

Mohammed A. SHALABY

Perception Applied Scientist | Ph.D.

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Robotist with over 6 years of experience in research and industry. Co-authored 19 peer-reviewed publications with over 170 citations. Currently leading perception and navigation development for off-road autonomous vehicles at Provectus Robotics.

SKILLS

Programming	Python	Embedded C	C++	Matlab	Julia		
Miscellaneous	ROS	Gazebo	Docker	FreeRTOS	git	Linux	LaTeX
Mathematical Tools	State Estimation	Perception	Probability Theory	Path Planning	Control Theory		
	SLAM	Machine Learning	Computer Vision				

EDUCATION

- 2023** **Doctorate of Philosophy** in Robotics, McGill University
Advisors : Prof. James Richard Forbes and Prof. Jérôme Le Ny
Major awards : Masters-to-PhD Fast-Track Award, FRQNT Doctoral Scholarship, McGill Engineering Doctoral Award
- 2019** **Bachelor of Engineering** in Mechanical Engineering, McGill University
Major awards : James McGill Scholarship, Enriched Educational Opportunities Scholarship, Dean's Honour List

WORK EXPERIENCE

- March 2024** | **Perception Applied Scientist, PROVECTUS ROBOTICS, Ottawa, Canada**
Present | Research, implement, and test novel perception solutions for challenging off-road scenarios. Contributions include a terrain mapper and a lidar-radar-based object tracker.
[C++](#) [Perception](#) [State Estimation](#) [SLAM](#) [Computer Vision](#)
- January 2023** | **Lecturer in Navigation Systems, POLYTECHNIQUE MONTREAL, Montreal, Canada**
April 2023 | Instructed a graduate course on autonomous robot navigation to 25 graduate students.
[State Estimation](#) [Probability Theory](#) [SLAM](#) [Optimization](#)
- May 2019** | **Human Brain Project Research Assistant, TECHNISCHE UNIVERSITÄT MÜNCHEN, Munich, Germany**
August 2019 | Learned from data the friction model of a moving ground vehicle for traction-control applications.
[Matlab](#) [C++](#) [Probability Theory](#) [Machine Learning](#)
- September 2018** | **Data Science & Machine Learning Intern, PRATT & WHITNEY, Montreal, Canada**
April 2019 | Developed an unsupervised learning algorithm on engine reliability data for maintenance forecasting.
[Python](#) [C](#) [Machine Learning](#)
- September 2017** | **Modelling & Optimization Engineering Intern, EXXONMOBIL, Edmonton, Canada**
August 2018 | Implemented linear-programming tools for decision making in crucial operational tasks for a refinery.
[Python](#) [Optimization](#)

HIGHLIGHTED PUBLICATIONS

- MULTI-ROBOT RELATIVE POSE ESTIMATION AND IMU PREINTEGRATION USING PASSIVE UWB TRANSCIVERS** T-RO 2024
M. A. Shalaby, C. C. Cossette, J. Le Ny, J. R. Forbes [Paper](#) [Video](#)
- DECENTRALIZED STATE ESTIMATION : AN APPROACH USING PSEUDOMEASUREMENTS AND PREINTEGRATION** IJRR 2024
C. C. Cossette, M. A. Shalaby, D. Saussié, 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, J. Le Ny [Paper](#) [Video](#) [Code](#)
- CASCADED FILTERING USING THE SIGMA POINT TRANSFORMATION (BEST PAPER FINALIST)** RA-L/ICRA 2021
M. A. Shalaby, C. C. Cossette, J. Le Ny, J. R. Forbes [Paper](#) [Video](#)
- RELATIVE POSITION ESTIMATION IN MULTI-AGENT SYSTEMS USING ATTITUDE-COUPLED RANGE MEASUREMENTS** RA-L/ICRA 2021
M. A. Shalaby, C. C. Cossette, J. R. Forbes, J. Le Ny [Paper](#) [Video](#)

