

# JUSTIN LIANG

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## EDUCATION

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- University of Toronto** Sept 2016 - May 2018  
Master of Science, Computer Science  
*Machine Learning Group*  
Supervisor: Raquel Urtasun  
GPA: 4.00, A+
- University of British Columbia** Sept 2011 - May 2016  
Bachelor of Applied Science, Mechanical Engineering  
*Mechatronics Option*  
90.3/100 — Rank: 1/34, A+

## WORK EXPERIENCE

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- Staff Research Scientist, Waabi** Sep 2025 - Present
- Developing and maintaining core mapping infrastructure and APIs for autonomous vehicles.
  - Leading the development of a core internal mapping tool to help visualize maps.
  - Designing the next generation map automation pipelines.
- Senior Research Scientist, Waabi** Jan 2023 - Sep 2025
- Led development of core mapping infrastructure and annotation pipelines, including validation frameworks that reduced annotation debugging time by 99% and enabled reliable delivery of production.
  - Designed and implemented CNN and transformer models achieving 95% pre-annotation accuracy, reducing annotation effort by 60%, and cutting training time from 7 days to 1.5 days.
  - Owned delivery of major map elements (e.g., signs, traffic lights, crosswalks, intersections), coordinating across all teams to deliver milestones and unblock downstream development.
  - Migrated core mapping infrastructure to Rust, designing APIs and porting major components and adding Python bindings for onboard and offline workflows.
- Research Scientist II, Waabi** Mar 2021 - Jan 2023
- Led the design and implementation the company's initial map schema and production APIs, and developed core mapping infrastructure and primitives (e.g., lanes, shoulders, etc).
  - Built the data pipelines and infrastructure for map automation ML models.
  - Contributed to internal frontend annotation tooling, adding key features to the tool and improving workflows to significantly accelerate map annotation throughput.
- Research Scientist II, Uber ATG** Sept 2018 - Mar 2021
- Conducted research in computer vision for autonomous driving, developing models for instance segmentation, road boundary detection, lane topology mapping, and video object segmentation.
  - Co-authored 6 publications at top-tier conferences (CVPR, ICCV, ECCV, WACV); one model achieved 1st place on the Cityscapes instance segmentation leaderboard, a leading benchmark at the time.
- Research Scientist I, Uber ATG** Oct 2017 - Aug 2018
- Developed a model to automatically detect and annotate crosswalks; research accepted at ECCV.
- Research Intern, Uber ATG** July 2017 - Sept 2017

- Built a lane boundary classifier achieving 99% accuracy.

**Software Development Intern, Verity Studios (ETH Spin-Off)** Jan 2015 - Aug 2015

- Built a parameter server in C++ to save and load parameter data onto quadcopters.
- Developed user interfaces using Qt and ROS.

**Controls Systems Engineer, Brock Solutions** May 2014 - Aug 2014

- Wrote VBA scripts to automatically generate excel checklists.
- Troubleshooted PLC ladder logic for controlling luggage conveyors at YVR.

**Controls Design Support Engineer, Confirmed Automation Systems** Sept 2013 - Dec 2013

- Designed mechanical and hardware solutions for industrial processing plants.

## PUBLICATIONS

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S. Duggal, Z. Wang, W.-C. Ma, S. Manivasagam, **J. Liang**, S. Wang, R. Urtasun. Mending Neural Implicit Modeling for 3D Vehicle Reconstruction in the Wild. (WACV 2022)

N.Homayounfar, **J. Liang\***, W.C. Ma, R. Urtasun. VideoClick: Video Object Segmentation with a Single Click. (Arxiv 2021)

N.Homayounfar\*, Y. Xiong\*, **J. Liang\***, W.C. Ma, R. Urtasun. LevelSet R-CNN: A Deep Variational Method for Instance Segmentation. (ECCV 2020)

**J. Liang**, N.Homayounfar, W.C. Ma, Y. Xiong, R. Hui, R. Urtasun. PolyTransform: Deep Polygon Transforming for Instance Segmentation. (CVPR 2020)

