CHARLES LIU

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EDUCATION

Bachelor of Applied Science and Engineering, Computer Engineering,
Minor In Artificial Intelligence Engineering
University of Toronto, St. George Campus Expected 2025 + PEY

PROFESSIONAL EXPERIENCE

Hardware/Firmware Engineer Intern May 2023 – September 2023
Epic Safety Inc. - *Personal Emergency Response Systems and Security IoTs startup* *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:** Implemented in **C** on an **STM32 ARM Cortex-M0** using Keil MDK and STM32CubeMx.

Web Developer, Freelance May 2021 – August 2021
Karasik Auctions - *Auction House Specializing in Numismatics* *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**.
- **Website Development:** Overhauled company website using **HTML5**, **CSS**, **JavaScript** and the Wix **REST-API**.

EXTRACURRICULAR EXPERIENCE

Software Developer October 2019 - April 2022
UTRA RoboSoccer Team - *designs and builds autonomous humanoid soccer-playing robots* *Toronto, ON*

- **Development Optimization:** Expedited dev cycle by **50**% by improving the simulation environment using **Python**.
- **Robot Software Development:** Deployed robot path-finding algorithms using **Python** and **ROS** on **Linux** with **BASH**.
- **Computer Vision**: Aided in the development of the robot's localization algorithm using **Python's OpenCV**.

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**.

Amazing Race Maps Application - *3 contributors total* GitHub Link April 2022

- **C++ Object Oriented Programming:** Used inheritance when defining objects and cut codebase size by roughly **10%**.
- **Graph Algorithms:** Employed **Dijkstra** and **Greedy** in **C++** to optimize path-finding and multi-stop route planning.
- **Version Control:** Incorporated **Git** to streamline team coding, practice **Agile** development, and resolve merge errors.
- **Software QA:** Automated testing of **3000+ lines of code** with testing framework **UnitTest++** and debugged problems.

SKILLS

Programming Languages:	Python, C++, C, C#, JavaScript, SQL, ARM Assembly, HTML5, CSS, Java.
Framework and Libraries:	Pandas, NumPy, Pytorch, OpenCV, scikit-learn, PyVISA, ReactJS, NodeJS.
Tools:	Altium, Multisim, Keil MDK, STMCubeMx, Git, Visual Studio, Wix, Excel, AccessDB.