Tyler Kowalski

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Technical Skills

Programming Languages: C, C++, GLSL, Python, Bash, Agda, Racket, ARMv8, x86, MIPS, LaTeX
Technologies/Frameworks: CUDA, Vulkan, Pytorch, TensorFlow, NumPy, Pandas
Developer Tools: Linux, VS Code, Visual Studio, Git, Juypter Notebook, Google Collab, Vim, JIRA
Linguistic Languages: English, Mandarin, Japanese

Education

University of Waterloo **Sep. 2021 - Apr. 2026**
Bachelor of Mathematics in Computer Science *Waterloo, Canada*

Work Experience

University of Waterloo, Faculty of Mathematics **Sept. 2023 - Dec. 2023**
*CS 246 Teaching Assistant (OOP in **C++**)*

- Migrated CS 246 **Linux** testing environment from **C++14** to **C++20** and created **Python** scripts to fix code from common **C++20** compiler errors
- Automated testing of assignments via **Bash** scripting, eliminating the need for handmarking
- Individually coordinated demoing and marking of the final project (> 500 students)
- Supported students by teaching weekly tutorials on **object-oriented programming** and **C++**

Core Avionics **Jan. 2023 - Apr. 2023**
Embedded ML Inference Engineer

- Augmented ComputeCore™, a safety-critical neural network inference engine for embedded GPUs, to support parallel inference branches in **Vulkan C** using **synchronization** primitives between CPU threads and GPU to minimize idle
- Conducted in-depth analysis of **OpenVX** and **MIGraphX** to gain insights and inspiration for efficient implementations of neural network graph inference
- Refactored **NNEF AI compiler** to support multiple dependencies per node in inference graph
- Utilized A/B testing with **Python** scripting to design optimized **GLSL** shaders for **AMD E9171** embedded GPU: *Local Response Normalization, Concat, addN,* and *maxPool2d*
- Added support for *AlexNet, DenseNet, ResNet, InceptionNet* and *Graph Neural Networks* to GPU-accelerated inference engine and debugged using **Pytorch**

Core Avionics **May. 2022 - Aug. 2022**
Embedded ML Inference Engineer

- Implemented **Pytorch ONNX** *MobileNetV2SSDLite* model in **Vulkan C**, resulting in contract from Airbus
- Wrote optimized **GLSL** shaders for deep learning inference on **AMD E9171** embedded GPU: *softmax, leakyReLu, convTranspose2d, padding,* and various **BLAS** functions
- Created a GPU-profiling tool with **Vulkan C** to benchmark efficiency of shaders
- **Researched** performance optimizations of CNNs on GPUs, leading to a memory reduction of 75%

Projects

TylerFish **Dec. 2023 - Present**
Neural Network Chess Engine

- Creating a chess engine that utilizes Monte Carlo Tree Search with a CNN for policy and board evaluation in **C++**, to be accelerated with **CUDA**
- Currently implementing multi-threaded bitboard move generation in **C++**

Pokemon ML **Sept. 2021**
Deep Learning from Scratch

- Implemented DNN inference and training using only **Pandas**, **Python** and **NumPy**
- Utilized **L2 Regularization** to prevent overfitting

Professional Development (Online Courses)

DeepLearning.AI **Sep. 2021**
Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

Volunteering

Mentoring the Stars **Jan. 2023 - Present**
Providing no-cost tutoring in mathematics for secondary students on Zoom