MITCHELL COHEN

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Robotics PhD candidate specializing in visual-inertial state estimation with 4+ years of industry collaboration experience. Strong foundation in estimation theory and practical expertise developing real-time algorithms for autonomous systems. Co-authored 8 peer-reviewed articles in robotics conferences and journals with over 150 citations.

EDUCATION

Doctor of Philosophy in Mechanical Engineering *2020 - 2026 (expected)*
McGill University, Montreal, QC
Research in robotic perception and visual-inertial state estimation

Master of Mechanical Engineering *2018 - 2020*
McGill University, Montreal, QC
Specialization in dynamics, control, and estimation of aerial autonomous systems. GPA: 3.83/4.00

Bachelor of Mechanical Engineering *2014 - 2018*
McGill University, Montreal, QC
Graduated with distinction GPA: 3.72/4.00 .

RELEVANT EXPERIENCE

DENSO Corporation *2020 - 2024*
Research Collaborator

- Researched, developed and implemented real-time visual-inertial odometry algorithms for automotive applications as part of a collaborative research project between DECAR at McGill University and DENSO Corporation.
- Conducted a 3-month internship (Sept. 2023 - Dec. 2023) at the DENSO R&D office in Tokyo, Japan, focused on simultaneous visual-inertial estimation and tracking of moving objects.

ARA Robotique *2019 - 2020*
Research Intern

- Guidance, navigation, and control research intern for unconventional vertical takeoff and landing (VTOL) unmanned aerial vehicle (UAV).
- Derivation and analysis of linear control allocation techniques for unconventional forward-flight aircraft.

Summer Undergraduate Research In Engineering *Summer 2018*
McGill University

- Dynamic modeling, simulation, and control of a passively-coupled tilt-rotor VTOL UAV.

SKILLS

Programming Languages	C++, Python, MATLAB
Libraries & Frameworks	Eigen, Ceres, GTSAM, OpenCV, ROS1/ROS2
Tools	Linux, Git, Docker
Languages	English, French

TECHNICAL STRENGTHS

State Estimation

- Derivation and implementation of optimization and filtering-based Bayesian state estimators (Kalman-type filters, MAP estimators, sliding-window filters) for robotic systems.
- Knowledge and implementation of common state estimation techniques for visual-inertial platforms, including IMU preintegration, the multi-state constraint Kalman filtering framework, and methodologies for consistent estimator design.
- Experience with libraries and frameworks commonly used in state estimation, including Eigen, Ceres, GTSAM, and OpenCV, as well as popular visual-inertial algorithms such as VINS-Mono, OpenVINS, and ORB-SLAM3.

Control And Guidance of Aerospace Systems

- Knowledge of control and guidance strategies for both fixed-wing and rotorcraft UAV systems.
- Simulation of attitude and position control techniques for fixed-wing and rotorcraft UAVs

Dynamic Simulation of Multibody Systems

- Experience with derivation of equations of motion of robotic systems.
- Experience with dynamic simulation in both MATLAB and C++ of six-degree of freedom, nonlinear dynamics of robotic systems.

PUBLICATIONS

- V. Korotkine, **M. Cohen**, and J. R. Forbes, "Globally Optimal Data-Association-Free Landmark-Based Localization Using Semidefinite Relaxations", in *Robotics and Automation Letters (RA-L)*, 2025.
- V. Korotkine, **M. Cohen** and J. R. Forbes, "A Hessian for Gaussian Mixture Likelihoods in Nonlinear Least Squares," in *Robotics and Automation Letters (RA-L)*, 2024.
- C. C. Cossette, **M. Cohen**, V. Korotkine, A. D. C. Bernal, M. A. Shalaby, and J. R. Forbes, "navlie: A Python Package for State Estimation on Lie Groups," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.*
- D. Lisus, **M. Cohen**, and J. R. Forbes, "Know What You Don't Know: Consistency in Sliding Window Filtering with Unobservable States Applied to Visual-Inertial SLAM," *IEEE Robotics and Automation Letters (RA-L)*, 2023.
- **M. Cohen**, J. R. Forbes "Navigation and Control of Unconventional VTOL UAVs in Forward-Flight with Explicit Wind Velocity Estimation", *Robotics and Automation Letters (RA-L)*, 2020.
- N. van Der Laan, **M. Cohen**, J. Arsenault, and J. R. Forbes, "The Invariant Rauch-Tung-Striebel Smoother", *Robotics and Automation Letters (RA-L)*, 2020.
- **M. Cohen**, K. Abdulrahim, and J. R. Forbes, "Finite-Horizon LQR Control of Quadrotors on $SE_2(3)$", *Robotics and Automation Letters (RA-L)*, 2020.
- R. Chiappinelli, **M. Cohen**, M. Doff-Sotta, M. Nahon, J. R. Forbes, and J. Apkarian, "Modeling and Control of a Passively-Coupled Tilt-Rotor Vertical Takeoff and Landing Aircraft", *International Conference on Robotics and Automation (ICRA)*, 2019.