Sinclair Hudson *University of Toronto MSc of Applied Computing, class of 2025*

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Education

University of Toronto
Master's of Science in Applied Computing, Artificial Intelligence Concentration *Sept '23 – Dec '25 (expected)*
- Vector Scholarship in Artificial Intelligence, worth $17 500 CAD.

University of Waterloo
Bachelor of Computer Science, Honours, Co-operative Program, AI Specialization *Sept '18 – Apr '23*
- 91.26 cumulative GPA, 93.50 major average
- President's Research Award, President's International Experience Award

Peer-Reviewed 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.
- Created a detailed physics-based simulation of RADAR returns bouncing off of a drone in flight, and used the simulated data to validate classification methods.

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   Markham, ON
LiDAR Perception Researcher   *Jan '20 – Apr '20*

- Implemented key modules from 12 different research papers in PyTorch, summarizing state-of-the-art techniques and enabling further research.
- Built DBLiDARNet and focal loss from scratch in PyTorch to use in semantic segmentation experiments.
- 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 a complete list of work experiences.

Skills

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

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

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