CHARLES LIU

(+1) 604-352-9514 | charlesc.liu@mail.utoronto.ca | linkedin.com/in/charles-ch-liu/ | GH: chaliuu | Website: chaliuu.github.io

SKILLS

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:	Git, Github, Visual Studio, Vim, MongoDB, Docker, Bash, Kubernetes, STMCubeMx.

PROFESSIONAL EXPERIENCE

Embedded Software Engineer Co-op   May 2024 – Present
ecobee Inc.   *Toronto, ON*

- **C++ and C# OOP:** Improved automated testing precision by **56%** via revamping test infrastructure software with **.NET** framework and **OOP** best practices in **C++/CLI** and **C#**.
- **Backend:** Refactored the persistence layer of a real-time data analysis dashboard web app in **Python** to improve **MongoDB** query speed by **64%** by leveraging indexing.
- **REST API Client:** Eliminated **100%** of human errors by developing a **REST API** client for a microservice that automates the replenishment of product serial numbers. The microservice is deployed with **Docker**.
- **Embedded Linux:** Expanded sensor compatibility by engineering drivers and testing endpoints with **C++** and **BASH** scripting on a **Yocto Linux** distribution. Modified **CMakefile** and **.bashrc** to build and validate customized firmware.
- **Production Software Release:** Built production software by leveraging **Jenkins CI/CD** pipelines. Released to factory floor to be used to mass produce over **3 million** flagship product units.
- **Agile methodology:** Utilized **Jira** scrum boards to participate in sprint planning and progress tracking. Leveraged **Git** to practice **Version Control**. Create MRs/PRs and participated in code reviews with **Github/Gitlab**

Hardware/Firmware Engineer Intern   May 2023 – September 2023
Epic Safety Inc.   *Vancouver, BC*

- **Overview:** Expedited product QA by developing an automated test jig for **50k+** devices in an assembly line.
- **PC Software and Database:** Architected it with **C#** and **.NET Core** to conduct tests and store results on **AcessDB**.
- **Embedded Firmware:** Wrote firmware in **C** on an **STM32 ARM Cortex-M0** using Keil MDK and STM32CubeMx.

Web Developer, Freelance   May 2021 – August 2021
Karasik Auctions   *Vancouver, BC*

- **Full-Stack Development:** 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.
- **Automated Data Processing:** Automated data conversion with an **Excel** parser using **Python's pandas**.

PROJECTS

Seatbelt Detection Using Deep Learning - *4 contributors total*   [GitHub Link](#) August 2023
OVERVIEW: Ensured vehicle occupant safety by detecting properly worn seatbelts on passengers using *Deep Learning*.

- **Data Pre-processing:** Merged and cleaned datasets from RoboFlow and Imagenet and imported with COCO format.
- **Model Building and Computer Vision**: Leveraged the **YOLO** object detection model for **transfer learning** and combined with a fully-connected **ANN** classifier using **PyTorch**.
- **Model Training**: Used **adversarial training** for improved performance, **CUDA** for expedited training time.
- **Model Evaluation**: Self-built a **CNN** for baseline comparison and achieved **90.5 %** accuracy on validation dataset.

UNO Game - *2 contributors total*   [GitHub Link](#) April 2023
OVERVIEW: Recreated an UNO computer game with a built in bot player for a **ARM-Cortex-A9 Soc**.

- **Algorithms in C**: Constructed **finite state machines** and game strategy algorithms to manage states and build bot.
- **Peripherals Management**: Utilized DE1-SOC peripherals by implementing hardware specific drivers in **C**.

EDUCATION

Bachelor of Applied Science and Engineering, Computer Engineering,
Minor In Artificial Intelligence Engineering
University of Toronto, St. George Campus   Expected May 2026