Lee Clement, PhD

Researcher, Architect, Engineer and Leader in Autonomous Vehicles

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Skills & Interests

Technical	Robot Autonomy, Motion Forecasting, Machine Learning, State Estimation, Software Engineering
Coding	Python, C/C++, PyTorch, TensorFlow, NumPy, SciPy, Pandas, Git, MATLAB, LaTeX
Languages	English, French
Interests	Prediction & Interactive Planning, Generative Models, Representation Learning, Technology Ethics

Experience

Staff Engineer · Oxa (formerly Oxbotica) *Canada (Remote)*

Prediction · OxaDriver · Previously Lead Software Engineer *2021 - Present*

- Own architecture, R&D and delivery of motion forecasting capabilities for autonomous vehicles "driven by Oxa."
- Led team of teams to co-design, implement and integrate refreshed scene representation, prediction and planning stack in OxaDriver; deployed working prototype to test vehicle in 6 months.
- Support personal and professional development of my direct reports and team members.

Software Engineer · Oxa (formerly Oxbotica) *Toronto, Canada*

Object Tracking & Prediction · OxaDriver *2019 - 2021*

- Developed object tracking and motion forecasting algorithms for autonomous vehicles.

Subject Matter Expert · Coursera *Toronto, Canada*

Self-Driving Cars Specialization · University of Toronto *2018*

- Co-created the State Estimation and Localization course of the Coursera Self-Driving Cars Specialization.

Course Instructor / Teaching Assistant · University of Toronto *Toronto, Canada*

Division of Engineering Science *2015 - 2018*

- Graduate level: AER 521 (Mobile Robotics and Perception), ROB 501 (Computer Vision for Robotics)
- Undergraduate level: ROB 301 (Introduction to Robotics)

Graduate Researcher · University of Toronto *Toronto, Canada*

STARS Lab · Institute for Aerospace Studies · Vector Institute *2013 - 2019*

- Conducted and published independent research on enhancing visual navigation using generative models.
- Postgraduate Affiliate of the Vector Institute for Artificial Intelligence.
- Invited participant, RSS Pioneers (2018); Student Mentor, Inclusion@RSS.

Education

Doctor of Philosophy · University of Toronto *Toronto, Canada*

STARS Lab · Institute for Aerospace Studies · Vector Institute *2013 - 2019*

- Thesis: "On learning models of appearance for robust long-term visual navigation." Advised by Prof. Jonathan Kelly.
- Supported by a competitive NSERC Postgraduate Scholarship - Doctoral Program, valued at $63,000.

B.Sc. (Distinction), Physics & Computer Science · University of Manitoba *Winnipeg, Canada*

Department of Physics and Astronomy · Department of Computer Science *2010 - 2013*

- GPA: 4.31 / 4.50
- Received two NSERC Undergraduate Student Research Awards in 2012 and 2013.

Selected Publications

[1] L. Clement, M. Gridseth, J. Tomasi, and J. Kelly, "Learning matchable image transformations for long-term metric visual localization," *IEEE Robotics and Automation Letters (RA-L)*, 2020, presented at ICRA.

[2] ——, "Matchable colorspace transformations for long-term metric visual localization," in *CVPR Workshop on Image Matching*, Long Beach, USA, Jun. 2019.

[3] 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, presented at ICRA.

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

Professional Activities & Community Service

Peer Reviewer *Various locations*

RSS, ICRA, IROS, FSR, MFI, CRV, IJRR, T-RO, JFR, IEEE RAS *2014-2020*

- Provided timely and relevant peer reviews for a range of top Robotics conferences and journals.

Organizer · Debates on the Future of Robotics Research Workshop *Various locations*

IEEE International Conference on Robotics and Automation *2019-2020*

- The Debates on the Future of Robotics Research Workshop brings together prominent researchers and industry leaders to formally debate key issues affecting robotics as an academic discipline and its broader social and economic contexts.

Postgraduate Affiliate · Vector Institute for Artificial Intelligence *Toronto, Canada*

Vector Institute Postgraduate Affiliate Program *2019-2020*

- The Vector Institute drives excellence and leadership in Canada's knowledge, creation, and use of artificial intelligence (AI) to foster economic growth and improve the lives of Canadians.

Invited Participant · RSS Pioneers Workshop *Pittsburgh, USA*

Robotics: Science and Systems *2018*

- RSS Pioneers is a day-long invitation-only workshop for senior graduate students and postdocs, held in conjunction with Robotics: Science and Systems, that seeks to bring together a cohort of the world's top early career researchers in all areas of robotics.

Student Mentor · Inclusion@RSS *Pittsburgh, USA*

Robotics: Science and Systems *2018*

- Inclusion@RSS focuses on programs that increase and sustain a broader participation in the robotics research community of groups traditionally underrepresented in robotics (including but not limited to: women, LGBTQ+, underrepresented minorities, and people with disabilities), especially people early in their studies and career.