

# Curriculum Vitae

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**Stephen J.R. Smith Faculty of Engineering & Applied Science**  
**Queen's University at Kingston, Ontario, Canada**

Full Professor in the Department of Electrical & Computer Engineering  
Faculty Member (and former Founding Director) at the Ingenuity Labs Research Institute  
Cross-appointed to the Department of Mechanical & Materials Engineering  
Cross-appointed to the Robert M. Buchan Department of Mining

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## Contents

<b>1 University Education</b>	<b>2</b>
<b>2 Industry, Research, and Academic Positions Held</b>	<b>2</b>
<b>3 Honours and Awards</b>	<b>4</b>
<b>4 Publications</b>	<b>5</b>
<b>5 Selected Scholarly and Industry Talks</b>	<b>17</b>
<b>6 Selected Media Attention</b>	<b>20</b>
<b>7 Research Support</b>	<b>21</b>
<b>8 University Teaching</b>	<b>27</b>
<b>9 Research Supervisions</b>	<b>31</b>
<b>10 Professional and Academic Service</b>	<b>37</b>
<b>11 University Service</b>	<b>42</b>
<b>12 Professional Development</b>	<b>45</b>
<b>13 Professional Affiliations</b>	<b>46</b>

## 1 University Education

### **09/2005: Ph.D., Electrical & Computer Engineering, University of Toronto**

Specialization in systems control and robotics

Thesis title: Coordinated Autonomy: Pursuit Formations of Multivehicle Systems

Advisors: B. A. Francis and M. E. Broucke

External examiner: V. Kumar, University of Pennsylvania, Philadelphia, PA

### **08/2001: M.Sc., Mechanical Engineering, Queen's University**

Specialization in dynamic systems and mechatronics

Thesis title: Towards Autonomous Excavation of Fragmented Rock: Experiments, Modelling, Identification, and Control

### **05/1999: B.Sc.(Hons.), Mine/Mechanical Engineering, Queen's University**

Graduated with first-class honours

Awarded a University Medal for top academic standing

## 2 Industry, Research, and Academic Positions Held

### **07/2021–Present: Professor (tenured)**

Department of Electrical & Computer Engineering, Stephen J. R. Smith Faculty of Engineering & Applied Science, Queen's University, Kingston, ON

**07/2021:** Continued cross-appointed to the Department of Mechanical & Materials Engineering, Faculty of Engineering & Applied Science

**07/2021:** Continued cross-appointed to the Robert M. Buchan Department of Mining, Faculty of Engineering & Applied Science

### **09/2018–12/2024: Founding Director**

Ingenuity Labs Research Institute, Queen's University, Kingston, ON

### **05/2019–06/2021: Associate Professor (tenured)**

Department of Electrical & Computer Engineering, Faculty of Engineering & Applied Science, Queen's University, Kingston, ON

**07/2019:** Cross-appointed to the Robert M. Buchan Department of Mining, Faculty of Engineering & Applied Science

**05/2019:** Continued cross-appointed to the Department of Mechanical & Materials Engineering, Faculty of Engineering & Applied Science

**08/2016–07/2017: KKS International Visiting Professor in Computer Science**

Centre for Applied Autonomous Sensor Systems (AASS), School of Science & Technology, Örebro University, Örebro, Sweden in collaboration with the Rocktec Automation division of Epiroc AB, Örebro, Sweden

**07/2016–04/2019: Associate Professor (tenured)**

The Robert M. Buchan Department of Mining, Faculty of Engineering & Applied Science, Queen's University, Kingston, ON

**04/2018:** Founded the multi-disciplinary Offroad Robotics research group

**09/2017-03/2019:** Associate Head, The Robert M. Buchan Department of Mining

**07/2016:** Renewed cross-appointed to the Department of Electrical & Computer Engineering, Faculty of Engineering & Applied Science

**07/2016:** Renewed cross-appointed to the Department of Mechanical & Materials Engineering, Faculty of Engineering & Applied Science

**07/2010–06/2018: Adjunct Research Professor**

Department of Mechanical & Aerospace Engineering, Faculty of Engineering and Design, Carleton University, Ottawa, ON

**05/2010–06/2016: Assistant Professor (tenure-track)**

The Robert M. Buchan Department of Mining, Faculty of Engineering & Applied Science, Queen's University, Kingston, ON

**09/2011:** Cross-appointed to the Department of Electrical & Computer Engineering, Faculty of Engineering & Applied Science

**05/2010:** Cross-appointed to the Department of Mechanical & Materials Engineering, Faculty of Engineering & Applied Science

**05/2010:** Founded the Mining Systems Laboratory (MSL)

**11/2007–04/2010: Assistant Professor (tenure-track)**

Department of Mechanical & Aerospace Engineering, Faculty of Engineering and Design, Carleton University, Ottawa, ON

**01/2008:** Founded the Carleton Robotic Vehicles Group and member of the Space Exploration Engineering Group (SEEG)

**09/2005–10/2007: R&D/Control Systems Engineer IT**

MacDonald, Dettwiler and Associates, Inc. (MDA), Space Missions Division (formerly MD Robotics and Spar Aerospace), Brampton, ON

**09/2001–09/2005: Research and Teaching Assistant in Systems Control**

Systems Control Group, The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, University of Toronto, Toronto, ON

**09/1999–08/2001: Research and Teaching Assistant in Mechatronics**

Department of Mechanical Engineering, Queen's University

**05/1999–08/1999: Research Associate in Robotics Applications**

Department of Mining Engineering, Queen's University

On contract placement at Inco Ltd., Mines Research Department, Copper Cliff, ON

**05/1998–08/1998: Research Associate in Instrumentation Systems**

Department of Mining Engineering, Queen's University

On contract with Brunswick Mining and Smelting, Bathurst, NB

**05/1997–08/1997 and 05/1996–08/1996: Engineering Assistant**

McIntosh Redpath Engineering Ltd. (now Stantec), North Bay and Sudbury, ON

### **3 Honours and Awards**

**2024:** Nominated (second nomination) by graduate students and faculty for the 2023 Award for Excellence in Graduate Student Supervision (AEGSS), Queen's University

**2021:** Research spin-off company RockMass Technologies Inc. awarded the Ontario Centre of Innovation (OCI) Mind to Market Award (M2M); M2M is OCI's premier recognition of extraordinary achievements in next-generation technology commercialization and celebrates "best in class" R&D collaborations that drive the development of made-in-Ontario technologies

**2020:** Instructor of the Year Award (as voted by graduate students) of the Graduate Electrical & Computer Engineering Student Council (GECE), Queen's University

**2018:** Nominated by faculty colleagues/Department Head for the Faculty of Engineering & Applied Science (FEAS) Excellence in Research Award, Queen's University

**2017:** Nominated for the Royal Society of Canada (RSC) College of New Scholars by the Faculty of Engineering & Applied Science, Queen's University

**2015:** Best Paper of the Conference Award at the *10th Conference on Field & Service Robotics* (FSR) with co-authors A. A. Dobson and J. Larsson

**2015:** Best Vision Paper Award at the *12th Conference on Computer & Robot Vision* (CRV) with co-authors M. T. Ahmed, M. Mohamad, and M. Greenspan

**2014:** Nominated by graduate students and faculty for the 2013 Award for Excellence in Graduate Supervision (AEGSS), Queen's University

**2013:** Elected to the grade of Senior Member of the Institute for Electrical and Electronics Engineers (IEEE)

- 2012:** Nomination for the Frank Knox Award for Excellence in Teaching (nominated by the student body and awarded by the Queen's Alma Mater Society)
- 2007:** MDA Engineering Innovation Award (selected by a technical committee of peers for the most innovative work of the year at MDA) with colleague T. D. Barfoot
- 2006:** MDA Employee Recognition Award for "outstanding performance"
- 2004–2005:** The Walter C. Sumner Memorial Fellowship (national)
- 2004:** The Edward S. Rogers Sr. Department of Electrical & Computer Engineering's Teaching Assistant Award (selected by students and faculty)
- 2003–2004:** The Edward S. Rogers Sr. Graduate Scholarship (institutional)
- 2001–2003:** NSERC PGS B Postgraduate Scholarship (national)
- 1999–2001:** NSERC PGS A Postgraduate Scholarship (national)
- 1999–2001:** Queen's Graduate Award (institutional)
- 1999:** Queen's University Medal for Academics (for top standing in my academic program, Faculty of Applied Science)
- 1999:** The WAMIC National Scholarship (national)
- 1998:** The CIM Maintenance and Engineering Centennial Scholarship (national)
- 1997–1998:** The Kostuik Scholarship (institutional)
- 1997–1998:** CMIEF National Scholarship (national)
- 1996–1998:** The Robert F. Segsworth Scholarship (national)
- 1996–1997:** L. H. & N. A. Timmins Award (institutional)

## 4 Publications

All citation counts are based on what is available about me on Google Scholar:

[scholar.google.ca/citations?user=2zOlvcUAAAAJ](https://scholar.google.ca/citations?user=2zOlvcUAAAAJ)

Google Scholar also computes that I have an h-index of **27**, an i10-index of **50**, and **3132** citations as of February 22, 2025. Links to papers and associated media can be found at:

[queensu.ca/offroad-robotics/publications](https://queensu.ca/offroad-robotics/publications)

In what follows, co-authors that are underlined indicate past or current students. The corresponding authors for paper submissions are indicated by an asterisk.

## Refereed Journal Articles

1. J. Wang\*, M. T. H. Fader, and J. A. Marshall. Learning-based model predictive control for improved mobile robot path following using Gaussian processes and feedback linearization. In *Journal of Field Robotics*, vol. 40, no. 5, August 2023.
2. L. Khaleghi\*, A. Sepas-Moghaddam, J. A. Marshall, and A. Etemad. Multi-view video-based 3D hand pose estimation. In *IEEE Transactions on Artificial Intelligence*, vol. 4, no. 4, pp. 896-909, August 2023.
3. L. Antonyshyn, J. Silveira, S. Givigi\*, and J. A. Marshall. Multiple mobile robot task and motion planning: A survey. In *ACM Computing Surveys*, vol. 55, no. 10, February 2023.
4. A. Farley, J. Wang\*, and J. A. Marshall. How to pick a mobile robot simulator: A quantitative comparison of CoppeliaSim, Gazebo, MORSE and Webots with a focus on the accuracy of motion simulations. In *Simulation Modelling Practice and Theory*, vol. 120, November 2022.
5. L. Khaleghi\*, U. Artan, A. Etemad, and J. A. Marshall. Touchless control of heavy equipment using low-cost hand gesture recognition. In the Special Issue on An End-to-end Machine Learning Perspective on Industrial IoT of the *IEEE Internet of Things Magazine*, vol. 5, no. 1, March 2022.
6. M. T. Ahmed\*, S. Ziauddin, J. A. Marshall, and M. Greenspan. Point cloud registration using virtual interest points from Macaulay's resultant of quadric surfaces. In the *Journal of Mathematical Imaging and Vision*, vol. 64, pp. 457-471, January 2021.
7. H. Fernando\* and J. A. Marshall. What lies beneath: Material classification for autonomous excavators using proprioceptive force sensing and machine learning. In *Automation in Construction*, vol. 119, November 2020.
8. J. Mitchell\* and J. A. Marshall. Towards a novel auto-rotating UAV platform for cavity surveying. In *Tunnelling and Underground Space Technology*, vol. 97, March 2020.
9. L. Dekker, J. A. Marshall\*, and J. Larsson. Experiments in feedback linearized iterative learning-based path following for center-articulated industrial vehicles. In *Journal of Field Robotics*, vol. 36, no. 5, pp. 955-972, August 2019.
10. H. Fernando\*, J. A. Marshall, and J. Larsson. Iterative learning-based admittance control for autonomous excavation. In *Journal of Intelligent and Robotic Systems*, vol. 96, no. 3-4, December 2019.
11. C. Watson and J. A. Marshall\*. Estimating underground mine ventilation friction factors from low-density 3D data acquired by a moving LiDAR. In the *International Journal of Mining Science and Technology*, vol. 28, no. 4, pp. 657-662, July 2018.

