

CHARLES C. COSSETTE

PhD Candidate | Robotics

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Researcher at McGill University supervised by Prof. James R. Forbes and Prof. David Saussie. I specialize in estimation, planning, and control algorithms for multi-robot teams, specifically how to best use ultra-wideband radio to enable collaboration between robots.

🎓 EDUCATION

present	Doctor of Philosophy , McGill University, Mechanical Engineering
2019	Master of Engineering , McGill University, Mechanical Engineering
2017	Bachelor of Engineering , McGill University, Mechanical Engineering

</> SKILLS

Coding	Python	Embedded C	Matlab	C++		
Other software	ROS	FreeRTOS	Pytorch	OpenCV	git	Linux
Math	State Estimation	SLAM	Probability Theory	Machine Learning	Deep Learning	
	Control Theory	Graph Theory	Optimization	Dynamics		









📁 WORK

January 2023	Lecturer - ELE6209A - Navigation Systems, ÉCOLE POLYTECHNIQUE, Montreal, Canada
March 2023	Co-teaching a course on autonomous robot navigation, as the primary instructor. State Estimation SLAM Probability
December 2018	Guidance, Navigation, and Control Consultant, REACTION DYNAMICS, Montreal, Canada.
July 2019	Built 3D flight dynamics simulator and designed control algorithms for an orbital launch vehicle. Python Matlab Dynamic simulation PID Control LQR Control
July 2018	Senior Technical Specialist, CAE, Montreal, Canada.
November 2018	Developed and fixed customer issues for airplane engine simulation software. C/C++
September 2017	Research Intern, ARA ROBOTICS, Montreal, Canada.
May 2018	Developed an adaptive notch filter for vibration filtering for quadcopters, as part of Master's degree. Embedded C Matlab Kalman Filtering FFT

📖 FEATURED PUBLICATIONS

OPTIMAL MULTI-ROBOT FORMATIONS FOR RELATIVE POSE ESTIMATION USING RANGE MEASUREMENTS C. C. COSSETTE, M. A. SHALABY, D. SAUSSIE, J. L. NY et J. R. FORBES 📄 Paper 📺 Video	IROS 2022
LOCALIZATION WITH DIRECTIONAL COORDINATES C. C. COSSETTE, M. SHALABY, D. SAUSSIE et J. R. FORBES 📄 Paper 📺 Video	IROS 2021
RELATIVE POSITION ESTIMATION BETWEEN TWO UWB DEVICES WITH IMUS C. C. COSSETTE, M. SHALABY, D. SAUSSIE, J. R. FORBES et J. LE NY (Best Paper Nomination) 📄 Paper 📺 Video	RAL/ICRA 2021
CASCADED FILTERING USING THE SIGMA POINT TRANSFORMATION M. SHALABY, C. C. COSSETTE, J. LE NY et J. R. FORBES (Best Paper Finalist) 📄 Paper 📺 Video	RAL/ICRA 2021
THE COMPLEX-STEP DERIVATIVE APPROXIMATION ON MATRIX LIE GROUPS C. C. COSSETTE, A. WALSH et J. R. FORBES 📄 Paper	RAL/ICRA 2020
CALIBRATION AND UNCERTAINTY CHARACTERIZATION FOR ULTRA-WIDEBAND TWO-WAY-RANGING MEASUREMENTS M. A. SHALABY, C. C. COSSETTE, J. R. FORBES et J. L. NY 📄 Paper	Preprint 2022

OTHER PUBLICATIONS

REDUCING TWO-WAY RANGING VARIANCE BY SIGNAL-TIMING OPTIMIZATION M. A. SHALABY, C. CHAMPAGNE COSSETTE, J. R. FORBES et J. LE NY  Paper	Preprint 2022
ULTRA-WIDEBAND TEACH AND REPEAT M. A. SHALABY, C. C. COSSETTE, J. L. NY et J. R. FORBES  Paper	Preprint 2022
RELATIVE POSITION ESTIMATION IN MULTI-AGENT SYSTEMS USING ATTITUDE-COUPLED RANGE MEASUREMENTS M. SHALABY, C. C. COSSETTE, J. R. FORBES et J. LE NY  Paper  Video	RAL/ICRA 2021
HEADING ESTIMATION USING ULTRA-WIDEBAND RECEIVED SIGNAL STRENGTH AND GAUSSIAN PROCESSES D. LISUS, C. C. COSSETTE, M. SHALABY et J. R. FORBES  Paper  Video	RAL/IROS 2021
MODULAR DERIVATION OF THE EQUATIONS OF MOTION OF A FLEXIBLE LAUNCH VEHICLE WITH PROPELLANT SLOSH C. C. COSSETTE, J. R. FORBES et D. SAUSSIÉ  Paper	SciTech 2020
LAGRANGIAN DERIVATION OF VARIABLE-MASS EQUATIONS OF MOTION USING AN ARBITRARY ATTITUDE PARAMETERIZATION C. C. COSSETTE, J. R. FORBES et D. SAUSSIÉ  Paper	JASS 2020

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

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 - MATH264 - Advanced Calculus for Engineers , McGill University

PROJECTS

TECHNICAL DIRECTOR - SPACEPORT AMERICA CUP CHAMPIONS - MCGILL ROCKET TEAM
 [Competition Video](#)  [Manufacturing Video](#)  www.mcgillrocketteam.com

2015 - 2018

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, triathlons, golf, wakeboarding, poker, skiing, rocketry.