JEFF NIU

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work experience

ETH ZURICH — *Summer 2020*
Research Intern, Scalable Parallel Computing Lab
- Created DECL, a system for automatically deriving modular, multi-level compilers from a declarative specification language
- Developed an ahead-of-time compiler for Lua 5.3 with DECL that produces code up to 5x faster than LuaJIT
- Reimplemented the Open Earth Compiler as a Python-embeddable DSL

GOOGLE — *Fall 2019*
Intern, Software Engineering
- Developed an improved system to match and rewrite code graphs in MLIR based on merging pattern sets into finite-state machines executed in an interpreter
- Improved pattern matching runtime complexity to be independent of pattern set size
- Presented work to MLIR community during an open design meeting

APPLE — *Winter 2019*
Intern, Silicon Validation Software (GPU)
- Developed shader algorithms to stress GPU memory buses, thrash multilevel caches and validate coherency, drive GPU+SoC power and bandwidth, and stress SoC-level caches
- Developed efficient algorithms to defeat hardware optimizations and enhance coverage
- Implemented a parallelizable PRNG (Philox) and developed an O(1) time+memory non-repeating PRNG based on quadratic residues in GPU assembly

COREAVI — *Summer 2018*
Intern, Embedded Graphics Developer
- Implemented EGL Compositor Extension in ArgusSC OpenGL driver
- Added VxWorks 6.x/7 real-time process and multi-thread support to Argus
- Ported Argus OpenCL driver to 64-bit Yocto embedded Linux

YAHOO! — *Fall 2017*
Intern, Software Engineer (Data)
- Contributed data visualizations and SQL/Druid query optimizations to Apache Superset
- Built a production tool for real-time anomaly detection on Druid streams
- Created ember-localforage, an EmberJS Data adapter that persists to browser cache

teams

TEAM WATERLOOP – CANADA'S HYPERLOOP TEAM — *Sep 2016 to Dec 2018*
Lead, Software
- Created WLib, a collection of C++ libraries optimized for embedded systems
- Designed a fail-safe, redundant vehicle control infrastructure on a CAN network
- Developed Wio, a build tool and package manager for cross-platform C/C++

UW **NANO ROBOTICS GROUP** — *Sep 2016 to Apr 2019*
Technical Lead, Controls
- Implemented a robot localization algorithm from a microscope feed using OpenCV
- Developed an AI for the robot to autonomously push an object through a maze
- Main developer of Minotaur, UWNRG's controls software built in Qt

projects

CERPENT: A basic C interpreter implemented with Clang, using LLVM to JIT function bodies

FRAKTAL: A GPU-accelerated Mandelbrot/Julia set visualizer, implemented with CUDA

UPTIMIZE: A cross-platform cloud-based distributed workload manager (e.g. compiling code)

education

UNIVERSITY OF WATERLOO
B.A.Sc. in Mechatronics Engineering (*Expected Spring 2021)*
GPA 4.0 (Rank 1, 96%)

languages

C++, C, JAVA, PYTHON, GO