12. R. A. Hewitt\*, E. Boukas, M. Azkarate, M. Pagnamenta, J. A. Marshall, A. Gasteratos, and G. Visentin. The Katwijk beach planetary rover dataset. In *The International Journal of Robotics Research*, vol. 37, no. 1, pp. 3–12, January 2018.
13. A. A. Dobson\* and J. A. Marshall. Admittance control for robotic loading: Design and experiments with a 1-tonne loader and a 14-tonne LHD. **Invited paper** in the Special Issue on Field & Service Robotics of the *Journal of Field Robotics*, vol. 34, no. 1, January 2017.
14. M. J. Gallant\* and J. A. Marshall. Automated rapid mapping of joint orientations with mobile LiDAR. In *International Journal of Rock Mechanics and Mining Sciences*, vol. 90, pp. 1–14, December 2016.
15. M. Pasternak and J. A. Marshall\*. On the design and selection of vehicle coordination policies for underground mine production ramps. In *International Journal of Mining Science and Technology*, vol. 26, no. 5, September 2016.
16. M. J. Gallant\* and J. A. Marshall. The LiDAR Compass: Extremely lightweight heading estimation with axis maps. In *Robotics and Autonomous Systems*, vol. 82, pp. 35–45, August 2016.
17. M. J. Gallant\* and J. A. Marshall. Two-dimensional axis mapping using LiDAR. In *IEEE Transactions on Robotics*, vol. 32, no. 1, January 2016.
18. C. Ingram\* and J. A. Marshall. Evaluation of a ToF camera for remote surveying of underground cavities excavated by jet boring. **Invited paper** in *Automation in Construction*, vol. 49, Part B, pp. 271–282, January 2015.
19. D. Haviland and J. A. Marshall\*. Fundamental behaviours of production traffic in underground mine haulage ramps. In *International Journal of Mining Science and Technology*, vol. 25, no. 1, pp. 7–14, January 2015.
20. C. McKinnon and J. A. Marshall\*. Automatic identification of large fragments in a pile of broken rock using a time-of-flight camera. In *IEEE Transactions on Automation Science and Engineering*, vol. 11, no. 3, pp. 935–942, July 2014.
21. M. Gallant\*, A. Ellery, and J. A. Marshall. Rover-based autonomous science by probabilistic identification and evaluation. In *Journal of Intelligent & Robotic Systems*, vol. 73, no. 3-4, pp. 591–613, December 2013.
22. N. J. Lavigne\* and J. A. Marshall. A landmark-bounded method for large-scale underground mine mapping. In *Journal of Field Robotics*, vol. 29, no. 6, pp. 861-879, November/December 2012.
23. J. A. Marshall\* and D. Tsai. Periodic formations of multivehicle systems. In *IET Control Theory & Applications*, vol. 5, no. 2, pp. 389–396, March 2011.

24. U. Artan, J. A. Marshall\* , and N. J. Lavigne. Robotic mapping of underground mine passageways. In *Transactions of the IMM (Part A): Mining Technology*, vol. 120, no. 1, pp. 18–24, January 2011.
25. J. A. Marshall\* and M. E. Broucke. Symmetry invariance of multiagent formations in self-pursuit. *IEEE Transactions on Automatic Control*, vol. 3, no. 9, pp. 2022-2032, October 2008.
26. J. A. Marshall\*, T. D. Barfoot, and J. Larsson. Autonomous underground tramming for center-articulated vehicles. **Invited paper** in the Special Issue on Field & Service Robotics of the *Journal of Field Robotics*, vol. 25, no. 6-7, pp. 400-421, June-July 2008.
27. J. A. Marshall\*, P. F. Murphy, and L. K. Daneshmend. Toward autonomous excavation: Full-scale experiments. *IEEE Transactions on Automation Science and Engineering*, vol. 5, no. 3, pp. 562-566, July 2008.
28. J. A. Marshall\*, T. Fung, M. E. Broucke, G. M. T. D'Eleuterio, and B. A. Francis. Experiments in multirobot coordination. *Robotics and Autonomous Systems*, vol. 54, no. 3, pp. 265-275, March 2006.
29. J. A. Marshall\*, M. E. Broucke, and B. A. Francis. Pursuit formations of unicycles. *Automatica*, vol. 42, no. 1, pp. 3-12, January 2006.
30. J. A. Marshall\*, M. E. Broucke, and B. A. Francis. Formations of vehicles in cyclic pursuit. *IEEE Transactions on Automatic Control*, vol. 49, no. 11, pp. 1963-1974, November 2004.

### Journal Articles Submitted

1. D. Sacoransky\*, K. Hashtrudi-Zaad, and J. A. Marshall. Radar-based autonomous vehicle localization using reflective roadside landmarks. Submitted to *Journal of Intelligent & Robotic Systems* on November 4, 2024.
2. H. Fernando, F. Sun, K. Wang, N. Hoult, and J. A. Marshall\*. Design and field testing of a mobile robot for automatically installing fibre optic sensors on rail. Submitted to *Automation in Construction* on September 24, 2024.

### Refereed Book Contributions

1. J. A. Marshall. Mining robotics. **Invited chapter** in the *Springer Encyclopedia of Robotics*, April 2020.
2. J. A. Marshall\*, A. Bonchis, E. M. Nebot and S. Scheduling. Robotics in mining. **Invited chapter** in the *Springer Handbook of Robotics*, 2nd edition, Chapter 59, Part F, pp. 1549–1576, 2016.



3. J. A. Marshall\*, Z. Lin, M. E. Broucke, and B. A. Francis. Pursuit strategies for autonomous agents. **Invited chapter** in *Cooperative Control: A Post-workshop Volume: 2003 Block Island Workshop on Cooperative Control*, eds. V. Kumar, N. E. Leonard, and A. S. Morse. Springer Series: Lecture Notes in Control and Information Sciences, vol. 309, pp. 137-151, 2004.

## Patents and Patent Applications

Note that most of the patents listed below—both filed and granted—have many associated patents filed/granted in multiple jurisdictions. I do not view/count these associated patents as distinct works (although some people do). Thus, for clarity's sake, only United States (US) patents are listed unless there is no equivalent patent in that jurisdiction.

1. U. Artan, H. Fernando, and J. A. Marshall. Automatic classification of excavation materials. International Patent Application No. PCT/CA2022/050520, filed on April 6, 2022.
  - US Patent Application No. US 2024/0369521 A1, filed on October 5, 2023 and published on November 7, 2024.
2. M. J. Gallant and J. A. Marshall. Automated mobile geotechnical mapping. US Patent No. US11226201B2, **granted** January 18, 2022.
  - Commercialized via the start-up company RockMass Technologies (Toronto, ON) as their AxisMapper product (rockmasstech.com)
3. S. Pyke, N. J. Lavigne, J. A. Marshall, J. Peck, and A. Scott. Dead-reckoning-augmented GPS for tracked vehicles. US Patent No. US10948607B2, **granted** March 16, 2021.
4. S. W. Pyke, J. A. Marshall, N. J. Lavigne, and U. Artan. Method and system for georeferencing underground data. US Patent No. US 10,838,106 B2, **granted** November 17, 2020.
5. J. Mitchell and J. A. Marshall. Autorotating unmanned aerial vehicle surveying platform. US Patent No. US10676190B2, **granted** June 9, 2020.
6. A. A. Dobson and J. A. Marshall. Autonomous loading vehicle controller. AU Patent No. AU2015208631B2, **granted** July 25, 2019.
  - Commercialized by Epiroc/Atlas Copco Rock Drills AB (Örebro, Sweden) as their underground LHD autonomous loading and load-assist packages
7. R. L. Vanderbeck and J. A. Marshall. Tunnel convergence monitoring apparatus and method. US Patent No. US 15/471,802, filed on March 28, 2017, **granted** on April 17, 2018.

8. J. A. Marshall and T. D. Barfoot. Global position and orientation estimation system for a vehicle in a passageway environment. European Patent No. EP2450763, **granted** January 3, 2017.
  - Commercialized by Peck Tech Consulting Ltd. (Montreal, QC) as the uGPS Rapid Mapper (ugpsrapidmapper.com)
9. T. D. Barfoot, J. A. Marshall, R. Mukherji, and R. Ward. Guidance, navigation and control system for a vehicle. US Patent No. US 8,090,491 B2, **granted** January 3, 2012, and US 8,260,483 B2, **granted** September 4, 2012.
  - Commercialized by Epiroc/Atlas Copco Rock Drills AB (Örebro, Sweden) as their LHD automation package (available on underground trucks and scoops)
10. J. A. Marshall and T. D. Barfoot. Traffic management system for a passageway environment. US Patent No. US 7,756,615 B2, **granted** July 13, 2010.
  - Commercialized by Peck Tech Consulting Ltd. (Montreal, QC) as their uGPS Rapid Mapper (ugpsrapidmapper.com)

### Conference Papers (Fully Refereed) Submitted

1. A. Beca\* and J. A. Marshall. Path-following controller designs for autonomous and semi-autonomous industrial motor graders. Submitted to the 2025 Canadian Conference on Robots and Vision (CRV2025), submitted on February 16, 2025.

### Conference Papers (Fully Refereed)

1. J. Silveira, J. A. Marshall, and S. Givigi\*. A simulation pipeline to facilitate real-world robotic reinforcement learning applications. To appear in *Proceedings of the 2025 IEEE International Systems Conference (SysCon)*, Montreal, QC, April 7-10, 2025.
2. D. Jenkins\*, J. A. Marshall. This is the way: Mitigating the roll of an autonomous uncrewed surface vessel in wavy conditions using model predictive control. In *Proceedings of the 2024 IEEE/RSJ International Conference on Intelligent Robots & Systems (IROS)*, Abu Dhabi, United Arab Emirates, October 2024.
3. S. Villemure, J. Silveira, and J. A. Marshall. Terrain classification for the Spot quadrupedal mobile robot using only proprioceptive sensing. In *Proceedings of the 2024 IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Kingston, Canada, August 2024.
4. E. Taylor, T. M. C. Sears, and J. A. Marshall. Experiments in decentralized multivehicle localization using ultra-wideband transceivers. In *Proceedings of the 2024 IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Kingston, Canada, August 2024.

5. T. M. C. Sears, M. R. Cooper, S. Button, and J. A. Marshall. OtterROS: Picking and programming an uncrewed surface vessel for experimental field robotics research with ROS 2. In *Proceedings of the Workshop on Field Robotics at the 2024 IEEE International Conference on Robotics & Automation (ICRA)*, Yokohama, Japan, May 13, 2024.
6. K. Wang, S. Givigi\*, and J. A. Marshall. Monkey see, Monkey do: Constant time delay leader following for wheeled mobile robots using uncertainty-tuned model predictive control). In *Proceedings of the 2024 IEEE International Systems Conference (SysCon)*, Montreal, QC, April 2024.
7. T. M. C. Sears\*, M. R. Cooper, and J. A. Marshall. Mapping waves with an uncrewed surface vessel via Gaussian process regression. In *Proceedings of the 2023 IEEE International Conference on Robotics & Automation (ICRA)*, London, UK, May-June 2023.
8. D. Sacoransky\*, K. Hashtrudi-Zaad, and J. A. Marshall. Towards unsupervised filtering of millimetre-wave radar returns for autonomous vehicle road following. In *Proceedings of the 2023 IEEE International Conference on Robotics & Automation (ICRA)*, London, UK, May-June 2023.
9. J. Silveira\*, K. Cabral, S. Givigi, and J. A. Marshall. Real-time fast marching tree for mobile robot motion planning in dynamic environments. In *Proceedings of the 2023 IEEE International Conference on Robotics & Automation (ICRA)*, London, UK, May-June 2023.
10. T. M. C. Sears\* and J. A. Marshall. Mapping of spatiotemporal scalar fields by mobile robots using Gaussian process regression. In *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, October 2022.
11. L. Khaleghi, J. A. Marshall, and A. Etemad\*. Exploiting sequential contexts using transformers for 3D hand pose estimation. In *Proceedings of the 26th International Conference on Pattern Recognition (ICPR)*, Montreal, QC, August 2022.
12. J. Caldwell\* and J. A. Marshall. Towards efficient learning-based model predictive control via feedback linearization and Gaussian process regression. In *Proceedings of the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, September 2021.
13. A. Greisman\*, K. Hashtrudi-Zaad, and J. A. Marshall. Detection of conductive lane markers using mmWave FMCW automotive radar. In *Proceedings of the 2021 IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, Karlsruhe, Germany, September 2021.
14. U. Artan\*, H. Fernando, and J. A. Marshall. Automatic material classification via proprioceptive sensing and wavelet analysis during excavation. In *Proceedings of the*

*2021 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, Delft, The Netherlands, July 2021.

