Ava Pun

🌐 avapun.com · ⦿ github.com/avalovelace1 · 🔗 linkedin.com/in/avapun · ✉ a5pun@uwaterloo.ca

❓ RESEARCH INTERESTS

Computer Graphics · Computer Vision · Artificial Intelligence

🎓 EDUCATION

Bachelor of Mathematics | *University of Waterloo*   Sep 2019–Apr 2024 (expected)

Double Major · Computer Science (Co-op) and Combinatorics & Optimization · 99% faculty average

Select coursework & grades:
- ▸ Introduction to Computer Graphics (cross-listed graduate course) · 100%
- ▸ Introduction to Machine Learning (cross-listed graduate course) · 98%
- ▸ Computational Geometry (graduate course) · 97%
- ▸ Algorithm Design and Analysis (cross-listed graduate course) · 100%

📖 PUBLICATIONS & PREPRINTS

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**

A Compact Representation for AVL Trees ⤢   2023
- ▸ **Authors:** Jeremy Chizewer*, Stephen Melczer*, J. Ian Munro*, **Ava Pun***
- ▸ arXiv preprint

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 | *Waabi Innovation Inc.*   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

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*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*   2021–2022

▸ 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*   2018–2021

▸ 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–present

▸ 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)   2019–2024

▸ Full scholarship awarded for outstanding academic achievement and coding contest performance

Gaby Barsky Memorial Scholarship ($2500)   2022

NSERC Undergraduate Student Research Award ($6000)   2021

President's Research Award ($3000 total)   2021

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

▸ Chosen to represent Canada at prestigious international programming competition

▸ Placed in the top 25% of 335 contestants chosen from 87 countries

▸ 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 · LaTeX