N.Homayounfar, W.C. Ma, **J. Liang**, X. Yu, J. Fan, R. Urtasun. Learning to Map by Discovering the Deep DAG Topology (ICCV 2019)

**J. Liang\***, N. Homayounfar\*, W. C. Ma, S. Wang, R. Urtasun. Convolutional Recurrent Network for Road Boundary Extraction. (CVPR 2019)

**J. Liang**, R. Urtasun. End-to-End Deep Structured Models for Drawing Crosswalks. (ECCV 2018)

S. Wang, M. Bai, G. Mattyus, H. Chu, W. Luo, B. Yang, **J. Liang**, J. Cheverie, S. Fidler, R. Urtasun. TorontoCity: Seeing the World with a Million Eyes. (ICCV 2017, **Spotlight**)

## RESEARCH EXPERIENCE

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**Research Assistant, Machine Learning Group, Dept. of Computer Science, UofT** Sept 2016 - May 2018

**Advisor: Prof. Raquel Urtasun**

- Designed models using neural networks to automatically map the world.
- Performed building footprint shape reconstruction on aerial images.
- Developed algorithms to automatically annotate crosswalks.
- Implemented a model to automatically classify lane markings.

**Research Assistant, Clean Energy Research Lab, Dept. of Mechanical Engineering, UBC** May 2013 - Aug 2013

**Advisor: Prof. Steven Rogak, Dr. James Montgomery**

- Designed experimental setup to test HVAC filters.
- Conducted analysis to predict energy use and operation cost of HVAC filters.

## PATENTS

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R. Cheng, A.W. Harley, **J. Liang**, X. Yan, R. Urtasun, M.E. Yumer. Systems and Methods for Dynamic Object Removal from Three-Dimensional Data. U.S. Patent Application 19/236,665 (2025)

E. Zheng, N. Homayounfar, **J. Liang**, R. Urtasun. Road Mapping Framework. U.S. Patent Application 18/949,302 (2025)

N. Homayounfar, Y. Xiong, **J. Liang**, W.C. Ma, R. Urtasun. High Quality Instance Segmentation. U.S. Patent 11,734,828 (2023)

**J. Liang**, N. Homayounfar, W.C. Ma, Y. Xiong, R. Urtasun. Systems and Methods for Predicting Instance Geometry. U.S. Patent Application 17/007,667 (2021)

N. Homayounfar, **J. Liang**, R. Urtasun. System and Methods for Generating High Definition Maps Using Machine-Learned Models to Analyze Topology Data Gathered From Sensors. U.S. Patent Application 16/825,518 (2020)

**J. Liang**, R. Urtasun. Structured Prediction Crosswalk Generation. U.S. Patent Application 16/183,012 (2019)

**J. Liang**, R. Urtasun. Map Automation-Lane Classification. U.S. Patent Application 16/353,871 (2019)

## AWARDS AND HONOURS

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Google Travel and Conference Grant (CVPR 2017)	2017
University of Toronto Graduate Fellowship	2016
Letson Prize	2016
Frank Vernon Memorial Scholarship 2x	2015, 2013
Charles and Jane Banks Scholarship	2014
NSERC Undergraduate Student Research Award	2013
Trek Excellence Scholarship 2x	2013, 2012
Association of Professional Engineers and Geoscientists Scholarship	2012
British Columbia Government Scholarship	2012
Top Science Student Award (Secondary School)	2011
Euclid Math Contest School Champion (Secondary School)	2011

## VOLUNTEER EXPERIENCE

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**Software Engineer, UBC Snowbots School Team** Sept 2014 - Aug 2015

- Implemented pathfinding algorithms on autonomous robot.

**Electrical Engineer, UBC SuperMileage School Team** Sept 2012 - Apr 2013

- Built test setup to evaluate vehicle performance.

## SKILLS

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**Languages** Python, Rust  
**Scientific Packages** Pytorch, NumPy, Shapely, OpenCV