15. O. Mayuku\*, B. F. Surgenor, and J. A. Marshall. A self-supervised near-to-far approach for terrain-adaptive off-road autonomous driving. In *Proceedings of the 2021 IEEE International Conference on Robotics and Automation (ICRA)*, Xi'an, China, May 2021.
16. O. Mayuku\*, B. F. Surgenor, and J. A. Marshall. Multi-resolution and multi-domain analysis of off-road datasets for autonomous driving. In *Proceedings of the 2021 Computer and Robot Vision Conference (CRV)*, Vancouver, BC, May 2021.
17. U. Artan\* and J. A. Marshall. Towards automatic classification of fragmented rock piles via proprioceptive sensing and wavelet analysis. In *Proceedings of the 2020 IEEE Conference on Multisensor Fusion and Integration (MFI)*, Karlsruhe, Germany, September 2020.
18. J. von Tiesenhausen\*, U. Artan, J. A. Marshall, and Q. Li. Hand gesture-based control of a front-end loader. In *Proceedings of the 33rd IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, London, ON, May 2020.
19. M. T. Ahmed\*, M. Greenspan, M. Asif, J. A. Marshall. Robust apple segmentation using fuzzy logic. In *Proceedings of the 5th IEEE International Multi-Topic ICT Conference (IMTIC)*, Jamshoro, Pakistan, April 2018.
20. M. T. Ahmed\*, J. A. Marshall, and M. Greenspan. Point cloud registration with virtual interest points from implicit quadric surface intersections. In *Proceedings of the 2017 International Conference on 3D Vision (3DV)*, Qingdao, China, October 2017.
21. L. G. Dekker\*, J. A. Marshall, and J. Larsson. Industrial-scale autonomous wheeled-vehicle path following by combining iterative learning control with feedback linearization. In *Proceedings of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, September 2017.
22. H. Fernando\*, J. A. Marshall, H. Ålmqvist, and J. Larsson. Towards controlling bucket fill factor in robotic excavation by learning admittance control setpoints. In *Proceedings of the 11th Conference on Field & Service Robotics (FSR)*, Zürich, Switzerland, September 2017.
23. M. J. Gallant\* and J. A. Marshall. Automated three-dimensional axis mapping with a mobile platform. In *Proceedings of the 2016 IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, Sweden, May 2016.
24. E. Deretey\*, M. T. Ahmed, J. A. Marshall, and M. Greenspan. Visual indoor positioning with a single camera using PnP. In *Proceedings of the 6th International Conference on Indoor Positioning and Indoor Navigation (IPIN)*, pp. 1-9, Banff, AB, October 2015.

25. R. Hewitt\* and J. A. Marshall. Towards intensity-augmented SLAM with LiDAR and ToF sensors. In *Proceedings of the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 2015.
26. A. A. Dobson\*, J. A. Marshall, and J. Larsson. Admittance control for robotic loading: Underground field trials with an LHD. In *Proceedings of the 10th Conference on Field & Service Robotics (FSR)*, Toronto, ON, June 2015. **Winner of the conference best paper award.**
27. M. T. Ahmed\*, M. Mohamad, J. A. Marshall, and M. Greenspan. Registration of noisy point clouds using virtual interest points. In *Proceedings of the 12th Conference on Computer and Robot Vision (CRV)*, Halifax, NS, June 2015. **Winner of the best vision paper award.**
28. C. Watson\* and J. A. Marshall. Towards extracting absolute roughness from underground mine drift profile data. In *Proceedings of the 37th International Symposium on the Application of Computers and Operations Research in the Mineral Industry (APCOM)*, Fairbanks, AK, May 2015.
29. M. J. Gallant\*, J. A. Marshall, and B. K. Lynch. Estimating the heading of a Husky mobile robot with a LiDAR compass based on direction maps. **Invited paper** in *Proceedings of the 2014 International Conference on Intelligent Unmanned Systems (ICIUS)*, Montreal, QC, September 2014.
30. C. Ingram\* and J. A. Marshall. 3D time-of-flight camera for surveying remote cavities mined with a jet boring system. In *Proceedings of the 30th International Symposium on Automation & Robotics in Construction and Mining (ISARC)*, Montreal, QC, August 2013. **Winner of a student best paper award.**
31. J. V. Simela\*, J. A. Marshall, and L. K. Daneshmend. Automated laser scanner 2D positioning and orienting by method of triangulation for underground mine surveying. In *Proceedings of the 30th International Symposium on Automation & Robotics in Construction and Mining (ISARC)*, Montreal, QC, August 2013.
32. D. Pike\*, S. Givigi, J. A. Marshall, A. Taylor, and A. Beaulieu. Robust vehicle routing policies using local communications and sensing. In *Proceedings of the 2013 American Control Conference (ACC)*, pp. 6351-6357, Washington, DC, June 2013.
33. S. Radacina Rusu\*, J. A. Marshall, and M. J. D. Hayes. Localization in large-scale underground environments with RFID. In *Proceedings of the 24th IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Niagara Falls, ON, May 2011.
34. M. Gallant\*, J. A. Marshall, and A. Ellery. Science-influenced mobile robot guidance using Bayesian networks. In *Proceedings of the 24th IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Niagara Falls, ON, May 2011.

35. N. J. Lavigne\*, J. A. Marshall, and U. Artan. Towards underground mine drift mapping with RFID. In *Proceedings of the 23rd IEEE Canadian Conference on Electrical & Computer Engineering*, Calgary, AB, May 2010.
36. U. Artan, N. J. Lavigne, and J. A. Marshall\*. Robotic mapping of underground drift networks. In *Proceedings of the 34th Conference on Applications of Computers and Operations Research in the Minerals Industry (APCOM)*, Vancouver, BC, October 2009. (Cited by 14)
37. U. Artan\*, N. J. Lavigne, and J. A. Marshall . Globally consistent mapping of large-scale passageway environments. In *Proceedings of the 22nd IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, pp. 656-659, St. John's, NL, May 2009.
38. J. Larsson\*, J. Appelgren, J. A. Marshall , and T. D. Barfoot. Atlas Copco infrastructureless guidance system for high-speed autonomous underground tramming. In *Proceedings of the 5th International Conference and Exhibition on Mass Mining (MassMin)*, pp. 585-594, Luleå, Sweden, June 2008.
39. J. A. Marshall and T. D. Barfoot\*. Design and field testing of an autonomous underground tramming system. In *Proceedings of the 6th International Conference on Field & Service Robotics (FSR)*, pp. 393-402, Chamonix, France, July 2007.
40. J. A. Marshall\* and M. E. Broucke. On invariance of cyclic group symmetries in multiagent formations. In *Proceedings of the Joint 44th IEEE Conference on Decision & Control and European Control Conference (CDC/ECC)*, pp. 746-751, Seville, Spain, December 2005.
41. J. A. Marshall\*, T. Fung, M. E. Broucke, G. M. T. D'Eleuterio and B. A. Francis. Experimental validation of multi-vehicle coordination strategies. In *Proceedings of the 2005 American Control Conference (ACC)*, pp. 1090-1095, Portland, OR, June 2005.
42. J. A. Marshall\*, M. E. Broucke, and B. A. Francis. Unicycles in cyclic pursuit. In *Proceedings of the 2004 American Control Conference (ACC)*, pp. 5344-5349, Boston, MA, July 2004.
43. J. A. Marshall\*, M. E. Broucke, and B. A. Francis. A pursuit strategy for wheeled-vehicle formations. In *Proceedings of the 42nd IEEE Conference on Decision & Control (CDC)*, pp. 2555-2560, Maui, HI, December 2003.

### **Conference Papers and Posters (Refereed Abstracts)**

1. F. Marrato and J. A. Marshall. Sound source tracking as a heuristic for frontier exploration in search and rescue using a quadrupedal mobile robot. Poster presented at the *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Detroit, MI, October 2023.

2. P. C. Hungler\*, J. A. Marshall, J. S. Parent, E. A. Tremblay, M. Karan, and D. Clarke. Utilization of virtual reality for engineering discipline selection. In *Proceedings of the 2019 Canadian Engineering Education Association Conference (CEEA-ACEG)*, Ottawa, ON, June 2019.
3. J. Mitchell\* and J. A. Marshall. Design of a novel auto-rotating UAV platform for underground mine cavity surveying. In *Proceedings of the 2017 SME Annual Conference & Exposition*, Denver, CO, February 2017.
4. E. Boukas\*, R. A. Hewitt, M. Pagnamenta, R. Nelen, M. Azkarate, J. A. Marshall, A. Gasteratos, and G. Visentin. HDPR: A mobile testbed for current and future rover technologies. In *Proceedings of the 14th International Symposium on Artificial Intelligence, Robotics and Automation in Space (i-SAIRAS)*, Beijing, China, June 2016.
5. A. A. Dobson\* and J. A. Marshall. Autonomous digging: Reducing the impact of communications delay for planetary mining. Presented at the *Planetary and Terrestrial Mining Sciences Symposium (PTMSS)*, Montreal, QC, May 2015.
6. D. Haviland\* and J. A. Marshall. Simulation of traffic flow in underground mine ramps. Presented at the *CIM Conference & Exhibition*, Edmonton, AB, May 2012.
7. S. Radacina Rusu, J. A. Marshall\*, and M. J. D. Hayes. Experiments in real-time map-based underground global positioning. In *Proceedings of the CIM Conference & Exhibition*, Montreal, QC, May 2011.
8. M. Gallant\*, A. Ellery, and J. A. Marshall. Exploring salience as an approach to rover-based planetary exploration. In *Proceedings of the ASTRO 2010 Conference*, Toronto, ON, May 2010.
9. J. Larsson\*, J. Appelgren, and J. A. Marshall. Next-generation system for unmanned LHD operation in underground mines. In *Proceedings of the SME 100 Years of Mining Research Symposium*, Phoenix, AZ, February 2010.
10. M. A. Swartz\*, A. Ellery, and J. A. Marshall. Towards adaptive localization for rover navigation using multilayer feedforward neural networks. In *Proceedings of the ASTRO 2008 Conference*, Montréal, QC, May 2008.
11. P. F. Murphy\*, J. A. Marshall, R. A. Hall, L. K. Daneshmend, and P. M. Wild. Advanced technologies for mobile underground equipment. In *Proceedings of the 2002 CIM Mining Millennium Conference*, Vancouver, BC, May 2002.
12. A. Dellah, P. M. Wild\*, B. W. Surgenor, and J. A. Marshall. A laboratory on the microprocessor control of a floating ping-pong ball. Poster given at the *2000 ASEE Annual Conference and Exposition*, St. Louis, MO, June 2000.

## Periodical and Magazine Articles

1. J. A. Marshall. The robot revolution is here: How it's changing jobs and businesses in Canada. In *The Conversation*, February 23, 2021, <https://theconversation.com/the-robot-revolution-is-here-how-its-changing-jobs-and-businesses-in-canada-155267>.
2. J. A. Marshall. Navigating the advances in underground navigation: Straight talk on mobile equipment positioning and robotic mapping. In *CIM Magazine*, pp. 20-21, June-July 2010.

## Selected Scholarly Reports for Industry

1. H. Fernando, F. Sun, K. Wang, J. A. Marshall, and N. Hoult. Design and field testing of a prototype mobile robot for the automatic installation of fibre on rail. Technical report issued to the National Research Council of Canada (NRC) under Collaborative Research & Development grant SC-AI4L-118-1, October 20, 2023 (32 pages).
2. J. Caldwell, R. Kealey, H. Fernando, and J. A. Marshall. Design requirements and operational concepts for a robotic underground scissor bolter. Technical report issued to Maclean Engineering under NSERC Engage project EGP 523529-18, October 30, 2018 (35 pages).
3. R. Hewitt and J. A. Marshall. LiDAR based navigation system prototype description and test report. Technical report issued to the European Space Agency (ESA) under contract 4000108490/13/NL/PA, January 21, 2015 (45 pages).
4. J. Mitchell, B. K. Lynch, and J. A. Marshall. Operational concepts and design requirements for an underground UAV platform. Technical report issued to Sprung-Brett RDI under NSERC Engage project EGP 462075-13, August 29, 2014 (69 pages).
5. A. A. Dobson, J. A. Marshall. Test results and recommendations from ST14 autoloading experiments at Kvarntorp. Technical report issued to Atlas Copco Rock Drills AB, July 10, 2014 (154 pages).
6. R. Hewitt and J. A. Marshall. State of the Art on SLAM, vehicle dynamics and feature detectors for LiDAR sensors. Technical report issued to the European Space Agency (ESA) under contract 4000108490/13/NL/PA, December 6, 2013 (43 pages).
7. T. D. Barfoot and J. A. Marshall. GN&C Strategies for Manned Lunar Mission Scenarios. Technical report issued to MacDonald, Dettwiler and Associates, Inc. (MDA), Space Missions Division, July 2009.
8. J. A. Marshall, K. L. Moore, and L. K. Daneshmend. Scoping Study: Application of Automation Technologies for P&H's IPCC (In-Pit Crushing and Conveying). Technical report issued to P&H Mining Equipment, Inc. (in collaboration with Peck Tech Consulting), April 2009.



