sept. 2024.
3. C. C. Cossette, M. Cohen, **V. Korotkine**, A. Del Castillo Bernal, M. A. Shalaby and J. R. Forbes, “navlie: A Python Package for State Estimation on Lie Groups,” *IEEE/RSJ IROS*, Detroit, MI, 2023, pp. 5282–5287.
4. Z. C. Guo, **V. Korotkine**, J. R. Forbes and T. D. Barfoot, “Koopman Linearization for Data-Driven Batch State Estimation of Control-Affine Systems,” *IEEE Robotics and Automation Letters*, vol. 7, no. 2, pp. 866–873, April 2022.

Projects

LiDAR-IMU Calibration on Tilted Ground (Author)

github.com/vkorotkine/licalib_tilted_ground

- Toolbox for automated evaluation of navigation systems, including C++-to-analysis pipelines and parameter sensitivity studies. Applied to analysis of GRIL-Calib, a LiDAR-IMU calibration system for ground vehicles.

Visual Odometry Project (Author)

github.com/vkorotkine/vo_project

- An implementation of a visual odometry system in the style of ORB-SLAM for an RGB-D camera. Work in progress.

estimation_evaluation_toolbox (Author)

github.com/vkorotkine/estimation_evaluation_toolbox

- Toolbox for automated evaluation of navigation systems, including C++-to-analysis pipelines and parameter sensitivity studies. Applied to analysis of GRIL-Calib, a LiDAR-IMU calibration system for ground vehicles.

navlie (Contributor)

github.com/decargroup/navlie

- Open-source Python library for on-manifold state estimation implementing EKF, UKF, particle filters, and batch solvers on Lie groups. Contributed the Interacting Multiple Model Filter module, as well as Gaussian Mixture Factors, both used in a subsequent group publications. 189 GitHub stars. Presented at IROS 2023.

Teaching & Mentorship

- Senior student on industry collaboration with Provectus Robotics Solutions. Supervised and supported junior students on the project.
- Teaching Assistant, Numerical Methods in Mechanical Engineering, Fall 2021. Gave tutorials to a class of 90 students.

Other Interests

Organized social events for the McGill Triathlon Club and the Graduate Association of Mechanical Engineering Students. Occasional baker.