

En Xu (Thomas) Li

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📍 Toronto, Canada

Research Interests

Autonomous Vehicle, LiDAR Semantic and Instance Segmentation, LiDAR Panoptic Tracking, LiDAR Temporal Reasoning, Object Detection and Recognition, Point Cloud Semi-supervised and Unsupervised Learning, 2D and 3D Scene Understanding, Video Understanding

Education

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| Sep 2022 – Present | Doctor of Philosophy in Computer Science , University of Toronto
<i>Supervisor: Prof. Raquel Urtasun</i> |
| 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
<i>Major GPA: 3.99/4.00, cGPA: 3.87/4.00</i>
<i>Thesis: "4D Panoptic LiDAR Segmentation for Autonomous Driving"</i>
<i>Supervisor: Prof. Steven Waslander</i>
<i>University of Toronto Scholar, NSERC Undergrad Student Research Award, Daisy Intelligence Scholarship, W. S. Wilson Medal, Dean's Honour List</i> |

Experience

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| Aug 2022 - Present | Waabi Innovation Inc. Full-time Research Scientist
<i>Supervised by Prof. Raquel Urtasun, Perception Team</i> |
| May 2020 - Aug 2021 | Noah's Ark Lab, Huawei Canada Research Intern
<i>Supervised by Dr. Bingbing Liu, Cognitive IoV Perception Team</i> <ul style="list-style-type: none">• 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 <i>CPSeg</i> and <i>SMAC-Seg</i>, state-of-the-art methods on SemanticKITTI panoptic segmentation benchmarks. Three Patents pending (as the main inventor), two paper (as the leading author) under review• Designed and supported the development of high-performance perception models. Co-author of <i>AF2-S3net</i> (accepted at <i>CVPR 2021</i>) and <i>GP-S3net</i> (accepted at <i>ICCV 2021</i>). 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
<i>Supervised by Prof. Roman Genov, Intelligent Sensory Microsystems Laboratory</i> <ul style="list-style-type: none">• 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

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| 2022 | W.S. Wilson Medal <ul style="list-style-type: none">• Awarded for being the top-ranked engineering science student in the 4th year |
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2020	Daisy Intelligence Scholarship <ul style="list-style-type: none"> Awarded for being the top-ranked robotics engineering student in the 3rd year
2019	NSERC USRA <ul style="list-style-type: none"> Undergraduate Student Research Award by Natural Sciences and Engineering Research Council of Canada (NSERC) ESROP-U of T Fellowship <i>[declined]</i> <ul style="list-style-type: none"> Awarded by Engineering Science Research Opportunities Program to pursue a paid summer research internship at University of Toronto ESROP-Global Fellowship <i>[declined]</i> <ul style="list-style-type: none"> 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

2022	[1] E. Li , R. Razani, Y. Xu, B. Liu, "SMAC-Seg: LiDAR Panoptic Segmentation via Sparse Multi-directional Clustering," ICRA 2022.
2021	[1] R. Razani*, R. Cheng*, E. Li , E. Tagahvi, Y. Ren, B. Liu, "GP-S3Net: <u>G</u> raph-based <u>P</u> anoptic <u>S</u> parse <u>S</u> emantic <u>S</u> egmentation Network," ICCV 2021 [2] R. Cheng, R. Razani, E. Tagahvi, E. Li , B. Liu, " $(AF)^2$ -S3Net: <u>A</u> ttentive <u>F</u> eature Fusion with <u>A</u> daptive <u>F</u> eature Selection for <u>S</u> parse <u>S</u> emantic <u>S</u> egmentation Network," CVPR 2021

Preprints Under Review

2021	[1] E. Li , R. Razani, Y. Xu, B. Liu, "CPSeg: Cluster-free Panoptic Segmentation Network of LiDAR Point Clouds," <i>arXiv preprint arXiv:2111.01723</i> , 2021.
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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," <i>US Patent Application No. 63/242,000</i> [2] E. Li , R. Razani, B. Liu, "System and Method for Panoptic Segmentation System of Point Clouds," <i>US Patent Application No. 63/238,759</i> [3] E. Li , R. Razani, B. Liu, "System and Method for Proposal-free and Cluster-free Panoptic Segmentation System of Point Clouds," <i>US Patent Application No. 63/241,986</i>
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