Charles Zhang

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University of Waterloo | 3B (Class of 2023)
B. Computer Science, AI Specialization | 4.0/4.0 GPA

Summary of Qualifications

- Experience with real time systems, computer vision, and autonomous vehicle path planning and controls
- Strong knowledge of low latency networking systems through internships at Apple and Cisco
- Leading a team of 80 students building a level 4 self-driving car for the SAE Autodrive Challenge
- **Programming:** C++, C, Python, Bash, Swift, SQL, HTML, CSS
- **Technical**: Unix, ROS, PyTorch, Git, MacOS, Docker, Kubernetes, MATLAB, Simulink, CARLA, GitLab CI

Work Experience

Apple Inc. | *Software Engineer* | *Cupertino, California (Remote)*   *May 2021 – August 2021*
- Returning intern to the WiFi Peer to Peer team.

Apple Inc. | *Software Engineer* | *Cupertino, California (Remote)*   *June 2020 – August 2020*
- Built upon a Swift application that parses gigabytes of Apple device logs into meaningful Wi-Fi visualizations.
- Developed automatic packet bug triaging between low latency Wi-Fi devices
- Implemented concurrent processing of multiple log archives using Swift condition variables and semaphores

uWaterloo WISE Lab | *Autonomous Vehicle Research Assistant* | *Remote*   *May 2020 – June 2020*
- Trained and built a real-time LIDAR object detection network in ROS (Python, PyTorch) using the PointPillars convolutional framework, achieving 0.75 mean Average Precision (mAP) for Cars on the NuScenes dataset
- Created a real time multi-object tracker utilizing a linear Kalman Filter, Hungarian algorithm, and Mahalanobis distance metric, improving tracking framerate from 15hz to >100hz

Cisco Systems | *Software Engineer in Test* | *Ottawa, Ontario*   *May 2019 – August 2019*
- Built unit tests for Cisco ASR9000 routers, used for routing major internet traffic by Verizon, Google
- Improved Jenkins test infrastructure stability, reducing test case instability from 15% to < 1%
- Experience with embedded C, TCP-IP stack, Cisco CEF, networking protocols (BGP, GRE, MPLS, SRv6)

Ciena Networks | *Software Automation* | *Ottawa, Ontario*   *July 2018 – August 2018*
- Automated migration of Ciena's requirement database from IBM DOORS to Jama with Python, DXL
- Updated Ciena's Budgeting Website's frontend using Angular 6, Angular Material, and TypeScript

Waterloo Design Teams

WATonomous | *Team Captain* | *Waterloo, Ontario*   *January 2019 – Present*
- Team Captain leading an 80-student team converting a Chevrolet Bolt into a level 4 autonomous vehicle for the GM SAE Autodrive Competition
- Built an Object Tracker capable of Sensor Fusion with dynamic obstacles from LIDAR, Camera, and RADAR.
- Implemented a lattice-based optimal trajectory generator in the Frenet space using ROS C++ and Python
- Developed a Dockerized development and production environment using Docker-Compose, Gitlab CI.
- Building a software-in-the-loop vehicle simulation system using ROS, CARLA, MATLAB, and Simulink

Projects

Self-supervised Monocular Depth Estimation   *December 2020*
- Trained and built a self-supervised monocular depth estimation neural network based on the CVPR 2017 paper by Godard et al: "Unsupervised Monocular Depth Estimation with Left-Right Consistency". arXiv:1609.03677
- Implemented with PyTorch and trained on the KITTI dataset

Article Generator iOS App   *July 2018 – January 2019*
- Created an iOS app in Swift that generates style-mimicking text using a Recurrent Neural Network
- Used Python, Keras, Tensorflow to train the model, CoreML to integrate the model into the app
- Trained the model on Amazon Web Services using Docker

Tetris Neural Network   *March 2018*
- In a week, developed a Neural Network from scratch that plays Tetris using a Genetic Algorithm
- Built a Tetris game simulator in Python with a standardized API to allow programmatic interaction

EzJigsaw IOS App   *August 2017 – October 2017*
- Built a Swift iOS app that allows users to build customized Jigsaw games from their own images
  - Downloaded over 300 times in 6 different countries within the first month

Education

University of Waterloo | *Waterloo, Ontario*   *Expected April 2023*
- Bachelor of Computer Science, Artificial Intelligence Specialization. Completing 3B term.
- 92.5% Cumulative GPA, Dean's Honours List, President's Scholarship of Distinction
- **Relevant Courses:** CS480 Machine Learning, CS458 Security & Privacy, ECE 493 T21 Autonomous Vehicles, CS484 Computer Vision, CO487 Cryptography, CS343 Concurrent and Parallel Programming, CS350 Operating Systems, CS341 Algorithms, CS348 Databases, STAT240 Advanced Probability and Markov Models