Lee Clement

Curriculum Vitae

University of Toronto Institute for Aerospace Studies
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Education

2013–Present **Ph.D. Candidate**, *University of Toronto*.
Mobile Robotics, Computer Vision, Machine Learning, Sensor Fusion

2010–2013 **B.Sc.(Maj.) with Distinction**, *University of Manitoba*, *GPA*: 4.31/4.50.
Physics, Computer Science

2006–2010 **B.Comm.(Hons.) with Distinction**, *University of Manitoba*, *GPA*: 4.13/4.50.
Accounting, Finance

Research Experience

2013–Present **Ph.D. Candidate**, *University of Toronto Institute for Aerospace Studies*.
Thesis: Enabling long-term visual navigation by learning models of appearance.
Supervisor: Prof. Jonathan Kelly

2013 **Research Assistant**, *Argonne National Laboratory - Physics Division*.
Participated in experiments with the Argonne Tandem Linac Accelerator System (ATLAS).
Supervisors: Prof. Kumar Sharma and Dr. Jason Clark

2012 **Research Assistant**, *University of Manitoba - Physics and Astronomy*.
Developed astrophysical modelling software.
Supervisor: Prof. Jason Fiege

Teaching Experience

2018 **Course Instructor**, *University of Toronto*.
AER 521 - Mobile Robotics and Perception

2015-2017 **Teaching Assistant**, *University of Toronto*.
ROB 301 - Introduction to Robotics
AER 521 - Mobile Robotics and Perception

Major Grants and Awards

2015-2018 **NSERC Postgraduate Scholarship - Doctoral Program**, *University of Toronto*.

2014-2015 **Kenneth Molson Fellowship**, *University of Toronto*.

2014-2015 **NSERC Canada Graduate Scholarship - Master's Program**, *University of Toronto*.

2012, 2013 **NSERC Undergraduate Student Research Award**, *University of Manitoba*.

2011, 2012 **Centennial Scholarship in Physics**, *University of Manitoba*.

Volunteer Service

2017-2018 **Grad Student Representative**, *Engineering Faculty Council*.
Faculty Council sets and approves academic policy, principles, priorities, and the general direction for the teaching and research activities of the Faculty.

2017-2018 **Grad Student Representative**, *Community Affairs & Gender Issues Committee*.
The CA&GI Committee seeks to improve and to recommend on strategies related to student recruitment and outreach and quality of life within the Faculty community, including the student experience, gender issues, diversity, safety and security, and personal conduct.

2016-2017 **President**, *Aerospace Students' Association*.
The Aerospace Students' Association represents graduate students at UTIAS and organizes athletic, social, academic and professional events.
Previously: Social Coordinator (2015-2016)

2016-2017 **Co-founder/Aerospace Representative**, *GECoS*.
The Graduate Engineering Council of Students acts as a forum for all Engineering Graduate Student Associations at UofT to collaborate and represent Engineering graduate students.

2016, 2017 **Student Member**, *UTIAS Student Experience Committee*.
The SEC gathers data about the UTIAS student body's experiences at the Institute and makes a report to the Director summarizing the data and suggesting improvements.

2014-2017 **Re-founder/Director**, *SEDS-Canada*.
Students for the Exploration and Development of Space (SEDS) is an international group of student-run organizations dedicated to promoting public interest in space.

Professional Affiliations

Student Member, *IEEE, IEEE Young Professionals, IEEE Robotics and Automation Society*.

Student Member, *Canadian Image Processing and Pattern Recognition Society (CIPPRS)*.

Publications

[1] L. Clement and J. Kelly, "How to train a CAT: Learning canonical appearance transformations for robust direct localization under illumination change," *IEEE Robotics and Automation Letters (RA-L)*, 2018.

[2] V. Peretroukhin†, L. Clement†, and J. Kelly, "Inferring sun direction to improve visual odometry: A deep learning approach," *International Journal of Robotics Research (IJRR) Special Issue on Experimental Robotics*, 2018, †Equal contribution.

[3] ——, "Reducing drift in visual odometry by inferring sun direction using a bayesian convolutional neural network," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Singapore, May 2017, †Equal contribution.

[4] J. Lambert, L. Clement, M. Giamou, and J. Kelly, "Entropy-based Sim(3) calibration of 2D lidars to egomotion sensors," in *Proceedings of the IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, Baden-Baden, Germany, Sep. 2016, Best Student Paper Award.

[5] L. Clement, J. Kelly, and T. D. Barfoot, "Robust monocular visual teach and

repeat aided by local ground planarity and colour-constant imagery," *Journal of Field Robotics*, 2016.

[6] L. Clement, V. Peretroukhin, and J. Kelly, "Improving the accuracy of stereo visual odometry using visual illumination estimation," in *Proceedings of the IFRR International Symposium on Experimental Robotics (ISER)*, Tokyo, Japan, Oct. 2016, Toyota Student Participation Award, invited to IJRR special issue.

[7] V. Peretroukhin, L. Clement, M. Giamou, and J. Kelly, "PROBE: Predictive robust estimation for visual-inertial navigation," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, Sep. 2015, pp. 3668–3675.

[8] L. Clement, J. Kelly, and T. D. Barfoot, "Monocular visual teach and repeat aided by local ground planarity," in *Proceedings of the 10th Conference on Field and Service Robotics (FSR)*, Toronto, Canada, Jun. 2015, pp. 547–561.

[9] L. Clement[†], V. Peretroukhin[†], J. Lambert, and J. Kelly, "The battle for filter supremacy: A comparative study of the multi-state constraint kalman filter and the sliding window filter," in *Proceedings of the 12th Conference on Computer and Robot Vision (CRV)*, Halifax, Canada, Jun. 2015, pp. 23–30, [†]Equal contribution.

[10] V. Peretroukhin, L. Clement, and J. Kelly, "Get to the point: Active covariance scaling for feature tracking through motion blur," in *Proceedings of the ICRA Workshop on Scaling Up Active Vision*, Seattle, USA, May 2015.

[11] L. Clement, J. Kelly, and T. D. Barfoot, "Monocular vision for long-range visual teach and repeat in unstructured environments," *NSERC Canadian Field Robotics Network (NCFRN) and Conference on Computer and Robot Vision (CRV) Joint Poster Session*, May 2014.

[12] B. Russell, L. Clement, J. Hernandez, A. Byagowi, D. Schor, and W. Kinsner, "Implementation of a nanosatellite attitude determination and control system for the T-Sat1 mission," in *Proceedings of the Canadian Conference on Electrical and Computer Engineering (CCECE)*, Regina, Canada, May 2013.