

## Education

### University of Waterloo

**Bachelor of Computer Science, Honours, Co-operative Program, AI Specialization** *Sept '18 – Apr '23 (expected)*

- 91.26 cumulative GPA, 93.50 major average
  - President's Research Award, President's International Experience Award
  - Six 4-month co-op placements at six distinct companies
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## Publications

**Sim-to-Real Domain Adaptation for Lane Detection and Classification in Autonomous Driving** *June 2022*

- Co-Authored a peer-reviewed [research paper](#) on sim2real lane detection using the [CARLA](#) simulator, integrating current GAN research with state-of-the-art lane detection models.
- Presented the paper at a poster board session during the [Intelligent Vehicles 2022 symposium](#).

**Application of machine learning for drone classification using radars** *April 2021*

- Authored a research paper and presented it at the [SPIE 2021 Conference](#), with a follow-up [peer-reviewed paper](#).
  - Used a convolutional neural network to classify 5 different commercial drones based on a Fourier transform of their noisy RADAR return signal.
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## Experience

### Cruise

SAN FRANCISCO, CA

#### Deep Learning Performance Engineer

*Sept '22 – Dec '22*

- Developed various Python tools to deploy deep learning models on the vehicle, using [ONNX](#), [TensorRT](#), and custom computation graph representations.
- Built a tool to assess numerical divergence between the original PyTorch models and optimized models.
- Built a linter to map ONNX nodes to lines in PyTorch source code, saving model deployment engineers hours.
- Created a tool to manually add outputs to exported ONNX graphs, allowing engineers to inspect intermediate activations while debugging models.

### NVIDIA

SANTA CLARA, CA (REMOTE)

#### Deep Learning Research for Autonomous Vehicles

*Jan '22 – Apr '22*

- Designed and iterated on multiple experiments for a LiDAR object detection neural network, improving cyclist and pedestrian F-scores by 43% and 15%, respectively.
- Implemented sparse tensor object detectors using [Minkowski Engine](#), outperforming the baseline model while using 70% less memory.
- Integrated confidence predictions into a LiDAR object detection auto-labeling pipeline, allowing human annotators to focus efforts on anomalous and challenging data instances.

### DarwinAI

WATERLOO, ON (REMOTE)

#### Machine Learning Developer

*May '21 – Aug '21*

- Built and tested defect detection deep learning solutions for clients in the manufacturing industry, focusing on defect detection.
- Implemented the core functionality of Dataset Distillation using the autograd package, to pursue research in low-data machine learning contexts.
- Trained XGBoost and SVR systems to model the relationship between environmental conditions and yield for an agriculture client, achieving 11% median error by weight.
- Created an anomaly detection research repository in PyTorch, for detecting anomalies in images.
- Implemented VAE, VQ-VAE, and VQ-VAE-2 from scratch in PyTorch, evaluating each autoencoder as an anomaly detector.

### Untether AI

TORONTO, ON (REMOTE)

#### Software Developer

*Sept '20 – Dec '20*

- Built a customer-facing Python API to optimize, format and quantize TensorFlow computation graphs.
- Designed and implemented Non-Max Suppression for quantized values using only integer operations, allowing Single-Shot Detector pipelines to be run on-chip.
- Experimented with different quantization schemes to improve the mAP of an SSD-ResNet-34 by 5%.
- Implemented a lookup table class to represent arbitrary non-linear functions in a quantized space.

Huawei

**LiDAR Perception Researcher**

MARKHAM, ON

Jan '20 – Apr '20

- Built DBLiDARNet and focal loss from scratch in PyTorch to use in semantic segmentation experiments.
- Implemented key modules from 12 different research papers in PyTorch, summarizing state-of-the-art techniques and enabling further research.
- Analysed the SemanticKITTI dataset to produce optimal class loss weights, increasing mIoU by 2%.
- Wrote a data loader to spatially align sequential LiDAR scans for temporal pipelines, based on IMU data.

*Please refer to [my LinkedIn profile](#) for the complete list of work experiences.*

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**Skills**

**Languages:** Python, C++, R, C, LaTeX, Java, Javascript

**Frameworks:** PyTorch, TensorFlow, NumPy, Pandas, OpenCV, ROS

**Tools:** Git, Docker, Conda, Bazel, CARLA, VIM, GCP, Linux, TensorRT