9. U. Artan, N. J. Lavigne, and J. A. Marshall. Globally Consistent Mapping of Underground Environments: Concept Designs and Implementation. Technical report issued to MacDonald, Dettwiler and Associates Inc. (MDA), Space Missions, December 2008. Research funded in part by the Ontario Centres of Excellence (OCE) under project CA-IA-I50965-08.
10. J. Peck, J. A. Marshall, and R. A. Hall. Overview of Automation in the Mining Industry and Recommendations for Orica's Future Technology Focus. Report issued (in cooperation with LNH Technologies) to Orica Limited, November 2008.
11. A. Ellery and J. A. Marshall. Traction Design Options for the Lunar Exploration Manned Utility Rover (LEMUR). Technical report issued to MacDonald, Dettwiler and Associates, Inc. (MDA), Space Missions (under subcontract to the Canadian Space Agency), May 2008.
12. J. A. Marshall and A. Ellery. Scalable Autonomy Options for the Lunar Exploration Manned Utility Rover (LEMUR). Technical report issued to MacDonald, Dettwiler and Associates, Inc. (MDA), Space Missions (under subcontract to the Canadian Space Agency), May 2008.
13. R. A. Hall, L. K. Daneshmend, and J. A. Marshall. Final Report: Follow-on Reliability Analysis and Production Simulation of Diamond Drills. Technical report issued to the Mines Research Department, Inco Ltd., Copper Cliff, ON, May 2000.
14. R. A. Hall, L. K. Daneshmend, and J. A. Marshall. Progress Report: Follow-on Reliability Analysis and Production Simulation of Diamond Drills. Technical report issued to the Mines Research Department, Inco Ltd., Copper Cliff, ON, July 1999.

### Academic Theses

1. *Coordinated Autonomy: Pursuit Formations of Multivehicle Systems*. Ph.D. Thesis, Department of Electrical & Computer Engineering, University of Toronto, Toronto, ON, September 2005.
2. *Towards Autonomous Excavation of Fragmented Rock: Experiments, Modelling, Identification and Control*. M.Sc.(Eng.) Thesis, Department of Mechanical Engineering, Queen's University, Kingston, ON, August 2001.
3. *Development of an Instrumentation and Data Acquisition System for Rock and Mine Backfill Testing*. B.Sc.(Hons.) Thesis, Department of Mining Engineering, Queen's University, Kingston, ON, May 1999.

## 5 Selected Scholarly and Industry Talks

1. "How Robotics is Shaping the Future of Mining: Challenges and Opportunities for Workers and Society" **Invited keynote** given at the *CIFAR Innovation, Equity & The*

- Future of Prosperity Innovation* (IEP) program meeting, Banff, AB, February 6, 2025.
2. "Engineer to Make an Impact" **Invited keynote** give at the 2024 IEEE Canada Kingston Section Annual General Meeting, Kingston, ON, November 19, 2024.
  3. "In the Future, Will Everything that Moves be Robotic?" **Invited** to give then annual Queen's Royal Legacy Society Tea Talk 2024, Kingston, ON, June 18, 2024.
  4. "Robots in Rocky Situations" **Invited talk** given at the University of Toronto's ENSC 301 Robotics Seminar Series, Toronto, ON, November 23, 2022.
  5. "Fear Not the Robots" **Invited talk** given at the NEXT Leaders Forum of the Business Council of British Columbia, Vancouver, BC, September 15, 2021.
  6. "Robots in Rocky Situations" **Invited talk** given at the University of Toronto's ENSC 301 Robotics Seminar Series, Toronto, ON, January 13, 2021.
  7. "Rocks, robots, and applied AI" **Invited talk** given at the October 2020 *Queensland Robotics Cluster* Muster, Brisbane, Australia, October 21, 2020.
  8. "The robots are coming but will Canada be fine?" **Invited talk** given at the *Canada Science and Policy Conference* (CSPC2019), Ottawa, ON, November 14, 2019, as part of an **Expert Panel Discussion** about "Artificial Intelligence and Natural Resources Management".
  9. **Invited** and delivered the opening keynote/remarks at the public grand opening of Amazon.ca's new fully-robotic distribution centre, Hamilton, ON, April 19, 2022.
  10. "Advancing mobile autonomy in mining" **Invited talk** given at the *NRCan Sector-Strong Artificial Intelligence Forum*, Ottawa, ON, February 28, 2019. Also participated as member of the **Expert Panel Discussion** about "AI in Natural Resources" at this Government of Canada conference.
  11. "The future of things" **Invited talk** given at the *Principal's Symposium: Imagining our Digital Future*, The Isabel Bader Theatre for the Performing Arts, Kingston, ON, November 26, 2018. Available online at <https://youtu.be/dsSBbfQvRKw>.
  12. "Automation for underground: Example technologies from the Mining Systems Laboratory" **Invited talk** given at the *Barrick Robotics Seminar*, hosted by Barrick Gold Corporation, Toronto, ON, September 19, 2017.
  13. "Mobile robots in the field: Examples from mining" **Invited talk** given at Kollmorgen AB, Gothenburg, Sweden, May 15, 2017.
  14. "Mobile autonomy for underground and other rocky situations" **Invited talk** given at Scania AB, Södertälje, Sweden, October 5, 2016.

15. "Experiential learning at the graduate level: Examples from the Queen's Mining Systems Laboratory" **Invited keynote** given at the *Seminario Tendencias tecnológicas en minería subterránea*, hosted by the Universidad del Desarrollo, Santiago, Chile, November 26, 2015.
16. "Bridging the gaps in underground machine positioning and automation technologies" **Invited talk** given to the Centre for Applied Autonomous Sensor Systems (AASS), Örebro University, Örebro, Sweden, November 13, 2013.
17. "Experiments in real-time map-based underground positioning" Given at the *CIM Conference & Exhibition*, Palais de Congrès de Montréal, QC, May 25, 2011.
18. "How to tame a 40-tonne mobile robot" **Invited talk** given to the Department of Electrical & Computer Engineering, Queen's University, Kingston, ON, February 10, 2011 (open research talk, as part of the cross-appointment process).
19. "Robotic mapping of underground drift networks" Given at the *34th Conference on Applications of Computers and Operations Research in the Minerals Industry (APCOM 2009)*, Sheraton Wall Centre, Vancouver, BC, October 7, 2009.
20. "Of rocks and robots" **Invited talk** given to the Department of Mining Engineering, Queen's University, Kingston, ON, July 21, 2009.
21. "Autonomy for underground" **Invited talk** given to the Department of Mining & Materials Engineering, McGill University, Montréal, QC, June 19, 2009.
22. "Engineering autonomy for Earth and Space" **Invited talk** given to the Department of Mechanical & Aerospace Engineering, Carleton University, Ottawa, ON, July 6, 2007.
23. "Development of a real-time underground global positioning system" **Invited talk**, given at the *Mass Mining Technology (MMT): Technology Transfer Meeting* (hosted by Orica Mining Services and the University of Queensland), Sydney, Australia, September 14, 2006.
24. "Experimental validation of multivehicle coordination strategies" Given at the *2005 American Control Conference*, Portland, OR, June 30, 2005.
25. "Coordinated control of multivehicle systems" **Invited talk**, given at *ECE Connections 2005*, University of Toronto, Toronto, ON, June 24, 2005.
26. "Symmetry invariance in multiagent formations" **Invited talk**, given at the *Northeast Nonlinear and Hybrid Control Workshop* (organized by M. Arcak and G. Pappas), Rensselaer Polytechnic Institute, Troy, NY, April 1, 2005.
27. "Autonomous yet coordinated: Pursuit strategies for multivehicle formations" **Invited talk**, given to the Department of Mechanical Engineering, The University of British Columbia, Vancouver, BC, March 16, 2005.

28. “Unicycles in cyclic pursuit” Given at the *2004 American Control Conference*, Boston, MA, July 2, 2004.
29. “Exploring the collective behaviour of wheeled vehicles in cyclic pursuit” **Invited talk**, given at the *Meeting on Nonlinear Control and its Applications* (hosted by A. Lewis and R. Hirschorn), Department of Mathematics and Statistics, Queen’s University, Kingston, ON, May 5, 2004.
30. “A pursuit strategy for wheeled-vehicle formations” Given at the *42nd IEEE Conference on Decision & Control*, Maui, HI, December 9, 2003.

## 6 Selected Media Attention

1. Quoted in “Toronto’s pink delivery robots have been pulled off the streets and may be banned next week—but is that the right move?” by Sean Frankling, *Toronto Star*, December 11, 2021.
2. Live radio interviewed by Angela Kokott on *Afternoons with Rob Breakenridge* about robotics in Canada and Amazon’s announcement of a new robotics facility in Alberta, as reported by *The Globe & Mail*, 770 CHQR Global News Radio in Calgary, AB, June 29, 2021.
3. Panel speaker at the *Collision 2021* conference for the “Masterclass: The technological transformation of mining”, Toronto, ON, April 21, 2021.
4. Interviewed by Amber Mac for the podcast *This is Mining* in Season 2, Episode 1, entitled “Robotics, automation, and the 21st century miner”, released April 8, 2021.
5. Live radio interviewed on *The Morning News with Sue Deyell and Andrew Schultz* about my article “The robot revolution is here: How it’s changing jobs and businesses in Canada”, 770 CHQR Global News Radio in Calgary, AB, February 25, 2021.
6. Live radio interviewed on *Kitchener Today with Brian Bourke* about my article “The robot revolution is here: How it’s changing jobs and businesses in Canada”, 570 News Radio, Rogers Sports & Media in Kitchener, ON, February 24, 2021.
7. Interviewed for the Faculty of Engineering & Applied Science’s podcast “In conversation with Dr. Joshua Marshall”, published July 20, 2020.
8. Quoted in “Connecting science, policy, and society” by Melinda Knox, *Queen’s Gazette*, published bi-weekly by Queen’s University, November 19, 2019.
9. Quoted in “Institutional innovation: How universities are trying to reinvent mining education to meet tomorrow’s needs” by Alexandra Lopez-Pacheco, *CIM Magazine*, May 13, 2019.

10. Research and prototype system for mobile underground positioning (a.k.a., uGPS) on permanent display in the “From Earth to Us” exhibit at the *Canada Science and Technology Museum*, Ottawa, ON, opened November 2017.
11. Quoted in “Drone maps mines to explore unsafe caverns and seek out minerals” by David Hambling, *New Scientist*, April 11, 2017.
12. Quoted in “Fully loaded: Atlas Copco feels its way into autonomous loading for LHDs” by Alexandra Lopez-Pacheco, *CIM Magazine*, vol. 11, no. 8, December 2016/January 2017.
13. Quoted in “The evolution of autonomy” by Kate Sheridan, *CIM Magazine*, vol. 11, no 6, September/October, 2016.
14. Mentioned in “Mining venture strikes gold in pitch contest”, by Mark Kerr, *Queen’s Gazette*, published bi-weekly by Queen’s University, August 18, 2016.
15. Video interview appeared in “Self driving cars headed for Ontario”, *Station 14*, Kingston, ON, October 19, 2015.
16. Quoted in “Researchers rock with robots” by Anne Craig, *Queen’s Gazette*, published bi-weekly by Queen’s University, May 12, 2015.
17. Quoted in “The industrial internet has arrived” by Simon Richardson, *Achieve: The Annual Magazine of the Atlas Copco Group*, published annually by Atlas Copco AB, Stockholm, Sweden, 2015.
18. Quoted in “Mining: Extreme prospects” by Brian Owens, *Nature*, no. 495, published weekly by Macmillan Publishers Ltd., March 14, 2013.

