Chang Won (John) Lee

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Education

University of Toronto — Toronto, Canada
MASc. in Aerospace Engineering and Robotics — Sep 2023 – Sep 2025 (expected)
- Advisor: Steven L. Waslander

University of Toronto — Toronto, Canada
BASc. in Engineering Science (Machine Intelligence Major) — Sep 2018 – Jun 2023

Select Publications

- **C. W. Lee** and S. L. Waslander, "UncertaintyTrack: Exploiting Detection and Localization Uncertainty in Multi-Object Tracking," in *2024 IEEE International Conference on Robotics and Automation (ICRA)*, 2024, pp. 4946–4953. [pdf]
- J. Deery, **C. W. Lee**, and S. L. Waslander, "ProPanDL: A Modular Architecture for Uncertainty-Aware Panoptic Segmentation," in *2023 20th Conference on Robots and Vision (CRV)*, 2023, pp. 137–144. [pdf]

Submissions Under Review

- **C. W. Lee**, S. Leveugle, P. Grouchy, C. Langley, S. Stolpner, J. Kelly, and S. L. Waslander, "FlowCLAS: Enhancing Normalizing Flow Via Contrastive Learning For Anomaly Segmentation," (Under Review). [pdf]
- S. Leveugle, **C. W. Lee**, S. Stolpner, C. Langley, P. Grouchy, S. L. Waslander, and J. Kelly, "ALLO: A Photorealistic Dataset and Data Generation Pipeline for Anomaly Detection During Robotic Proximity Operations in Lunar Orbit," in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, 2025, (Under Review). [pdf]

Professional & Research Experience

Computer Vision Researcher — Sep 2023 – Present
University of Toronto Robotics Institute — Toronto, Canada
- Engineering a novel self-supervised anomaly segmentation algorithm for Canadarm3 using normalizing flows in PyTorch, demonstrating 2x accuracy improvement over baseline methods.
- Developed an automated Blender-based pipeline to generate 100K+ photorealistic lunar orbit images and established performance benchmarks, laying foundation for visual anomaly detection for space robotics.
- Designed a 2D multi-object tracker for autonomous driving in Pytorch, leveraging learned localization uncertainty to overcome challenges like occlusions and non-linear motion, reducing errors by ∼30% .

Software Engineer Intern — Jan 2023 – Apr 2023
16 Bit — Toronto, Canada
- Engineered a PyTorch-based bone mineral density (BMD) test analysis tool, combining object detection and OCR, reducing analysis time for hundreds of daily cases from minutes to seconds.
- Deployed BMD test analysis pipeline using ONNX optimization and Docker containerization, enabling seamless integration with 16 Bit's existing medical imaging services.

Research Intern — Dec 2021 – Aug 2022
University of Toronto — Toronto, Canada
- Implemented and benchmarked state-of-the-art object detection and segmentation models in PyTorch, establishing performance baselines for long-range traffic detection and panoptic segmentation research.

- Developed and executed MATLAB-based camera calibration pipeline to process 100+ hours of traffic footage, enabling high-quality data annotation for autonomous driving perception systems.

Software Engineer Intern May 2021 – Apr 2022
The Citco Group Limited Toronto, Canada

- Deployed a Dockerized search engine for financial application logs by leveraging the Elastic stack and custom regex patterns. Enhanced log searchability by around 500% and curtailed service downtime.
- Employed character recognition libraries and a custom REST API to effectively classify and organize financial documents within a PostgreSQL database. Accelerated document lookups for enhanced operational efficiency.
- Developed automated tests in Javascript using the Cypress framework, enabling the seamless and precise functionality of Citco's investment platform.
- Collaborated effectively with cross-functional teams by participating in daily scrums and utilizing other Agile methodologies to drive successful project outcomes.

Teaching

- **Teaching Assistant,** Mathematics for Robotics (ROB310) Sep 2023 – Present
  University of Toronto, Institute for Aerospace Studies
- **Teaching Assistant,** Linear Algebra for Engineering (MAT188) Sep 2022 – Dec 2022
  University of Toronto, Department of Mathematics

Activities & Societies

aUtoronto Software Engineer Aug 2021 – Apr 2023

- Engineered a robust 3D multi-object tracking system for autonomous driving in C++/Python using Extended Kalman Filters and Hidden Markov Models, increasing accuracy and efficiency by 10% and 5%.
- Integrated the tracking system into our autonomous vehicle's ROS-based perception pipeline, contributing to the team's first-place victories across multiple categories in the SAE AutoDrive Challenge II.

University of Toronto Engineering Student Ambassador 2019 – 2022

- Participated in prospective student engagement as an Engineering Science representative at key faculty events, including program orientations, information sessions, and club fairs.

University of Toronto Engineering Student Mentor 2020 – 2021

- Guided first-year engineering students in academic success strategies and career development, facilitating connections to institutional resources and support services.

Engineering Science Education Conference (ESEC) Web Designer & Organizer 2021

- Designed and developed the conference website featuring keynote profiles, event details, and preparation resources for Engineering Science Education Conference 2021. [link]
- Collaborated with the organizing committee to coordinate industry speakers who shared insights into diverse engineering fields to guide Engineering Science students in making informed specialization choices.

Honors, Awards & Certificates

- Dean's Honor List 2018 – 2023
- Natural Sciences and Engineering Research Council of Canada (NSERC) 2020, 2022
  Undergraduate Student Research Award (USRA) - $7500 CAD
- University of Toronto Scholar's Award - $7500 CAD 2018
- Official Bilingual Certificate (English, French) 2018

Languages

English (Native), **French** (Native), **Korean** (Native)