En Xu (Thomas) Li

✉ tli@cs.toronto.edu   🌐 https://www.cs.toronto.edu/~tli/

Research Interests

Autonomous Vehicle, LiDAR Semantic and Instance Segmentaion, Temporal Reasoning, Object Detection, Sensor Fusion

Education

Sep 2022 – Present	**Doctor of Philosophy in Computer Science**, University of Toronto *Supervisor: Prof. Raquel Urtasun* *GPA: 4.00/4.00*
Sep 2017 – Apr 2022	**Bachelor of Applied Science in Engineering Science with High Honours**, University of Toronto Robotics Major, Artificial Intelligence Minor, Engineering Business Certificate *Major GPA: 3.99/4.00, cGPA: 3.87/4.00* *Thesis: "4D Panoptic Segmentation for Autonomous Driving"* *Supervisor: Prof. Steven Waslander* *University of Toronto Scholar, NSERC Undergrad Student Research Award, Daisy Intelligence Scholarship, W. S. Wilson Medal, Dean's Honour List*

Experience

Aug 2022 - Present	**Waabi Innovation Inc.**	Research Scientist *Supervised by Prof. Raquel Urtasun, Perception and Prediction Team* Senior Researcher [Aug 2024 - Present] Researcher II [Aug 2023 - Aug 2024] Researcher I [Aug 2022 - Aug 2023]
May 2020 - Aug 2021	**Noah's Ark Lab, Huawei Canada**	Research Intern *Supervised by Dr. Bingbing Liu, Cognitive IoV Perception Team* • Built a custom PyTorch training pipeline for panoptic segmentation with LiDAR inputs • Led a research project on real-time deployable panoptic segmentation networks using LiDAR point cloud as inputs. First author of *CPSeg* (accepted at ICRA 2023) and *SMAC-Seg* (accepted at ICRA 2022), state-of-the-art methods on SemanticKITTI panoptic segmentation benchmarks. Three Patents filed as the main inventor • Designed and supported the development of high-performance perception models. Co-author of *AF2-S3net* (accepted at *CVPR 2021*) and *GP-S3net* (accepted at *ICCV 2021*). The two models are top ranked on SemanticKITTI and nuScenes semantic segmentation and panoptic segmentation challenges upon publication
May 2019 - Aug 2019	**Department of ECE, University of Toronto**	Summer Student Researcher *Supervised by Prof. Roman Genov, Intelligent Sensory Microsystems Laboratory* • Designed FSMs and Programmed the FPGA board (Opal Kelly XEM7310) to control 3D imaging cameras with CMOS sensors using Verilog and Python • Refined the PC-FPGA communication and memory interfacing to allow faster data process by replacing sequential read/write to all-freedom DDR3 memory address mapping

Honors

2022	**W.S. Wilson Medal** • Awarded for being the top-ranked engineering science student in the 4th year

2020 | **Daisy Intelligence Scholarship**
- Awarded for being the top-ranked robotics engineering student in the 3rd year

2019 | **NSERC USRA**
- Undergraduate Student Research Award by Natural Sciences and Engineering Research Council of Canada (NSERC)

ESROP-U of T Fellowship [*declined*]
- Awarded by Engineering Science Research Opportunities Program to pursue a paid summer research internship at University of Toronto

ESROP-Global Fellowship [*declined*]
- Awarded by Engineering Science Research Opportunities Program to pursue a paid summer research internship at National University of Singapore

2017 | **University of Toronto Scholar**
The Murray Calder Hendry Scholarship

Publications

2024 | [1] S. Casas*, B. Agro*, J. Mao*, T. Gilles, A. Cui, **T. Li**, R. Urtasun, "DeTra: A Unified Model for Object Detection and Trajectory Forecasting," **ECCV** 2024.

2023 | [2] A. Athar*, **E. Li***, S. Casas, R. Urtasun, "4D-Former: Multimodal 4D Panoptic Segmentation," **CoRL** 2023.
[3] **E. Li**, S. Casas, R. Urtasun, "MemorySeg: Online LiDAR Semantic Segmentation with a Latent Memory," **ICCV** 2023.
[4] **E. Li***, R. Razani*, Y. Xu, B. Liu, "CPSeg: Cluster-free Panoptic Segmentation Network of LiDAR Point Clouds," **ICRA** 2023.
[5] C. Shentu*, **E. Li***, C. Chen, P. Dewi, D. Lindell, J. Burgner-Kahrs, "MoSS: Monocular Shape Sensing for Continuum Robots," **RA-L** 2023.

2022 | [6] **E. Li***, R. Razani*, Y. Xu, B. Liu, "SMAC-Seg: LiDAR Panoptic Segmentation via Sparse Multi-directional Clustering," **ICRA** 2022.

2021 | [7] R. Razani*, R. Cheng*, **E. Li**, E. Tagahvi, Y. Ren, B. Liu, "GP-S3Net: Graph-based Panoptic Sparse Semantic Segmentation Network," **ICCV** 2021
[8] R. Cheng, R. Razani, E. Tagahvi, **E. Li**, B. Liu, "$(AF)^2$-S3Net: Attentive Feature Fusion with Adaptive Feature Selection for Sparse Semantic Segmentation Network," **CVPR** 2021

Patents

2021 | [1] **E. Li**, R. Razani, Y. Ren, B. Liu, "Methods and Systems for Deterministic Calculation of Surface Normal Vectors for Sparse Point Clouds," *US Patent Application No. 63/242,000*
[2] **E. Li**, R. Razani, B. Liu, "System and Method for Panoptic Segmentation System of Point Clouds," *US Patent Application No. 63/238,759*
[3] **E. Li**, R. Razani, B. Liu, "System and Method for Proposal-free and Cluster-free Panoptic Segmentation System of Point Clouds," *US Patent Application No. 63/241,986*