## 7 Research Support

### As Principal Investigator

#### 04/2023-04/2028: NSERC Discovery Grant — Individual

<b>Title</b>	Mobile-Robot Navigation, Control, and Mapping in Spatiotemporal Worlds
<b>Grant</b>	\$42,000 per annum for five years

#### 03/2021-03/2024: Research Contract under FedDev Southern Ontario

<b>Title</b>	Collaboration Agreement Between City of Kingston and Development Hub (Ingenuity Labs)
<b>Contract</b>	\$210,000
<b>Client</b>	City of Kingston

**02/2019-05/2024 (extended): NSERC/DND Collaborative R&D Grant (CRD)**

<b>Title</b>	Off-Road Multi-Vehicle Autonomy for Challenging Outdoor Environments
<b>Grant</b>	\$100,000 + \$50,000 (industry cash) per annum × four years
<b>Co-Is</b>	B. Surgenor (MME), K. Rudie (ECE), S. Givigi (Computing)
<b>Partners</b>	General Dynamics Land Systems Canada (London, ON) and Defence Research & Development Canada (DRDC) (Suffield, AB)

**05/2018-09/2019: NSERC Engage Grant**

<b>Title</b>	Design Requirements and Operational Concepts for a Robotic Underground Scissor Bolter
<b>Grant</b>	\$24,700
<b>Partner</b>	MacLean Engineering (Collingwood, ON)

**05/2018-05/2019: FEAS Dean's Research Fund (DRF)**

<b>Title</b>	Off-Road Mobile Robotics Research Initiative
<b>Grant</b>	\$107,000 (2018), \$50,000 (2019)
<b>Co-I</b>	B. Surgenor, Q. Li, K. Hastrudi-Zaad, S. Givigi (RMC), and L. Daneshmend

**04/2015-04/2022 (deferred twice): NSERC Discovery Grant — Individual**

<b>Title</b>	Multi-Robot Tools and Techniques for Exploration and Mobile Surveying
<b>Grant</b>	\$25,000 per annum for five years

**03/2014-09/2014: NSERC Engage Grant**

<b>Title</b>	Operational Concepts and Design Requirements for a Novel Underground UAV-Based Exploration Platform
<b>Grant</b>	\$24,980
<b>Partner</b>	Sprung-brett RDI (Waterloo, ON)

**01/2014-04/2014: Research Contract**

<b>Title</b>	Robotic Loading Experiments
<b>Contract</b>	182,000 SEK
<b>Client</b>	Atlas Copco Rock Drills AB (Örebro, Sweden)

**02/2014-05/2014: Research Contract**

<b>Title</b>	Underground Communications Infrastructure Implementation Survey
<b>Contract</b>	\$8,000
<b>Client</b>	Global Mining Standards and Guidelines Group (Montreal, QC)

**04/2013-04/2016: ESA Networking/Partnering Initiative (NPI)**

<b>Title</b>	Robust and Continuous Localisation and Mapping for Mars Sample Return using LiDAR
<b>Contract</b>	€30,000 (2014), €30,000 (2015), €30,000 (2016)
<b>Client</b>	European Space Agency (ESA), The Netherlands

**03/2013–03/2016: NSERC Collaborative R&D Grant**

<b>Title</b>	uGPS: 3D Mapping, Real-Time Localization, and Machine Coordination in Underground Mines
<b>Budget</b>	\$121,300 (2013), \$126,600 (2014), \$124,600 (2015)
<b>Co-I</b>	M. Greenspan (Queen's)
<b>Partners</b>	Barrick Gold Corporation (Toronto, ON) and Peck Tech Consulting Ltd. (Montreal, QC)

**2011: CFI Leaders Opportunity Fund (LOF) — Infrastructure**

<b>Title</b>	Cooperative Mining Machines Research Testbed
<b>Grant</b>	\$150,000
<b>Partner</b>	Clearpath Robotics, Inc. (Waterloo, ON)

**2011: Ontario Ministry of Research & Innovation's Ontario Research Fund (ORF) — Small Infrastructure Funds (matching funds for CFI)**

<b>Title</b>	Cooperative Mining Machines Research Testbed
<b>Grant</b>	\$150,000
<b>Partner</b>	Clearpath Robotics, Inc. (Waterloo, ON)

**05/2010: Queen's University Research Initiation Grant**

<b>Award</b>	\$100,000 lump sum
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**10/2009: CFI Leaders Opportunity Fund — Infrastructure**

<b>Title</b>	Robotic Vehicles Research Testbed
<b>Grant</b>	\$170,342
<b>Status</b>	Awarded but declined due to applicant's move to Queen's

**06/2009–05/2011: NSERC Collaborative R&D Grant (CRD)**

<b>Title</b>	Concept and Experiments for an Underground GPS Technology
<b>Budget</b>	\$65,800 (2009), \$63,500 (2010)
<b>Partner</b>	MacDonald, Dettwiler and Associates (MDA), Inc. (Brampton, ON)

**05/2009–04/2015: NSERC Discovery Grant — Individual**

<b>Title</b>	Theory and Applications of Cooperative Navigation
<b>Grant</b>	\$31,150 per annum for five years (deferred one instalment in 2010)

**05/2008–12/2008: OCE Interact Project**

<b>Title</b>	Mapping Concept for an Underground GPS Technology
<b>Budget</b>	\$33,400
<b>Partner</b>	MacDonald, Dettwiler and Associates (MDA), Inc. (Brampton, ON)

**11/2007: Carleton University Start-Up Grant**

<b>Award</b>	\$30,000 lump sum
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**As Co-Investigator****10/2024-06/2025: Vinnova Impact Innovation**

<b>Title</b>	Styckefallsövervakning för gruvbrytning underjord (Integrated fragmentation monitoring for underground mining operations)
<b>Budget</b>	1,450,000 SEK
<b>PI</b>	M. Magnussun (Örebro University)
<b>Co-I</b>	U. Artan (Örebro), J. A. Marshall (Queen's), O. Lundberg (Epiroc AB), K. Öquist (Epiroc AB)

**09/2024-08/2030: NSERC Collaborative Research & Training Experience (CREATE)**

<b>Title</b>	ADVENTOR: Advanced Engineering and Training in Next-Generation Mobile Robotics for Human Spaces
<b>Budget</b>	\$150,000 (2024), \$300,000 (2025), \$300,000 (2026), \$300,000 (2027), \$300,000 (2028), \$300,000 (2029)
<b>PI</b>	A. Wu (Queen's)
<b>Co-I</b>	J. A. Marshall (Queen's), K. Hashtrudi-Zaad (Queen's), M. Pan (Queen's), M. Robertson (Queen's), V. Kuhlmeir (Queen's), G. Nejati (Toronto), J. Millar (Ottawa), Y. Hu (Waterloo), J. Forbes (McGill), H.-C. Lin (McGill)
<b>Partners</b>	Quanser, ARA Robotique, Haply Robotics, Clearpath Robotics, Avidbots, Mosaic, Kinova, MDA, Aurigo

**09/2020-08/2026: NSERC Collaborative Research & Training Experience (CREATE)**

<b>Title</b>	Building Trust in Connected Autonomous Vehicles
<b>Budget</b>	\$147,000 (2020), \$268,000 (2021), \$346,000 (2022), \$338,000 (2023), \$301,000 (2024), \$250,000 (2025)
<b>PI</b>	F. Yu (Carleton)
<b>Co-I</b>	J. A. Marshall (Queen's), M. Ahmadi (Carleton), E. Frances Judge (Ottawa), J. Wu (Windsor), Y. Zabolotnyuk (Carleton), Y. Guo (Carleton), A. Khan (Carleton), O. Shafiq (Carleton), H. Yanikomeroğlu (Carleton), W. Zhuang (Waterloo)
<b>Partners</b>	Transport Canada, Public Safety Canada, DND Canada, City of Ottawa, SmartCone, Remotronic, Identos, Solana Networks, Interset, Blackberry, Ericsson, Nokia, Ciena, Ford

**04/2020-03/2023: National Research Council of Canada (NRC) Collaborative Science, Technology & Innovation Program (CSTIP)**

<b>Title</b>	AI for Rail Infrastructure Thermal Stress Condition Assessment
<b>Budget</b>	\$99,549 (Year 1), \$87,450 (Year 2), \$98,450 (Year 3)
<b>PI</b>	N. Hoult
<b>Co-I</b>	J. A. Marshall

**06/2018-12/2024 (extended): NSERC Strategic Network**



<b>Title</b>	NSERC Canadian Robotics Network (NCRN)
<b>Budget</b>	\$1,000,000 (2018), \$1,125,000 (per year 2019–2022)
<b>PI</b>	G. Dudek (McGill)
<b>Co-I</b>	J. Marshall (Queen's), M. Jenkin (York), R. T. Vaughan (SFU), S. L. Waslander (Waterloo), I. Sharf (McGill), J. Pineau (McGill), H. Zhang (Alberta), J. K. Tsotsos (York), D. P. Meger (McGill), A. P. Schoellig (Toronto), R. Urtasun (Toronto), D. Kulic (Waterloo), A. Lussier-Desbiens (Sherbrooke)
<b>Partners</b>	CrossWing, Clearpath Robotics, Huawei Technologies Canada, Kinova Robotics, General Dynamics Land Systems, Canadian Space Agency, ElementAI, FPIInnovations, Barrick Gold Corporation

**04/2022-09/2022: Canadian Space Agency (CSA) Space Exploration Topical Team**

<b>Title</b>	Planetary prospecting for resources
<b>Budget</b>	\$20,000
<b>PI</b>	G. Osinsky (Western)
<b>Co-I</b>	J. A. Marshall and 13 other experts from across Canada

**06/2021-09/2021: MITACS Globalink Research Internship (GRI)**

<b>Title</b>	Highway self-driving
<b>Budget</b>	\$7,500
<b>PI</b>	K. Hashtrudi-Zaad
<b>Co-I</b>	J. A. Marshall

**01/2020–12/2020: Ingenuity Labs Research Opportunity Seed Fund (ROSF)**

<b>Title</b>	Gesture-Based Semi-Autonomous Vehicle Control
<b>Budget</b>	\$25,000 (2020)
<b>PI</b>	A. Etemad
<b>Co-I</b>	J. A. Marshall

**08/2016–07-2017: KK-stiftelsen “Strategic knowledge enhancement 15”**

<b>Title</b>	International Visiting Professorship funding for project “Fully autonomous operation of haul-load-dump machines”
<b>Budget</b>	1,426,023 SEK
<b>PI</b>	J. Schollin (ORU), D. Driankov (ORU), and J. A. Marshall (Queen's)
<b>Partner</b>	Atlas Copco Rock Drills AB (Örebro, Sweden)

**07/2012–07/2017: NSERC Strategic Network**

<b>Title</b>	NSERC Canadian Field Robotics Network (NCFRN)
<b>Budget</b>	\$1,336,936 (2012), \$1,313,436 (per year 2013–2016)
<b>PI</b>	G. Dudek (McGill)
<b>Co-I</b>	R. Bachmayer (MUN), T. D. Barfoot (Toronto), R. M. Jenkin (York), J. Pineau (McGill), H. Zhang (Alberta), J. A. Marshall (Queen's), R. T. Vaughan (SFU)
<b>Partners</b>	Clearpath Robotics, CrossWing Inc., Aeryon Labs, DRDC-Suffield, Canadian Space Agency, MDA Inc., Neptec Design Group, BGC Engineering, Quanser Consulting, WillowGarage, DRDC-Valcartier, Kinsol Research, Institut de Recherche d'Hydro-Québec, and Newmont Mining Corporation

#### 04/2011–04/2017: NSERC Collaborative Research & Training Experience (CREATE)

<b>Title</b>	Technologies and Techniques for Earth and Space Exploration
<b>Budget</b>	\$318,800 (2011), \$502,450 (per year 2012–2017)
<b>PI</b>	G. R. Osinski (Western)
<b>Co-I</b>	M. Daly (York), Z.-H. Zhu (York), T. D. Barfoot (Toronto), J. A. Marshall (Queen's), P. Sylvester (Memorial), B. Rivard (Alberta), C. Johnson (UBC), K. Mclsaac (Western), M. Naish (Western), R. Patel (Western)
<b>Partners</b>	MDA Inc., Canadian Space Agency, Barrick Gold Corporation, NASA Ames Research Center, Gedex Inc., Optec Inc., CNT Mineral Consulting Inc., Quansar Inc., Clearpath Robotics, NASA Lunar Science Institute, Smithsonian Institution

#### 06/2010–05/2012: MITACS Accelerate Cluster

<b>Title</b>	Mine Traffic Optimization
<b>Budget</b>	\$26,667 (33% of project, 2010), \$26,667 (33% of project, 2011)
<b>PI</b>	L. K. Daneshmend (Queen's)
<b>Co-I</b>	J. A. Marshall (Queen's), G. Jamieson (Toronto), B. Donmez (Toronto)
<b>Partner</b>	Barrick Gold Corporation (Toronto, ON)

#### 01/2010–04/2011: Research Subcontract

<b>Title</b>	KAPVIK: Smart Reconfigurable All-Terrain Multi-Mission Microrover
<b>Contract</b>	\$200,000
<b>PI</b>	A. Ellery (Carleton)
<b>Co-I</b>	J. A. Marshall (Queen's/Carleton), A. de Ruitter (Carleton), M. Ahmadi (Carleton)
<b>Client</b>	MPB Communications Inc. (Montreal, QC) and the Canadian Space Agency (St. Hubert, QC)

## 8 University Teaching

### Teaching Support Awarded

#### 04/2021: eCampusOntario Virtual Learning Strategy (VLS) Grant

<b>Title</b>	Ethics module for artificial intelligence engineering
<b>Grant</b>	\$47,219
<b>PI</b>	T. Dean (Queen's)
<b>Co-Is</b>	N. Zhang (Windsor), D. Zhao (McMaster), J. Ni (Queen's), J. A. Marshall (Queen's)

#### 08/2016: Queen's University Teaching & Learning Enhancement Grant

<b>Title</b>	Just-in-time tutorials: Anytime, anywhere
<b>Grant</b>	\$4,600
<b>Co-I</b>	H. Fernando (Queen's), S. Nokleby (UOIT)

#### 01/2015-12/2015: COU Online Course and Module Development Project

<b>Title</b>	Mining systems, automation & robotics course
<b>Grant</b>	\$75,000
<b>Co-I</b>	S. Nokleby (UOIT)

### University Courses Taught

Dates of instruction are given by term (F for fall, W for winter) together with the year.

