

EXPERIENCE

OTTO Motors

Machine Learning Engineer Intern

Kitchener, ON

May 2022 – Aug. 2022

- Developed a warehouse simulation pipeline using Unity with C# to procedurally generate perception data
- Trained YOLOv7 forklift detection models using PyTorch to evaluate the simulation's sim2real performance
- Achieved a 20% increase in mAP over the COCO pre-trained baseline by pre-training on the simulation dataset

DarwinAI

Machine Learning Engineer Intern

Waterloo, ON

May 2021 – Aug. 2021

- Trained a U-Net with PyTorch to segment weld defects on an X-Ray image dataset containing only 10 high-resolution images
- Achieved 50% test IoU by experimenting with training schemes and developing novel data extraction methods
- Led the development of an automatic model training pipeline using PyTorch, Kubeflow, MLflow, and DVC

Huawei Technologies Canada

Perception Research Intern

Toronto, ON

Jan. 2020 – Apr. 2020, Sep. 2020 – Dec. 2020

- Designed experiments to improve LiDAR object detection models using both PyTorch and TensorFlow
- Led the development of a LiDAR semantic segmentation labeling web app that uses JavaScript with Three.js

P&P Optica

Imaging Software Developer Intern

Waterloo, ON

May 2019 – Aug. 2019

- Trained SVMs and CNNs to classify the freshness in vegetables given hyperspectral image data using Scikit-Learn and TensorFlow
- Reduced data labeling time by 40% by creating an ROI masking tool using spectral filtering and OpenCV

PUBLICATIONS

Evaluating and Improving Neural Rendering In The Extrapolation Regime For AV Simulation

Work In Progress

MASc Thesis

- Designed and collected a multi-sensor autonomous driving dataset to provide quantitative evaluation for neural rendering methods outside the training trajectory
- Developed tools using ROS and OpenCV to assist with the calibration of the camera and LiDAR sensors
- Evaluated multiple SOTA NeRF and 3D Gaussian Splatting based models as baselines
- Trained multi-view latent diffusion models with PyTorch to supervise neural rendering methods, improving their performance in the extrapolation regime

FJMP: Factorized Joint Multi-Agent Motion Prediction over Learned Interaction Graphs

CVPR 2023

Conference Publication

- Researched joint motion prediction using graph neural networks (GNNs) and interaction graphs, achieving SOTA performance on the INTERACTION dataset
- Experimented with various GNN-based architectures to encode agent trajectories and HD map data

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

IV 2022

Conference Publication

- Researched methods to perform zero-shot sim2real domain adaptation for lane detection
- Created a randomly generated synthetic lane detection dataset using the CARLA simulator
- Achieved 80% zero-shot transfer detection accuracy on the TuSimple dataset by integrating GAN-based domain adaptation methods with SOTA lane detection models

PROJECTS

End-to-End Planning Using Deep Learning

Personal Project

- Trained a neural network using PyTorch to do end-to-end motion planning on the comma2k19 dataset
- Generated future path labels using a Kalman filter and addressed dataset imbalance with a custom path curvature metric
- Designed a neural network using RegNets and GRUs to predict the path given a video input, achieving a test MAE of 0.3 meters over 2 second trajectories

Comma Calibration Challenge

Personal Project

- Implemented a monocular visual odometry pipeline using OpenCV to estimate the relative pose between the mounted camera and the ego vehicle
- Improved pose estimation of the odometry pipeline by 35% by filtering out moving points with a DeepLabV3+ semantic segmentation model trained on the comma10k dataset using PyTorch

Computer Vision Team Lead

UW Robotics Team

- Led a team developing autonomous mobile robot perception software using C++ with ROS and OpenCV
- Wrote software to detect and classify traffic signs, lane lines, and stop lines utilizing classical computer vision methods such as Haar cascade classification, Canny edge detection, and the Hough transform

SKILLS

Languages: Python, C++, C#, MATLAB, C, CUDA, JavaScript

Frameworks: PyTorch, Scikit-Learn, OpenCV, TensorFlow, NumPy, Pandas, ROS, VTK, Three.js

Tools: Git, Unity, CARLA, Docker, Kubeflow, DVC, MLflow, Bash, Linux

EDUCATION

University of Waterloo

Waterloo, ON

MASc in Electrical and Computer Engineering; GPA: 3.9/4.0

Sep. 2022 – Aug. 2024

BASc in Mechatronics Engineering; GPA: 3.9/4.0

Sep. 2016 – Apr. 2022

External Coursework: Deep Learning Specialization (Coursera), Introduction to Self-Driving Cars (Coursera), Artificial Intelligence for Robotics (Udacity)