

CHARLES LIU

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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 ecobee - <i>North America's second largest smart home automation and security company</i>	May 2024 – Present Toronto, ON
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- **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 dashboard web app persistence layer in **Python** to improve **MongoDB** query speed by **64%**.
- **REST API Client:** Eliminated **100%** of human errors by developing a **REST API** client to an automated serialization server deployed with **Docker** for the automation of serial number replenishing of a sensor test software.
- **Embedded Linux:** Expanded sensor compatibility by engineering drivers and testing APIs with **C++** and **BASH** shell scripting on a **Yocto Linux** distribution. Modified **Makefile** 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 Epic Safety Inc. - <i>Personal Emergency Response Systems and Security IoTs startup</i>	May 2023 – September 2023 Vancouver, BC
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- **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 Karasik Auctions - <i>Auction House Specializing in Numismatics</i>	May 2021 – August 2021 Vancouver, BC
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- **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 - <i>4 contributors total</i> <i>OVERVIEW:</i> Ensured vehicle occupant safety by detecting properly worn seatbelts on passengers using <i>Deep Learning</i> .	GitHub Link August 2023
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- **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 - <i>2 contributors total</i> <i>OVERVIEW:</i> Recreated an UNO computer game with a built in bot player for a ARM-Cortex-A9 Soc .	GitHub Link April 2023
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- **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, <i>Minor In Artificial Intelligence Engineering</i> University of Toronto, St. George Campus	Expected May 2026
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