#### 09/2010–Present: Faculty of Engineering & Applied Science, Queen's University

Course	Title	Term(s)	Enrolment
ELEC 446	Autonomous Mobile Robotics †Built this <u>new course</u> for its inaugural offering in F2024	F2024†	58
MREN 203	Mechatronics & Robotics Design II †Built this <u>new course</u> for its inaugural offering in W2023	W2024 W2023†	64 65

Course	Title	Term(s)	Enrolment
ELEC 390/49X	Electrical Engineering Project (enrolment indicates number of students supervised) †Some co-supervised with other faculty (K. Rudie, K. Hashtrudi-Zaad, G. Chan, M. Greenspan, M. Pan, M. Greeff)	FW2023-24†	2 groups × 5
		FW2022-23†	2 groups × 4
		FW2021-22†	8 groups × 4
		FW2020-21†	4 groups × 3.5
		FW2019-20†	1 group × 4
		FW2018-19†	1 group × 3
		FW2017-18†	3 + 4
		FW2016-17† FW2014-15†	1 group × 3 2 groups × 3
MTHE 493	Engineering Math Project (enrolment indicates number of thesis projects supervised) †Co-supervised with M. Greeff	FW2023-24†	1 group × 5
ELEC 845	Autonomous Vehicle Control and Navigation †Offered online (synchronously)	F2023	20
		W2023	18
		W2022	22
		F2020†	19
		W2020	14
ELEC 299	Mechatronics Project †Completely redeveloped with new hardware and co-taught with E. Morin	W2022†	301
ELEC 497	Research Project †Co-supervised with K. Hashtrudi-Zaad	FW2021-22†	1
		FW2019-20†	1
ELEC 443	Linear Control Systems †Received the <b>highest student evaluation</b> of all courses, in all USAT categories, in ECE in F2019	F2019†	55
ENPH 454	Advanced Engineering Physics Design Project (enrolment indicates number of thesis projects supervised) †Co-supervised with A. Wu	FW2019-20†	1
		FW2018-19	1
		FW2017-18	1
MINE 855	Autonomous Ground Vehicles Engineering	W2019	5
		W2018	6

<b>Course</b>	<b>Title</b>	<b>Term(s)</b>	<b>Enrolment</b>
MINE 472	Mining Systems, Automation, and Robotics (offered online) – Funded by Ontario Online and co- taught with S. Nokleby (UOIT)	W2019	23
		W2018	33
		W2017	19
		W2016	13
MINE 471	Mine-Mechanical Design Project (enrolment indicates number of stu- dents supervised)	W2019	6
		W2018	8
		W2016	14
		W2015	11
		W2014	10
		FW2012-13 W2012	3 6
MINE 202	Computer Applications and Instrumen- tation in Mining	F2018	21
		F2017	15
		F2013	72
		F2012	78
		F2011	69
		F2010	41
APSC 200	Engineering Design and Practice II – Served as design project instructor (weeks 7-12, Mining)	F2018	18
		F2013	69
		F2012	78
		F2011	69
MINE 434	Project Report (enrolment indicates number of thesis projects supervised)	W2018	5
		W2017	5
		W2016	8
		W2015	6
		W2014	8
		W2013	4
		W2012	6
W2011	2		
MINE 853	Mining Robotics † Offered as a distance educa- tion course to students from across Canada at multiple universities (RMC, UOIT, Laurentian, Queen's)	W2016†	4
		W2015†	6
		W2014†	12
		W2013†	6
		W2012	5
MINE 459	Maintenance, Reliability, and Risk As- sessment	F2015	66
		F2014	68

Course	Title	Term(s)	Enrolment
MINE 201	Introduction to Mining and Mineral Processing – Served as course coordinator and co-taught with J. Peacey (2011, 2012), C. Pickles (2013, 2015), A. Ghahremaninezhad (2014)	F2015	33
		F2014	68
		F2013	73
		F2012	77
		F2011	73
APSC 100	Module 3: Design Project	W2015	15
MINE 800	Mining Systems and Processes – Served as instructor for Module 1 (of 6); offered as a distance education (online) course	F2014	15
MINE 852	Mine Mechanization and Automation	W2011	7

### 01/2008–04/2010: Faculty of Engineering and Design, Carleton University

Course	Title	Term(s)	Enrolment
MECH 5504	Guidance, Navigation and Control † Received the <b>highest student evaluation</b> of all courses in the Department of Mechanical & Aerospace Engineering at Carleton University	W2010	12
		W2009†	15
		W2008	18
AERO 4907	S-CO <sub>2</sub> Gas Turbine Design Project  NORSAT Microsatellite Project	FW2009-10	2
		FW2008-09	3
		W2008	2
ECOR 1010	Introduction to Engineering † Taught two sections	F2009	332
		F2008†	698
MAAE 4500	Feedback Control Systems	F2008	59

### Teaching Assistantships

#### 09/2001–04/2005: The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, University of Toronto

Course	Title	Term(s)	Role
ECE 311	Dynamic Systems and Control	4	Tutorials
MAT 298	Linear Algebra and Differential Equations	1	Tutorials

Course	Title	Term(s)	Role
MAT 290	Advanced Engineering Mathematics	3	Lead TA Tutorials
ECE 1635	Distributed Control of Autonomous Mobile Robots	1	Guest lecturer
ECE 557	Systems Control	1	Guest lecturer

### 09/1999–04/2001: Department of Mechanical Engineering, Queen's University

Course	Title	Term(s)	Role
MECH 452	Mechatronic Systems	2	Labs
MECH 323	Machine Design	2	Tutorials

### 09/1999–04/2001: Department of Mining Engineering, Queen's University

Course	Title	Term(s)	Role
APSC 100	Practical Engineering Design	2	Project Manager
MINE 459	Maintenance Engineering	2	Tutorials

## 9 Research Supervisions

Unless specified otherwise, supervisions listed here were/are at Queen's University.

### Postdoctoral Supervisions

Name	Period	Department	Co-Supervisor
T. Teatro	09/2024–08/2026	Ingenuity Labs RI	K. Birch (York)
H. Fernando Research Engineer, FP Innova- tions (Montréal, QC)	01/2021–02/2023	Ingenuity Labs RI	N. Hoult
J. Wang Assistant Professor, Dept. of Mechanical Engineering, University of Manitoba	02/2020–09/2022	Ingenuity Labs RI	

<b>Name</b>	<b>Period</b>	<b>Department</b>	<b>Co-Supervisor</b>
B. K. Lynch Director of Horticulture Technology Systems, Vineland Research Centre (Vineland Station, ON)	09/2013–06/2016	ECE/Mining	

### Doctoral Supervisions

<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
D. Jenkins	09/2023–present	ECE	
K. Wang	05/2024–present	ECE	S. Givigi
S. Qahremani	09/2023–present	ECE	K. Hashtrudi-Zaad
J. Silveira	05/2020–present	ECE	S. Givigi
T. Sears	09/2019–present	ECE	
U. Artan Postdoctoral Fellow, School of Science & Technology, Örebro University (Sweden)	09/2018–09/2023	Mining	
O. Mayuku Member of Technical Staff, MDA (Brampton, ON) Former Lecturer, Dept. of Mechanical Engineering, University of Port Harcourt (Nigeria)	01/2018–02/2022	Mechanical	B. Surgenor
H. Fernando Research Engineer, FP Innovations (Montréal, QC)	09/2014–01/2021	Mechanical	
R. Hewitt Torc Robotics (Los Angeles, CA) Formerly: Research Scientist, NASA JPL (Pasadena, CA)	05/2012–03/2018	ECE	
T. Ahmed Research Scientist, Epson Canada (Markham, ON)	05/2013–05/2017	ECE	M. Greenspan



<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
M. Gallant Senior Software Developer, Avidbots (Kitchener, ON) Formerly: Systems Engineer, Quanergy Systems (Ottawa, ON)	09/2012–09/2016	ECE	
J. Simela Mine Systems Engineering Consultant (Kingston, ON)	01/2011–12/2015	Mining	L. Daneshmend
A. Dobson Autonomy Engineer, Clearpath Robotics (Kitchener, ON)	09-2010–01/2015	Mining	

### Master's Supervisions

<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
J. Diab	09/2022–present	Mechanical	B. Surgenor
J. von Tiesenhausen Research EIT, MacLean Engi- neering (Collingwood, ON)	01/2019–present (part time)	Mechanical	Q. Li
E. Taylor Research Engineer, School of Environmental Studies, Queen's University	09/2020–05/2024	ECE	
M. R. Cooper Research Associate, Ingenuity Labs (Kingston, ON)	09/2021–03/2024	ECE	
K. Wang PhD Student, Queen's ECE (Kingston, ON)	05/2022–02/2024	ECE	S. Givigi
F. Marrato Software Engineer, Calian Group Ltd. (Toronto, ON)	09/2021–01/2024	ECE	
D. Sacoransky (4+1) Generative AI Data Scientist, IBM watsonx (Toronto, ON)	09/2021–09/2023	ECE	K. Hashtrudi- Zaad
J. Baker Mechanical Engineer, MacLean Engineering (Collingwood, ON)	09/2020–11/2022	Mechanical	B. Surgenor

<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
D. Khalatyan Mechanical Engineer, MacLean Engineering (Collingwood, ON)	09/2019–04/2022	Mechanical	
L. Khaleghi AI Software Developer, Ross Video (Ottawa, ON)	01/2020–03/2022	ECE	A. Etemad
J. Caldwell Member of Technical Staff, MDA (Brampton, ON)	09/2019–12/2021	ECE	
A. Greisman (4+1) Robotics Engineer, InDro Robotics (Ottawa, ON)	09/2019–11/2021	ECE	K. Hashtrudi-Zaad
J. Ruan (MEng) PhD Student, Westlake University (China)	05/2021–09/2021	ECE	
J. Roy Robotics Engineer, MacLean Engineering (Collingwood, ON)	09/2018–07/2021	ECE	
J. Kulchyk Data Consultant, Validere (Calgary, AB)	10/2019–01/2021	ECE	K. Rudie
M. Fader Engineer, Calian Group Ltd. (Toronto, ON)	09/2018–12/2020	Mechanical	
N. Pandillapally Vehicle Autonomy Specialist, General Dynamics (London, ON)	09/2018–09/2020	Mechanical	B. Surgenor
L. Dekker Robotics Engineer, MacLean Engineering (Collingwood, ON)	05/2016–04/2018	Mechanical	
A. Wiseman Software Developer, League (Toronto, ON)	09/2016–09/2018	ECE	M. Greenspan
J. Mitchell Consultant, Bain & Company (Toronto, ON)	05/2015–07/2017	Mining	

<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
G. Turner Systems Engineer, Motion Metrics Int'l (Vancouver, BC)	09/2014–10/2016	ECE	
R. L. Vanderbeck Autonomy Engineer, MacLean Engineering (Collingwood, ON)	09/2014–04/2016	Mining	
C. Watson Applications Specialist, Peck Tech Consulting (Montreal, QC)	09/2013–04/2016	Mining	
E. Deretey Engineer, Grantek Systems Integration (Burlington, ON)	09/2013–12/2015	ECE	M. Greenspan
C. Ingram Major Projects Engineer, Cameco (Saskatoon, SK)	09/2011–09/2014	Mining	
V. Vukovich Engineer, Shell Canada (Fort McMurray, AB)	09/2011–09/2013	Mining	
B. Owens Applications Engineer, Neptec Technologies (Ottawa, ON)	09/2010–01/2013	Mining	
D. Pike Systems Engineer, Neptec Design Group (Ottawa, ON)	09/2010–09/2012	ECE (RMC)	S. Givigi (RMC)
A. Chapman Manager of Mining Solutions, Peck Tech Consulting (Montreal, QC)	09/2010–08/2012	Mining	
M. Gallant Systems Engineer, Quanergy Systems (Ottawa, ON)	09/2009–08/2011	Aerospace (Carleton)	A. Ellery (Carleton)
S. Radacina Rusu Owner, MineView Systems Inc. (Ottawa, ON)	09/2009–08/2011	Mechanical (Carleton)	
N. J. Lavigne Software Engineer, Amazon Web Services (Seattle, WA)	09/2008–09/2010	Aerospace (Carleton)	

<b>Name</b>	<b>Period</b>	<b>Program</b>	<b>Co-Supervisor</b>
U. Artan President & CEO, Artech Technologies (Toronto, ON)	05/2008–01/2010	Mechanical (Carleton)	
M. Swartz Simulation Engineer, CAE Inc. (Ottawa, ON)	01/2007–01/2009	Aerospace (Carleton)	A. Ellery (Carleton)
J. d'Engelbronner Equipment Engineer, ASML (The Netherlands)	01/2008–05/2008 (on exchange from TU Delft)	Aerospace (Carleton)	

### Undergraduate Supervisions

Only salaried research supervisions are listed here; numbers for thesis project supervisions are provided in Section 8 (e.g., see MINE 434, ELEC 490, EPHY 455, and AERO 4907).

