NATALIA PAVLASEK

PhD Candidate in Trajectory Optimization for Aerospace Systems

@ pavlasek@uw.edu   🔗 nataliapavlasek.com   in nataliapavlasek   🎓 Google Scholar

EDUCATION

PhD, Aeronautics and Astronautics
📅 Sep. 2022 – Present

University of Washington, Seattle, WA, USA

Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarships – Doctoral
- GPA: 3.85/4.0
- Advised by Prof Behçet Açıkmeşe.
- Thesis title: Trajectory Optimization under Competing Priorities

Master of Science (Thesis), Mechanical Engineering
📅 Jan. 2021 – Aug. 2022

McGill University, Montreal, QC, Canada
- GPA: 4.0/4.0
- Advised by Prof James Richard Forbes.
- Thesis title: Simultaneous Localization and Mapping using Magnetic Fields and Their Gradients.

Bachelor of Mechanical Engineering
📅 Sep. 2016 – Dec. 2020

McGill University, Montreal, QC, Canada
- GPA: 3.95 / 4.0

WORK EXPERIENCE

Graduate Research Assistant – University of Washington
📅 Sep. 2022 – Present

Autonomous Controls Laboratory, supervised by Prof. Behçet Açıkmeşe

Research Intern – Mitsubishi Electric Research Laboratory
📅 Mar. 2025 – July. 2025

Trajectory optimization for geostationary satellites, supervised by Avishai Weiss
- Developed a scheduling algorithm for controlling a system of 11 satellites.
- Validated results using NASA's General Mission Analysis Tool.

Research Intern – Mitsubishi Electric Research Laboratory
📅 Jun. 2024 – Sep. 2024

Trajectory optimization for geostationary satellites, supervised by Avishai Weiss
- Developed a trajectory-optimization-based algorithm for satellites in geostationary Earth orbit.
- Validated results using NASA's General Mission Analysis Tool.

Teaching Assistant – University of Washington
📅 Jan. 2024 – Mar. 2024

Convex Optimization
- Planned and taught tutorial sessions, held office hours, graded exams.

Graduate Research Assistant – McGill University
📅 Jan. 2021 – Aug. 2022

Estimation of Robotic Systems Group, supervised by Prof James Richard Forbes

NSERC Undergraduate Research Assistant – McGill University
📅 May 2020 – Aug. 2020

Estimation of Robotic Systems Group, supervised by Prof James Richard Forbes

Mechanical Design Intern – MAXAR Montreal
📅 Sep. 2018 – Dec. 2018

Sainte-Anne-de-Bellevue, QC
- Prepared drawings and technical documentation for satellite components.
- Designed components used for testing motor capabilities.
- Assisted in process improvement through the design of a screw selection interface.

NSERC Research Assistant – McGill University
📅 May 2018 – Aug. 2018

Aerospace Mechatronics Lab, supervised by Prof Inna Sharf

PUBLICATIONS

[P1] Ganiban, J., **Pavlasek, N.**, and Açıkmeşe, B. *"A Sequential Operator-Splitting Framework for Exploration of Nonconvex Trajectory Optimization Solution Spaces."* arXiv preprint arXiv:2511.14752, 2025.

[P2] **Pavlasek, N.**, Di Cairano, S., and Weiss, A. *"Geostationary Satellite Station Keeping and Collocation under High-Thrust Impulsive Control"* 2025 ACC.

[P3] Hayner, C.R., **Pavlasek, N.**, Carson III, J.M., Leung, K., and Açıkmeşe, B. *"Information-Aware Powered Descent Guidance for Entry, Descent, and Landing."* 2025 Scitech, Entry, Descent, and Landing invited session.

[P4] **Pavlasek, N.**, Li, S.H.Q., Açıkmeşe, B., Oishi, M., and Danielson, C. *"Blameless and Optimal Control under Prioritized Safety Constraints"* 2024 ACC.

[P5] **Pavlasek, N.**, Cossette, C.C., Roy-Guay, D., and Forbes, J.R. *"Magnetic Navigation using Attitude-Invariant Magnetic Field Information for Loop Closure Detection",* 2023 IEEE/RSJ IROS.

[P6] **Pavlasek, N.**, Hayner, C.R., Li, S.H.Q., Açıkmeşe, B., Oishi, M., and Danielson, C. *"Generating Blamelessly Optimal Control for Prioritized Contraint Sets"* 2023 RSS Towards Safe Autonomy: New Challenges and Trends in Robot Perception Workshop.

[P7] **Pavlasek, N.**, Walsh, A., and Forbes, J.R. *"Invariant Extended Kalman Filtering Using Two Position Receivers for Extended Pose Estimation",* 2021 IEEE ICRA.

RESEARCH PROJECTS

Mitsubishi Electric Research Laboratory
📅 Jun. 2024 – Jul. 2025

Trajectory Optimization for Satellites **[P2]**

- Developed a trajectory-optimization-based algorithm for high thrust satellites.
- Ensured satellites remained in station-keeping windows despite uncontrolled periods lasting several days.

Autonomous Controls Lab – University of Washington
📅 Sep. 2022 – Present

Operator Splitting Sequential Convex Programming **[P1]**

Prioritized Optimization **[P4]**

- Developed an algorithm for incorporating constraints prioritization in convex optimization problems.
- Proved the necessary and sufficient conditions for an objective function that guarantees satisfaction of the highest priority feasible constraint.

Active View Planning **[P3]**

- Developed a method for selecting sensor pointing angle with guarantees on containment of keypoints.
- Implemented successive convex programming (SCP) to solve for a control trajectory.

Estimation of Robotics Systems Group – McGill University
📅 Apr. 2020 - Aug. 2022

Magnetic Navigation **[P5]**

- Developed an algorithm for navigating using magnetic field and magnetic field gradient measurements.
- Tested the algorithm in simulation and experiments on a Clearpath Husky.

InEKF using Two Position Receivers **[P7]**

- Designed an invariant extended Kalman filter for pose estimation in 3 dimensions.
- Developed a simulation and performed experiments to validate the algorithm.

AWARDS AND HONOURS

NSERC Canada Graduate Research Scholarship – Doctoral program

MITACS Accelerate Fellowship   Jan. 2021

McGill Engineerings Undergrad Student Masters Award   Jan. 2021

Canadian Society for Mechanical Engineering Gold Medal   Dec. 2020

NSERC Undergraduate Student Research Award   May 2020

NSERC Undergraduate Student Research Award   May 2018

OUTREACH AND SERVICE

Women of Aerospace, President
📅 Sep. 2022 - Present

University of Washington, Seattle, Washington, USA

- Managed the finances and organization of events for a club of over 50 members.
- Organized and invited notable women from both industry and academia to give talks.
- Managed outreach efforts to encourage new membership from underrepresented students.

SKILLS

PROGRAMMING LANGUAGES: MATLAB ● Java ● C/C++ ● Python ● Julia

FRAMEWORKS AND LIBRARIES: ROS ● OpenCV ● SciKit Learn ● PyTorch ● CVX

OPERATING SYSTEMS: Linux ● MacOS ● Windows