

## TL;DR

- Hands-on experience with autonomous vehicle compilers/runtimes at Tesla, WATonomous, and MIT-PITT-RW.
- Master's research in Control, Robotics & Autonomous Systems: sensor malfunction detection and mitigation for safety-critical systems.
- Built a bare-metal server cluster at WATcloud for student AI/ML research; architecture adopted by major labs on campus.
- Previously completed a Bachelor of Computer Science (AI Option) at the University of Waterloo.
- Proficient in Python, TypeScript, C/C++, Docker, Nix, Terraform, Ansible, Kubernetes, and Linux system administration.
- Active open-source contributor; upstreamed changes and maintained forks of Terraform, Ansible, Ceph, Microk8s, and LeRobot.

## Work Highlights

### Founder and Advisor @ WATcloud

Jan 2020 - present

*Making compute accessible for students and researchers.*

Waterloo, Ontario, Canada

- Built a bare-metal compute cluster from consumer PCs, addressing reliability challenges through robust observability and cluster design.
- Led multiple funding rounds to scale the cluster 10x in CPU/RAM and 20x in GPU FLOPS.
- Managed end-to-end operations: hardware assembly, networking, user management, observability tooling, and CI/CD.
- Deployed and maintained Proxmox+Ceph, Kubernetes, zero-trust authentication, centralized logging, and high-availability.
- Backported kernel modules, compiled LVM for advanced caching, and contributed to/forked Terraform, Ansible, and Microk8s.
- Supported 700+ students and researchers in multiple competitions; collaborated with universities in Canada, the US, and Italy.
- Now serving dozens of teams, research labs, and courses, with 200+ active users per term; architecture adopted by major labs on campus.

### Autopilot Engineer (Intern) @ Tesla Inc.

May 2022 - Aug 2022

*"Ben performed at a level commensurate with our best engineers." — Mentor*

Palo Alto, California

- Designed a DAG scheduling algorithm delivering solutions within 3% of optimal, running 120x faster than the prior SAT-based approach and reducing neural network (NN) deployment time from hours to 15 minutes.
- Sped up the trace extraction pipeline by 8x by optimizing data structure queries.
- Accelerated next-gen hardware bring-up by tightening the NN deployment cycle.

### Team Captain @ Waterloo Autonomous Racing, Controls Lead @ MIT-PITT-RW

Jul 2020 - Dec 2021

*Autonomous vehicles for racing, with a focus on planning and control.*

Waterloo, Ontario, Canada

- Integrated and improved upon a Nonlinear Model Predictive Path Following Controller.
- Built simulator interface, racing line optimizer, containerized dev environment, data pipeline, visualization tools, and team website.
- Led development in a 2021 simulation competition; team placed 4th of 33 schools.

### Software Engineer (Intern) @ Apple Inc.

May 2019 - Aug 2019

*"He is a self-motivated, focused engineer who strives to look at problems in depth..." — Manager*

Cupertino, California

- Improved Apple's HLS player, reducing HD/UHD startup time by 30% through bandwidth prediction and recording optimizations.
- Created a Media Source Extensions conformance suite to streamline the certification process for external hardware.

### Software Engineer (Intern) @ Hive.AI

Jan 2019 - Apr 2019

*"Ben is the best intern we've had on our team and one of the strongest engineers at the company." — Manager*

San Francisco, California

- Rewrote a data export pipeline, boosting large export speed 50x via resource, caching, and concurrency optimizations.
- Developed a polygon consensus algorithm using vertex-voting and multi-density clustering techniques.
- Implemented a Node.JS Streams library with batching, bucketing and concurrency control capabilities.

### Also previously worked at Yahoo, Kik, and 500px

May 2016 - Apr 2018

## Publications

- C.T. Zhang, D. Rayside, C. Nielsen. *Sensor Protection and Fault Detection: Application to Autonomous Vehicles*. IEEE CCTA, 2025.
- *Optimal Sensor Protection and Measurement Corruption Detection in Safety-Critical Systems*. Master's Thesis, UWaterloo, 2025.
- A. Saba, ... , C.T. Zhang, et al. *Fast and Modular Autonomy Software for Autonomous Racing Vehicles*. Field Robotics, 2024.
- P.J. Genovese, F. Xu, M. Singh, L.W. Chan, C.T. Zhang. *Adjusting recipients of a message*. US Patent 10,686,742, 2020.