<b>Name</b>	<b>Term</b>	<b>Funding</b>	<b>Co-Supervisor</b>
A. Beca	S2024	NSERC USRA	
E. Herbert	S2024	C. A. Thompson	
S. Button	S2023	Queen's USSRF	
S. Villemure	S2023	NSERC USRA	
K. Edwards	S2022	Queen's MRE	B. Surgenor
G. Puthumanaillam	S2021	Mitacs Globalink	K. Hashtrudi-Zaad
D. Sacoransky	S2021	NSERC USRA	
E. Bugeja	S2021	NRC Contract	N. Hoult
A. Greisman	S2020	NSERC Discovery	K. Hashtrudi-Zaad
A. Farley	S2020	NSERC Discovery	
J. Baker	S2020	NSERC CRD	B. Surgenor
H. Corley	W2020	NSERC CRD	
H. Corley	S2019	NSERC CRD	B. Surgenor
F. Schier	S2019	IAESTE	B. Surgenor
M. Fader	S2018	NSERC Discovery	
D. Khalatyan	S2018	NSERC Discovery	
R. Kealey	S2018	NSERC Engage	
J. Caldwell	S2018	NSERC Engage	
L. Dekker	S2015	C. A. Thompson	
J. Procopio	S2015	NSERC CRD	
Q. Ripley	S2015	NSERC IUSRA	J. Peck
J. Marr	S2014	NSERC USRA	M. Greenspan
J. Mitchell	S2014	NSERC USRA	
C. Stewart	S2014	NSERC USRA	M. Greenspan
A. Wiseman	S2014	NSERC CRD	M. Greenspan

<b>Name</b>	<b>Term</b>	<b>Funding</b>	<b>Co-Supervisor</b>
C. McKinnon	S2013	NSERC Discovery	
M. Pasternak	S2013	NSERC USRA	
C. McKinnon	S2012	NSERC USRA	
D. Haviland	S2011	NSERC USRA	
A. Richards (at RMC)	S2010	DRDC Contract	S. Givigi (RMC)
D. Tsai	S2009	NSERC Discovery	

## 10 Professional and Academic Service

### Service as Invited External Examiner

**30/08/2024:** Dominic Baril, Ph.D. Thesis Defence, Department of Computer Science and Software Engineering Université Laval  
Thesis title: Improving the Robustness of Motion Modeling, Control and Localization for Mobile Robots in Harsh Conditions

**17/04/2024:** Elfituri Lahemer, Ph.D. Thesis Defence, Department of Mechatronic Systems Engineering, Simon Fraser University  
Thesis title: Landmark-Based Robotics Navigation for Indoor Environments - An Extended Reality Perspective

**22/08/2023:** Kayvan Mahmoodifar, Ph.D. Thesis Defence, Department of Electrical & Computer Engineering, Western University  
Thesis title: Development and Comparison of Control and Path Planning Methods for Center Articulated Steering Mobile Robot Module

**09/07/2021:** Thomas Bamford, Ph.D. Thesis Defence, Department of Civil & Mineral Engineering, University of Toronto  
Thesis title: Application of Unmanned Aerial Systems to Blast Optimization in Open Pit Mines

**12/04/2021:** Hemanth Reddy Alla, Ph.D. Thesis Defence, Department of Civil & Environmental Engineering, University of Alberta  
Thesis title: Investigation into the use of Data Mining Techniques for Fault Diagnosis and Prognosis of Haul Trucks

**28/07/2020:** Ian Greyvensteyn, Master's Thesis Examination, School of Electrical Engineering and Robotics, Queensland University of Technology, Australia  
Thesis title: Evaluating the Effect of Illumination on the Performance of Visual Odometry in Underground Mining Environments

**29/06/2020:** Kamal Othman, Ph.D. Thesis Defence, School of Mechatronic Systems Engineering, Simon Fraser University

Thesis title: Towards the Vision of a Social Robot in every Home: A Navigation Strategy via Enhanced Subsumption Architecture

- 23/03/2020:** Nicolas Olmedo, Ph.D. Thesis Defence, Department of Mechanical Engineering, University of Alberta  
Thesis title: Robotic Systems for Environmental Monitoring and Terrain Classification
- 15/05/2018:** Daniel Lucifora, Ph.D. Thesis Defence, Department of Mining & Materials Engineering, McGill University  
Thesis title: Autonomous Surface Rotary Blasthole Drilling
- 28/01/2018:** Haoquan Liu, Ph.D. Thesis Examination, School of Mechanical and Mining Engineering, The University of Queensland, Australia  
Thesis title: Strategic Planning for Dragline Excavation Sequencing
- 26/04/2016:** Raheleh Rasimarzabadi, Ph.D. Thesis Defence, Department of Civil & Environmental Engineering, University of Alberta  
Thesis title: Particle Flow Into Cable Shovel Dippers
- 22/02/2012:** Rolf Reimar Kohlmeyer, Master's Thesis Defence, Department of Electronic Engineering, University of Pretoria, South Africa  
Thesis title: Modelling and Control of an Articulated Underground Mining Vehicle
- 17/05/2012:** James Robinson, Ph.D. Thesis Defence, Mechanical & Aerospace Engineering, Carleton University and the University of Ottawa  
Thesis title: Algebraic Screw Pairs

### Editorial Roles and Conference Organization

- 2023–Present:** Appointed as **Associate Editor** (AE) for the *International Journal of Robotics Research* (IJRR)
- 2020–2022:** Appointed as **Technical Editor** (TE) for the *IEEE/ASME Transactions on Mechatronics* (T-MECH)
- 2022:** Invited Session Chair, Recognition at the *IEEE/RSJ International Conference on Robots & Systems* (IROS), Kyoto, Japan, October 23, 2022
- 2021:** Invited Session Chair, Sensors 1 at the *IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Delft, The Netherlands, July 14, 2021
- 2021:** Invited Session Chair, Vision and Perception: Self-Supervised Learning at the *IEEE International Conference on Robotics & Automation* (ICRA), X'ian, China, June 3, 2021
- 2019–2021:** Appointed as **Senior Editor** of the IROS Conference Paper Review Board (CPRB) of the IEEE Robotics and Automation Society

- Senior Editor and Member of the Awards Committee for IROS 2021 (Prague, Czech Republic)
- Senior Editor for IROS 2020 (Las Vegas, NV)
- Senior Editor for IROS 2019 (Macau, China)

**2017–2021:** Nominated and elected as **Associate Editor** to the Conference Editorial Board (CEB) of the IEEE Control Systems Society, which “coordinates the receiving, logging, acknowledging, distributing, collecting and collating reviews, and evaluating Regular papers submitted to the Society (co-)sponsored conferences: the *IEEE Conference on Decision & Control* (CDC), the *American Control Conference* (ACC), and the *IEEE Multi Conference on Systems and Control* (MSC)”

- Associate Editor for CDC 2020 (Jeju Island, Republic of Korea)
- Associate Editor for ACC 2020 (Denver, CO)
- Associate Editor for CDC 2019 (Nice, France)
- Associate Editor for ACC 2019 (Philadelphia, PA)
- Associate Editor for CDC 2018 (Miami Beach, FL)
- Associate Editor for ACC 2018 (Milwaukee, USA)

**2019:** International Program Committee Member, *12th Conference on Field & Service Robotics* (FSR), Tokyo, Japan

**2017:** International Program Committee Member, *11th Conference on Field & Service Robotics* (FSR), Zürich, Switzerland

**2017:** Scientific Committee Member, *The 34th International Symposium on Automation & Robotics in Construction* (ISARC), Taipei, Taiwan

**2016–2017:** Sponsorship & Exhibitions Chair, *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), Vancouver, BC

**2016–2017:** Session Chair, Case Studies & Application of Robotics and Automation at Operating Mines, *2017 SME Conference & Exhibition*, Denver, CO

**2015:** Program Committee Member and Session Chair, *10th Conference on Field & Service Robotics* (FSR), Toronto, ON

**2013–2014:** Symposium Co-Chair (with Soosan Beheshti, Ryerson), *Control and Robotics Symposium of the 27th IEEE Canadian Conference on Electrical & Computer Engineering* (CCECE), Toronto, ON

**2011–2013:** Co-Chair for Mining, *The 30th International Symposium on Automation & Robotics in Construction, Mining & Petroleum* (ISARC), Montreal, QC

**2011–2012:** Symposium Co-Chair (with Stephen Smith, Waterloo), *Control and Robotics Symposium of the 25th IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Montreal, QC

**2011–2012:** Technical Program Committee Member, *Robotics Science & Systems Conference (RSS)*, Sidney, NSW, Australia

**2009–2010:** Technical Program Committee Member, *Control and Robotics Symposium of the 23rd IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Calgary, AB

**2008–2009:** Technical Program Committee Member and Session Chair, *34th Conference on Applications of Computers and Operations Research in the Minerals Industry (APCOM)*, Vancouver, BC

**2005:** Co-Chair and awarded Best Talk of the “Cooperative Control Methods and Applications” session at the *2005 American Control Conference (ACC)*, Portland, OR

**2003:** Co-Chair of the “Multiple Agent Systems” session and Conference Volunteer at the *42nd IEEE Conference on Decision & Control (CDC)*, Maui, HI

### **Grant Competition Reviews**

**2009–present:** Reviewer for multiple NSERC Discovery Grant applications (2 in 2009; 3 in 2010, 3 in 2011, 2 in 2012, 2 in 2013, 2 in 2014, 1 in 2015, 1 in 2019, 3 in 2021, 2 in 2023)

**2016, 2018:** Reviewer for multiple NSERC Collaborative Research & Development (CRD) applications

**2016:** Reviewer for one MITACS Elevate application

**2008:** Reviewer for one Ontario Centres of Excellence (OCE) Collaborative project

### **Technical Paper Reviews**

**2001–Present:** Reviewer for many international journals: IEEE Transactions on Vehicular Technology; Journal of Field Robotics; IEEE Robotics & Automation Letters, IEEE Transactions on Robotics; Industrial Robot; Systems & Control Letters; IEEE Transactions on Automatic Control; Automatica; IEEE Robotics & Automation Magazine; IEEE Transactions on Control Systems Technology; the International Journal of Control; IET Control Theory & Applications; International Journal of Mining Science & Technology; ASME Journal of Dynamic Systems, Measurement, & Control; International Journal of Robotics & Automation; SIAM Journal of Control and Optimization, Control Engineering Practice; AIAA Journal of Guidance, Control, & Dynamics; Autonomous Robots; IEEE Transactions on Systems, Man, &



Cybernetics; Robotics & Autonomous Systems; Canadian Aeronautics & Space Journal; Robotics & Computer Integrated Manufacturing

**2001–Present:** Reviewer for countless conferences (far too many to keep track) ... (e.g., see conference board Editor and Associate Editor service, above)