📄 OTHER PUBLICATIONS

REDUCING TWO-WAY RANGING VARIANCE BY SIGNAL-TIMING OPTIMIZATION	TAES 2024
M. A. Shalaby, C. C. Cossette, J. R. Forbes, J. Le Ny 📄 Paper	
ULTRA-WIDEBAND TEACH AND REPEAT	PREPRINT
M. A. Shalaby, C. C. Cossette, J. Le Ny, J. R. Forbes 📄 Paper 📺 Video	
DIVE : DEEP INERTIAL-ONLY VELOCITY AIDED ESTIMATION FOR QUADROTORS	RA-L/IROS 2024
A. Bajwa, C. C. Cossette, M. A. Shalaby, J. R. Forbes 📄 Paper	
NAVIE : A PYTHON PACKAGE FOR ON-MANIFOLD STATE ESTIMATION	IROS 2023
C. C. Cossette, M. Cohen, V. Korotkine, A. del C. Bernal, M. A. Shalaby, J. R. Forbes 📄 Paper </> Code	
OPTIMAL MULTI-ROBOT FORMATIONS FOR RELATIVE POSE ESTIMATION USING RANGE MEASUREMENTS	IROS 2022
C. C. Cossette, M. A. Shalaby, D. Saussié, J. Le Ny, J. R. Forbes 📄 Paper	
RELATIVE POSITION ESTIMATION BETWEEN TWO UWB DEVICES WITH IMUS (BEST PAPER NOMINATION)	RA-L/ICRA 2021
C. C. Cossette, M. A. Shalaby, D. Saussié, J. R. Forbes, J. Le Ny 📄 Paper	
HEADING ESTIMATION USING ULTRA-WIDEBAND RECEIVED SIGNAL STRENGTH AND GAUSSIAN PROCESSES	RA-L/IROS 2021
D. Lisus, C. C. Cossette, M. A. Shalaby, J. R. Forbes 📄 Paper 📰 News	
LOCALIZATION WITH DIRECTIONAL COORDINATES	IROS 2021
C. C. Cossette, M. A. Shalaby, D. Saussié, J. R. Forbes 📄 Paper	

🏆 NOTABLE AWARDS AND ACHIEVEMENTS

2022	FRQNT Personal Doctoral Scholarship (\$88K) . “Real-time decentralized localization for multi-robot systems using ultra-wideband range measurements”.
2022	NSERC Alliance Grant (\$440K) . “Infrastructure inspection using a team of unmanned aerial vehicles.” Co-authored with James Forbes, Jérôme Le Ny, Charles Cossette, David Saussié, Gunes Kurt & ARA Robotique.
2021	Best Paper Finalist at ICRA 2021 . Top 3 papers among 4056 submissions.
2021	McGill Engineering Doctoral Award (\$111K) .
2020	Master’s to Ph.D. Fast-Track Award . “An award to fund and attract high-calibre students to Ph.D. programs”.
2019	McGill Engineering Undergraduate Student Masters Award (\$61K) .
2019	Graduate Excellence Fellowship (\$5K) .
2019	Dean’s Honour List . Designation assigned to the top 10% of the graduating class at McGill University.
2017	Louis C Ho SURE Award (\$7.5K) .
2016	John Howard Ambrose Scholarship (\$5K) .
2015	Outstanding Cambridge Learner Award . Multiple top-in-the-world rankings in A-Level and IGCSE subjects.
Other	James McGill Scholarship, Peter Sebestyen Award, TUM Practical Research Experience Scholarship, Enhanced Educational Opportunities Scholarship (\$20K) .

⚖️ VOLUNTEERING AND OTHER EXPERIENCE

2023	Talk at the University of Toronto Robotics Institute - “Multi-Robot Relative Pose Estimation Using UWB”.
2022	Teaching assistant in System Dynamics and Control (MECH 412) - McGill University.
2021-2022	Session chair/co-chair at ICRA and IROS - Localization and mapping.
2020	Talk at GERAD Student Research Day - “3D Position estimation for multi-robot systems using range and attitude measurements”.
2020 - present	Reviewer - Reviewed papers for RA-L, ICRA, IROS, L-CSS, CDC, ACC, TIE, etc.
2018	Robotics Lab Educator - Telus World of Science in Edmonton, Canada.
2016	Steering Systems Leader - Part of the Dynamics Group at the McGill Racing Team.

🖥️ PROJECTS

DATASET COLLECTION

I have collected datasets for

1. research (left),
2. to help others (middle, at UofT),
3. and for fun (right).

ROS [📄 Docker](#) [📄 Python](#) [📄 Embedded C](#)
[📄 C++](#) [📄 Computer Vision](#)

