JEFF NIU

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work experience

GOOGLE
Intern, Software Engineering
- Developed an improved system to match and rewrite code graphs in MLIR based on merging a pattern set into a finite-state machine 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 **Philox 2x3210** PRNG 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
- Developed a generic VxWorks **kernel-mode driver** and added RS-343A support
- 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
- Developed a Bullet sprout to query in real-time the Twitter Firehose

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**, including an STL, JSON library, and a **constant-time memory allocator**
- Designed a **fail-safe** software infrastructure based on CAN and distributed hubs
- 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
- Used **OpenCV** to develop an occupancy grid localization algorithm that tracks the microbot, nearby objects, and walls in C++
- Applied a modified A* procedure and 2D game physics to create a microbot AI that can autonomously push an object through a maze
- Main developer of Minotaur, UWNRG's controls software built in **Qt**

projects

CERPENT
A Basic C-language interpreter
- Leverages **clang**'s libraries to generate line-by-line ASTs parsed by Cerpent
- Uses LLVM **just-in-time compilation** for run-time functions definitions

FRAKTALS
- Mandelbrot, Julia, and *n*-brot fractal explorer up to 2e+20 magnification
- Hardware accelerated rendering with **Nvidia CUDA** up to 4K resolution
- Also does *n*-body gravity simulations

education

UNIVERSITY OF WATERLOO
B.A.Sc. in Mechatronics Engineering (*Expected Spring 2021)*
GPA 4.0 (Rank 1, 97%)

languages

C++, C, JAVA, PYTHON, GO, MATLAB

tools

GIT, UNIX, VIM, GDB, LLVM