### **Other Academic and Professional Service**

**Fall 2022:** Engineers Canada, Expert Panelist (invited) for the review of Mechatronics syllabus of the Canadian Engineering Qualifications Board (CEQB)

**09/2022:** External Referee for one promotion to full professor application, School of Mechatronic Systems Engineering, Simon Fraser University

**07/2022:** External Referee for one tenure and promotion application, Département d'informatique et de recherche opérationnelle, Université de Montréal

**03/2022:** Book proposal reviewer (Electrical & Computer Engineering Books Division) for John Wiley & Sons Ltd., West Sussex, United Kingdom

**11/2021:** External Referee for one tenure and promotion application, Department of Electrical & Computer Engineering, University of Windsor

**09/2021:** External Referee for one tenure and promotion application, Faculté des sciences et de génie, Département d'informatique et de génie logiciel, Université Laval

**09/2021:** External Referee for one tenure and promotion application, Faculty of Engineering, Department of Mechanical Engineering, University of Alberta

**07/2021:** External Referee for one tenure and promotion application, Faculty of Engineering, Department of Computing & Software, McMaster University

**09/2020:** External Referee for one tenure and promotion application, Faculty of Engineering & Applied Science, University of Ontario Institute of Technology

**10/2018–09/2020:** IEEE Awards Committee Member (by nomination), 2018, 2019, 2020 IEEE Medal for Environmental & Safety Technologies Committee

**2019:** Engineers Canada, Program Visitor (invited) of the Canadian Engineering Accreditation Board (CEAB) 2019 Accreditation Site Visit to Simon Fraser University (Mechatronic Systems Engineering)

**2019:** Engineers Canada, Vice-Chair (invited) of the Canadian Engineering Accreditation Board's (CEAB) 2019 Accreditation Site Visit to Dalhousie University (all programs)

**2018:** Engineers Canada, Program Visitor (invited) of the Canadian Engineering Accreditation Board (CEAB) 2018 Accreditation Site Visit to the University of Alberta (Mineral Resource Engineering)

**2014:** Quality Assurance External Reviewer for the University of Ontario Institute of Technology (UOIT) proposed new program in Mechatronics Engineering, which included a two-day site visit and follow-up written report

**2009:** Exam Reviewer (×2) for Canadian Council of Professional Engineers (CCPE) Technical Exam 98-Comp-B6 *Computer Control and Robotics* (for individuals seeking professional engineering licensure)

## 11 University Service

### Department Service

**2022-2024:** Chair (appointed by Head), Appointments Committee (Mitchell Chair), Department of Electrical & Computer Engineering, Queen's University

**2022-2023:** Member (elected), Appointments Committee (three junior positions + CRC Tier 1), Department of Electrical & Computer Engineering, Queen's University

**2021-2024:** Graduate Admissions Coordinator (appointed), Graduate Affairs Subcommittee, Department of Electrical & Computer Engineering, Queen's University

**2020-2021:** Member (elected), Appointments Committee, Department of Electrical & Computer Engineering, Queen's University

- Served as Acting Chair for one term-faculty hire during Summer 2020

**2019-2020:** Chair (appointed by Head), Appointments Committee, Department of Electrical & Computer Engineering, Queen's University

**2018-2019:** Member (appointed by Head), Appointments Committee (Mitchell Chair), Department of Electrical & Computer Engineering, Queen's University

**2018:** Chair (appointed by Head), Appointments Committee (Mechatronics), Department of Mechanical & Materials Engineering, Queen's University

**2018:** Chair (appointed by Head), Curriculum Committee, The Robert M. Buchan Department of Mining, Queen's University

**2018:** Member (appointed by Head), Queen's Mining 125 Anniversary Committee, The Robert M. Buchan Department of Mining, Queen's University

**2011-2016, 2017-2018:** Member (appointed by Head), Curriculum Committee, The Robert M. Buchan Department of Mining, Queen's University

**2013-2014:** Member (elected), Appointments Committee, The Robert M. Buchan Department of Mining, Queen's University

- 2011–2012:** Member (elected), Term Adjunct Appointments Committee, The Robert M. Buchan Department of Mining, Queen's University
- 2010:** Faculty Coordinator of the Mechanical & Aerospace Engineering Graduate Seminar Series, Carleton University
- 2009–2010:** Member (appointed by Chair), Faculty Promotion Committee, Department of Mechanical & Aerospace Engineering, Carleton University
- 2009:** Member (appointed by Chair), Ad-hoc Committee on Academic Integrity, Department of Mechanical & Aerospace Engineering, Carleton University
- 2009:** Chair (appointed), Ad-hoc Committee on Graduate Program Seminars, Department of Mechanical & Aerospace Engineering, Carleton University
- 2008–2009:** Departmental Library Representative, Department of Mechanical & Aerospace Engineering, Carleton University

### **Faculty and University Service**

- 2021–present:** Faculty Lead (with B. Surgenor and K. Hashtrudi-Zaad), SAE AutoDrive Challenge II Team, Faculty of Engineering & Applied Science, Queen's University
- 2018–present:** Member (as Director), Ingenuity Labs Research Institute Advisory Board, Faculty of Engineering & Applied Science, Queen's University
- 2018–present:** Chair (as Director), Ingenuity Labs Research Institute Steering Committee, Faculty of Engineering & Applied Science, Queen's University
- 06/2024:** Expert Panelist (invited), Panel on Entrepreneurship in Academia, Rose Event Commons, Dunin-Deshpande Queen's Innovation Centre (DDQIC), Queen's University
- 04/2024:** Expert Panelist (invited), Early Career Researcher (ECR) Panel on Graduate Student Recruitment, Smith Engineering, Queen's University
- 11/2023:** Invited Speaker, Resources for Research at Queen's (R4RQ) talk about Science Rendezvous, Vice Principal (Research) Office, Queen's University
- 2021–2023:** Member (appointed), Centre for Advanced Computing (CAC) Strategic Advisory Committee, Office of the Vice Principal (Research), Queen's University
- 2021:** Volunteer Member, Organizing Committee of the *2021 Ingenuity Labs Robotics & AI Symposium* (RAIS2021), Ingenuity Labs Research Institute, Queen's University
- 2021:** Member (appointed), Principal's Working Group on Teaching and Research Interdependence, Queen's University

- 2010–2021:** Faculty Advisor, Queen’s Space Engineering Team (QSET), Faculty of Engineering & Applied Science, Queen’s University
- 2020–2021:** Member (appointed), Principal’s Advisory Committee: Vice-Principal (Research), Queen’s University
- 2020:** Member (appointed), 2020 Catalyst Fund Adjudication Panel, Office of the Vice-Principal (Research), Queen’s University
- 2020:** Member (appointed), Health Data Platform Advisory Group, Office of the Vice-Principal (Research), Queen’s University
- 2019–2020:** Member (appointed), Vice-Principal (Research) Working Group on AI, Queen’s University
- 2019–2020:** ECE Representative (appointed by Head), Faculty Board, Faculty of Engineering & Applied Science, Queen’s University
- 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020:** Member (volunteer), Major Admissions Awards Panel, Queen’s University
- 2019:** Member (appointed by Dean), “Curiosity Creates” FEAS Vision Working Group, Faculty of Engineering & Applied Science, Queen’s University
- 2018:** Chair (appointed by Dean), New “HME” Centre Working Group, Faculty of Engineering & Applied Science, Queen’s University
- 2018:** Member (appointed by ADR), Dean’s Graduate Research Assistant Awards Committee, Faculty of Engineering & Applied Science, Queen’s University
- 2018:** Member (appointed by Dean), FEAS 125 Anniversary Committee, Faculty of Engineering & Applied Science, Queen’s University
- 2017:** Member (appointed by Dean) of the Dean’s Excellence in Education Adjudication Committee, Faculty of Engineering & Applied Science, Queen’s University
- 2016–2017:** Member (appointed by Dean) of the Dean’s Ad-Hoc Committee on Student Teams, Faculty of Engineering & Applied Science, Queen’s University
- 2016:** Member (appointed by Dean) of the Dean’s Advisory Committee on the Appointment of a New Associate Dean (Research and Graduate Studies), Faculty of Engineering & Applied Science, Queen’s University
- 2013–2016:** QUFA Representative (appointed by Dean) to the Joint Health and Safety Committee, Faculty of Engineering & Applied Science, Queen’s University
- 2014–2015:** Member (appointed by Head), ONCAT Queen’s-Northern College Haileybury School of Mines (NCHSM) Bachelor of Technology Project Committee, Faculty of Engineering & Applied Science, Queen’s University

- 2014:** Adjudicator for the Prizes for Excellence in Research Nominations, Office of the Vice-Principal (Research), Queen's University
- 2011–2014:** Member (appointed by Dean), Senate Advisory Research Committee (SARC): Subcommittee III (Engineering and Applied Science), Queen's University
- 2014:** Member (appointed by Dean), ONCAT Project Manager Search Committee, Faculty of Engineering & Applied Science, Queen's University
- 2013:** Member (appointed by Dean), Educational Developer Search Committee, Faculty of Engineering & Applied Science, Queen's University
- 2011:** Member (elected by Dean), Mining Headship Selection Committee, Faculty of Engineering & Applied Science, Queen's University
- 2008–2009:** Member, First-Year Instructors' Committee, Faculty of Engineering and Design, Carleton University
- 2005:** Interview Committee Member, served as advisor to the Dean of the School of Graduate Studies in search for a Director of Student Services, University of Toronto
- 2003–2005:** Graduate Student Member (elected), Council of the School of Graduate Studies (SGS) and the Executive Committee of SGS Division III, University of Toronto
- 2000–2001:** Chair, Graduate Student Standing Committee of the Society of Graduate and Professional Students, School of Graduate Studies and Research (SGSR), Queen's University
- 1999–2001:** Graduate Student Member (elected), Graduate Council of the SGSR and the SGSR Division III Council, Queen's University

### **Other Selected University Service**

- 21/06/2021:** Member (invited), SDG Room 11: Sustainable Cities and Communities, 17 Rooms Event, Queen's University
- 10/12/2020:** Panelist for the workshop called "How to Use the Early Years Effectively" for Early Career Researchers at Queen's University

## **12 Professional Development**

- 21/02/2024–23/02/2024:** *CASE: Development for Deans and Academic Leaders: Winter Session* (San Francisco, CA), Council for Advancement and Support of Education
- 29/06/2021:** *Insights Into Philanthropy: Advancement Training*, Faculty of Engineering & Applied Science, Queen's University

**12/2020–06/2021:** *Building Leadership Capacity @ Queen's* program (senior leadership stream), Queen's University, including the 3 × 4 *Coaching* program by Third Factor

**02/05/2019:** *More than a Website: Increasing Research Impact Workshop*, Research Development Day 2019, Queen's University

**25/05/2018:** *Showing Up for Equity and Inclusion* (invited workshop for Queen's senior administrators), The Equity Office, Queen's University

**01/12/2014:** *Workshop on Graduate Supervision*, Centre for Teaching and Learning Queen's University

**18/10/2012–19/10/2012:** *Queen's University Leadership Skills Workshop* (invited), Centre for Higher Education Research and Development (CHERD), The University of Manitoba

**05/06/2012:** *Occupational Health & Safety for Supervisors*, Department of Environmental Health and Safety, Queen's University

**22/06/2011:** *Preparing a Teaching Dossier*, Centre for Teaching and Learning, Queen's University

**12/04/2011:** *Advancing your Research and Scholarship Career: A Session on Leadership and Strategic Advice*, Office of Research Services, Donald Gordon Centre, Queen's University

**11/02/2011:** *Developing Complex Problem Solving Skills*, Centre for Teaching and Learning, Queen's University

**27/05/2009–29/05/2009:** *Engineering a Successful Teaching Experience* (invited) for new faculty in engineering disciplines (province-wide attendance), University of Toronto

**04/2001:** *Team-Based Project Management for Graduate Students*, NSERC, OCE, and the Queen's University School of Business

## 13 Professional Affiliations

**2007–Present:** Professional Engineer (Licence No. 100118247) and Member of the Association of Professional Engineers of Ontario (PEO)

**2001–Present:** Senior Member (S'01–M'05–SM'13) of the Institute for Electrical and Electronics Engineers (IEEE); Control Systems Society (CSS); Robotics & Automation Society (RAS)

**1997–2001, 2006–2019:** Member of the Canadian Institute for Mining, Metallurgy, and Petroleum (CIM); Society for Innovative Mining Technology (SIMT)

**1998–2001, 2011–2016:** Professional Member of the Society for Mining, Metallurgy, & Exploration (SME)