CHARLES C. COSSETTE, PHD
Software Engineer

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📍 San Francisco Bay Area, CA

Robotics software engineer and researcher, with 21 peer-reviewed papers, and 1 patent application. I currently work on the self-driving AI stack at Zoox.

🎓 EDUCATION

2023	**Doctor of Philosophy**, McGill University, Robotics
2018	**Master of Engineering**, McGill University, Robotics
2017	**Bachelor of Engineering**, McGill University, Mechanical Engineering

</> SKILLS

Coding	Python · C++ · Embedded C
Other software	Pytorch · Jax · OpenCV · Docker · ROS · Linux
Math	Estimation · SLAM · Computer Vision · Probability · Machine Learning · Deep Learning · Graph Theory · Optimization · Control Theory · Dynamics

💼 WORK

August 2023 – present
Software Engineer, Zoox (Amazon), San Francisco Bay Area
Researched, prototyped, and implemented an on-vehicle probabilistic collision checking algorithm. Filed a patent application in my 3rd month at the company.
Python · C++ · Estimation · Probability

January 2023 – March 2023
Lecturer - Autonomous Navigation, École Polytechnique, Montreal
Taught a graduate course on autonomous robot navigation, as the primary instructor.
Estimation · SLAM · Probability · Optimization

December 2018 – July 2019
Guidance, Navigation, and Control Consultant, Reaction Dynamics, Montreal
Built 3D flight dynamics simulator and designed control algorithms for an orbital launch vehicle.
Python · Matlab · Dynamic simulation · PID Control · LQR Control

📕 FEATURED PUBLICATIONS

DIVE : Deep Inertial Velocity Estimation for Quadcopters   preprint 2024
A. Bajwa, C. C. Cossette, M. A. Shalaby et J. R. Forbes

Decentralized State Estimation : An Approach using Pseudomeasurements and Preintegration   IJRR 2023
C. C. Cossette, M. A. Shalaby, D. Saussié et J. R. Forbes ⤴ Paper

Calibration and Uncertainty Characterization for Ultra-Wideband Two-Way-Ranging Measurements   ICRA 2023
M. A. Shalaby, C. C. Cossette, J. R. Forbes et J. Le Ny ⤴ Paper

Optimal Multi-robot Formations for Relative Pose Estimation Using Range Measurements   IROS 2022
C. C. Cossette, M. A. Shalaby, D. Saussie, J. Le Ny et J. R. Forbes ⤴ Paper   ⤴ Video

Relative Position Estimation between Two UWB Devices with IMUs   RAL/ICRA 2021
C. C. Cossette, M. Shalaby, D. Saussie, J. R. Forbes et J. Le Ny **(Best Paper Nomination)** ⤴ Paper   ⤴ Video

Cascaded Filtering Using the Sigma Point Transformation   RAL/ICRA 2021
M. Shalaby, C. C. Cossette, J. Le Ny et J. R. Forbes **(Best Paper Finalist)** ⤴ Paper   ⤴ Video

Heading Estimation Using Ultra-wideband Received Signal Strength and Gaussian Processes   RAL/IROS 2021
D. Lisus, C. C. Cossette, M. Shalaby et J. R. Forbes ⤴ Paper   ⤴ Video

🎓 Successful Grant Proposals

2022 **NSERC Alliance Grant ($440K).** *"Infrastructure inspection using a team of unmanned aerial vehicles."* Co-authored with James Forbes, Mohammed Shalaby, Jérôme Le Ny, David Saussié, Gunes Kurt.

2020 **FRQNT Personal Doctoral Scholarship ($63K).** *"Formation control of robotic systems using ultra-wideband radio for self-localization."*

2019 **NSERC Engage Award ($25K).** *"Control, Navigation and Guidance Concept Studies for a Venture Class Orbital Launch Vehicle."* Co-authored with James Forbes, Bachar Elzein.

2019 **Mitacs Accelerate Scholarship ($15K).** *"Research and Experimental Testing of Liquid-Injection Thrust Vector Control Actuator."* Co-authored with James Forbes, Julien Otis-Laperrière.

2019 **Canadian Space Agency Space Technology and Development Program ($539K).** *"Development of Guidance, Navigation, and Control Technologies for a Hybrid Engine Small Satellite Launch Vehicle."* Co-authored with Sandro Papais, Bachar Elzein.

🏆 Awards

2020 **Best Presentation Award** at GERAD Student Research Day

2018 **Spaceport America Cup Champions** - 1st out of 124 universities at rocket engineering competition

2018 **1st place in 10000ft COTS motor category** - Spaceport America Cup rocket engineering competition

2017 **1st place at McGill Engineering Research Showcase**

2016 **Teaching Assistant of the Year** - McGill Association of Mechanical Engineers

2016 **Outstanding Contribution to Design Teams** - McGill Engineering Undergraduate Society

🎓 Teaching Experience

2023 **Visiting Lecturer - ELE 6209 - Navigation Systems**, Polytechnique Montréal

2018 **Teaching Assistant - MECH 383 - Applied Electronics and Instrumentation**, McGill University

2015-2018 **Crash Course Instructor - Visual Basic for Applications (Excel)**, McGill University

2015-2016 **Teaching Assistant - MATH 264 - Advanced Calculus for Engineers**, McGill University

🖥 Projects

navlie - A python package for state estimation on Lie groups
2023-present

🔗 Github 🔗 Docs

Main contributor and maintainer to a general-purpose estimation package for robotics.

`Python` `C++` `Estimation` `Probability`

Technical Director - Spaceport America Cup Champions - McGill Rocket Team
2015 - 2018

🔗 Victory Video 🔗 Manufacturing Video 🔗 www.mcgillrocketteam.com

1st place of 124 international universities, 1st place in 10000ft off-the-shelf motor category at rocket engineering competition. Designed and built 11-foot-tall supersonic rocket with carbon-fiber airframe, automated parachute recovery, avionics, telemetry, and scientific payload. Led the 100+ student team as Technical Director.

`Embedded C` `Matlab` `Solidworks` `Manufacturing` `Systems Engineering` `Project Management` `Fundraising` `Onboarding` `Hours of sanding`

💡 Interests

Home-brewing beer, sharing my homebrew, skiing, wakeboarding, triathlons, golf, poker, rocketry.