

# En Xu (Thomas) Li

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📍 Toronto, Canada

## Research Interests

Autonomous Vehicle, LiDAR Semantic and Instance Segmentation, 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 Team*  
Researcher II [Aug 2023 - Present]  
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	<b>Daisy Intelligence Scholarship</b> <ul style="list-style-type: none"> <li>• Awarded for being the top-ranked robotics engineering student in the 3rd year</li> </ul>
2019	<b>NSERC USRA</b> <ul style="list-style-type: none"> <li>• Undergraduate Student Research Award by Natural Sciences and Engineering Research Council of Canada (NSERC)</li> </ul> <b>ESROP-U of T Fellowship</b> [ <i>declined</i> ] <ul style="list-style-type: none"> <li>• Awarded by Engineering Science Research Opportunities Program to pursue a paid summer research internship at University of Toronto</li> </ul> <b>ESROP-Global Fellowship</b> [ <i>declined</i> ] <ul style="list-style-type: none"> <li>• Awarded by Engineering Science Research Opportunities Program to pursue a paid summer research internship at National University of Singapore</li> </ul>
2017	<b>University of Toronto Scholar</b> <b>The Murray Calder Hendry Scholarship</b>

## Publications

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2023	[1] A. Athar*, E. Li*, S. Casas, R. Urtasun, "4D-Former: Multimodal 4D Panoptic Segmentation," <b>CoRL</b> 2023. [2] E. Li, S. Casas, R. Urtasun, "MemorySeg: Online LiDAR Semantic Segmentation with a Latent Memory," <b>ICCV</b> 2023. [3] E. Li*, R. Razani*, Y. Xu, B. Liu, "CPSeg: Cluster-free Panoptic Segmentation Network of LiDAR Point Clouds," <b>ICRA</b> 2023. [4] C. Shentu*, E. Li*, C. Chen, P. Dewi, D. Lindell, J. Burgner-Kahrs, "MoSS: Monocular Shape Sensing for Continuum Robots," <b>RA-L</b> 2023.
2022	[5] E. Li*, R. Razani*, Y. Xu, B. Liu, "SMAC-Seg: LiDAR Panoptic Segmentation via Sparse Multi-directional Clustering," <b>ICRA</b> 2022.
2021	[6] 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," <b>ICCV</b> 2021 [7] 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," <b>CVPR</b> 2021

## Patents

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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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