

Ava Pun

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RESEARCH INTERESTS

Computer Graphics · Computer Vision · Machine Learning

EDUCATION

Ph.D. in Computer Science | *Carnegie Mellon University* 2024–present
Bachelor of Mathematics | *University of Waterloo* 2019–24
Double Major · Computer Science (Co-op) and Combinatorics & Optimization · 98.5% faculty average

PUBLICATIONS

Enumeration and Succinct Encoding of AVL Trees [↗](#) 2024
▶ **Authors:** Jeremy Chizewer*, Stephen Melczer*, J. Ian Munro*, **Ava Pun***
▶ Accepted to the **International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA) 2024**

Neural Lighting Simulation for Urban Scenes [↗](#) 2023
▶ **Authors:** **Ava Pun***, Gary Sun*, Jingkang Wang*, Yun Chen, Ze Yang, Sivabalan Manivasagam, Wei-Chiu Ma, Raquel Urtasun
▶ Accepted to the **Conference on Neural Information Processing Systems (NeurIPS) 2023**

AdvSim: Generating Safety-Critical Scenarios for Self-Driving Vehicles [↗](#) 2021
▶ **Authors:** Jingkang Wang, **Ava Pun**, James Tu, Sivabalan Manivasagam, Abbas Sadat, Sergio Casas, Mengye Ren, Raquel Urtasun
▶ Accepted to the **Conference on Computer Vision and Pattern Recognition (CVPR) 2021**

EXPERIENCE

Research Intern | *Adobe* May–Aug 2024
▶ Added experimental features to Premiere Pro & After Effects

Research Intern | *Waabi* Jan–Dec 2023
▶ **Advisor:** Prof. Raquel Urtasun
▶ Designed and implemented a neural technique for relighting urban driving scenes
▶ Developed a neural inverse rendering method for dynamic outdoor scenes

Undergraduate Research Assistant | *University of Waterloo* Sep–Dec 2022
▶ **Advisor:** University Prof. Ian Munro
▶ Devised a method for compactly representing AVL trees using arithmetic codes
▶ Proved that this method uses < 1 bit per node, very close to the information-theoretic lower bound

Student Researcher | *Google* May–Aug 2022
▶ **Advisor:** Prof. Chris Bregler
▶ Used interpretability/explainability techniques to uncover potential weaknesses in a machine learning system designed to detect synthesized speech

Undergraduate Research Fellow | *UWaterloo Computational Motion Group* Sep–Dec 2021
▶ **Advisor:** Prof. Christopher Batty

*Denotes equal contribution or alphabetical order.

- ▶ Designed and implemented a hybrid fluid animation technique that combined Eulerian and Lagrangian (vortex filament) methods for better artistic control

Undergraduate Research Assistant | *UWaterloo Computer Graphics Lab* May–Aug 2021

- ▶ **Advisor:** Prof. Craig Kaplan
- ▶ Designed and implemented algorithms to enumerate polyforms and calculate their Heesch numbers, as well as software to display visualizations of polyform tilings
- ▶ Aided in the discovery of an aperiodic monotile, resolving a 60-year-old open problem [↗](#)

Research Intern | *Uber Advanced Technology Group* May–Aug 2020

- ▶ **Advisor:** Prof. Raquel Urtasun
- ▶ Designed and implemented a method to seamlessly add/remove objects from real LiDAR scenes
- ▶ Developed AdvSim, a framework for generating adversarial driving scenarios using optimization algorithms

ACTIVITIES

Leader | *European Girls' Olympiad in Informatics (EGOI) Team Canada* 2021–22

- ▶ Coached Team Canada to prepare for international programming competition
- ▶ Organized training sessions for girls interested in contest programming, covering topics such as dynamic programming, square root decomposition, and polynomial hashing [↗](#)

Contest Organizer & Problem Author | *DMOJ Modern Online Judge* 2018–21

- ▶ Authored, reviewed, tested, and wrote tutorials for 40+ programming challenges
- ▶ Organized the DMOPC, an online programming contest aimed at pre-collegiate students
- ▶ Created a problem selected to be used in the 2021 Canadian Computing Olympiad [↗](#)

Educational Writer & Artist | *UWaterloo Centre for Teaching Excellence* 2023

- ▶ Worked in a team supervised by Dr. Anton Mosunov to write and illustrate a storybook debunking common misconceptions about careers in mathematics [↗](#)

Educational Writer, Artist, Director, & Advisor | *MathSoc Cartoons* 2020–23

- ▶ Wrote and illustrated several cartoons explaining undergraduate math and computer science concepts [↗](#)
- ▶ Directed a team of writers, artists, and reviewers to produce educational cartoons

Creator, Writer, & Artist | *Academy 118* 2016–present

- ▶ Created *Academy 118*, an independently published science webcomic [↗](#)

HONOURS

Michael and Ophelia Lazaridis Olympiad Scholarship (approx. \$120,000) 2019–24

- ▶ Full scholarship awarded for outstanding academic achievement and coding contest performance

Alumni Gold Medal 2024

- ▶ Achieved the highest math average (98.5%) and second-highest cumulative average (97.6%) of all Waterloo students graduating in 2023–24 [↗](#)

Jessie Zou Memorial Award for Excellence in Undergraduate Research (\$1000) [↗](#) 2024

NSERC Undergraduate Student Research Award (\$6000) 2021

President's Research Award (\$3000 total) 2021

Silver Medal | *International Olympiad in Informatics (IOI)* 2018

- ▶ Highest-ranking female participant overall, as well as first-ever female participant from Canada

SKILLS

Python (Pytorch, TensorFlow) · C++ · C · Java · Go · JavaScript · PHP · HTML · CSS · MATLAB · L^AT_EX