Charles Liu

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Summary of Qualifications

Programming Languages: C++, C#, Python, JavaScript, C, SQL, Go, HTML5, CSS.

Frameworks and Libraries: ReactJS, NodeJS, ExpressJS, .NET, Bootstrap, PyTorch, YOLO, OpenCV, scikit-learn.

Tools and others:: Kubernetes, MongoDB, Docker, Bash, Git, Github, Visual Studio, Vim, Agile, STMCubeMx.

Education

University of Toronto, St. George Campus Expected May 2026

Bachelor of Applied Science in Computer Engineering, Minor In Artificial Intelligence Engineering *Toronto, ON*

Professional Experience

Software Engineer Co-op, Embedded May 2024 – Present

ecobee Inc. *Toronto, ON*

- **Won company-wide hackathon** by designing a portable air quality sensor and engineering its **REST API** endpoints for cloud-based services and mobile app integration.
- Eliminated **100%** of human errors by developing a **ASP.NET**-based microservice client in **C#** that automates serial number replenishment. Leveraged **Test Driven Development** by writing unit tests with **XUnit**.
- Improved automated hardware testing precision by **56%** via revamping test infrastructure software with **.NET** framework and **OOP** best practices in **C++/CLI**. Used to produce **3 million+** smart thermostats
- Streamlined software release process by engineering a **Gitlab CI/CD** pipline using **YAML** and **Powershell** scrips to automate artifacts generation, upload software bundle, and generating release notication emails to clients .
- Implemented firmware testing endpoints with **C++** and **BASH** scripting on **Yocto Embedded Linux**.
- Refactored dashboard web app backend persistence layer in **Python** to improve **MongoDB** query results.
- Streamlined software release process by automating artifacts generation, software bundle upload, and email generation using **Gitlab CI/CD** pipline, **YAML**, and **Powershell** scrips.

Hardware/Firmware Engineer Intern May 2023 – September 2023

Epic Safety Inc. *Vancouver, BC*

- Architected production-grade **Windows** software with **C#** and **.NET Core** to conduct tests and store results.
- Wrote **Embedded Firmware** in **C** on a **STM32 ARM Cortex-M0** using Keil MDK and STM32CubeMx.

Web Developer, Freelance May 2021 – August 2021

Karasik Auctions *Vancouver, BC*

- Developed a collectibles-labeling web application using **ReactJS/NodeJS** that catapulted the company's efficiency by **200 %** by semi-automating the arduous process of hand-editing new grading labels.

Other Technical Experience

Cloud Software Open Source Contributor September 2024 - Present

CNCF Kubernetes Knative Project *Toronto, ON*

- Enabled synchronous requests on Kubernetes Knative Eventing's asynchronous event-driven architecture by making the custom init container triggers for the RequestReply resource in **Go**.

Autonomous Vehicle System Software Engineer October 2024 - Present

aUToronto- University of Toronto's first-prize-winning autonomous vehicle design team *Toronto, ON*

- Automated self-driving vehicle system fault recovery by implementing a diagnostics **Robot Operating System** node for a system watchdog in **C++** and converting cepton lidar driver nodes to use ROS 2's managed lifecycle.

Projects

Seatbelt Detection Using Deep Learning Aug. 2023 – Present

- **Preprocessed data** by merging, cleaning and converting COCO datasets from RoboFlow and Imagenet
- **Built computer vision model** by leveraging the **YOLO** object detection model for **transfer learning** and combining it with a fully-connected **ANN** classifier using **PyTorch**
- **Trained model** using **adversarial training** for improved performance, **CUDA** for expedited training time.
- **Evaluated model** by building a baseline **CNN** that achieved a **90.5 %** accuracy on validation dataset.