Ryan Senanayake

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Education

Massachusetts Institute of Technology (MIT) **Cambridge, MA**

Master of Engineering in Computer Science GPA: 5.0/5.0 Sep 2018 - Dec 2019

Bachelor of Science in Computer Science GPA: 5.0/5.0 Sep 2015 - Jun 2019

- 1st Place M.E. Thesis: "A Unified Iteration Space Transformation Framework for Sparse and Dense Tensor Algebra"
- Selected graduate-level courses: Distributed Systems, Multicore Programming, Performance Engineering, Operating Systems, Computer System Security, Formal Verification, and Computer Architecture

Skills

C, C++, CUDA, Java, Python, Go, OpenMP, MPI, Legion, Glow, TVM, Halide, TACO, AWS, bash

Experience

Reservoir Labs, Inc. **New York, NY**

Senior Engineer, Compilers Dec 2020 – Present

Engineer, Compilers Apr 2020 – Nov 2020

- Wrote and designed central "automatic tensorization" section of an accepted DOE SBIR Phase IIB proposal for $1.1M
- Optimized and onboarded the BERT neural network until it was power-limited on a wide-vector VLIW accelerator
- Developed the OpenMP GPU Offload Backend for the R-Stream polyhedral compiler (submitting to WACCPD@SC21)
- Created an end-to-end system design proposal for DNN inference on a new accelerator, which the client selected
- Accepted into the highly-competitive two-week Argonne National Labs Training Program for Extreme-Scale Computing
- Built a new polyhedral pass to automatically parallelize reductions with atomic operations or thread-local arrays
- Mentored 2 summer interns on the Legion task-based runtime and the TVM compiler

MIT Compiler Group (Prof. Saman Amarasinghe) *Research Assistant* **Cambridge, MA** Dec 2017 – Feb 2020

- Extended the Sparse Tensor Algebra Compiler (TACO) with a scheduling language, CUDA backend, and dynamic typing

Citadel Securities *Software Engineering Intern* **New York, NY** Jun 2019 – Aug 2019

- Developed a tool to fingerprint for a user-specified WebSocket protocol given an incomplete TCP packet capture

NVIDIA Corporation *AI Developer Technology Intern* **Santa Clara, CA** May 2018 – Aug 2018

- Achieved 3x the throughput of the cuDNN LSTM implementation for batch size 1 inference
- Utilized advanced features of CUDA including: cooperative groups, tensor cores, and warp-level primitives
- Selected to give two hour-long presentations to a total of 50+ engineers and at a company-wide poster session

Singular Computing LLC *Software Engineer* **Cambridge, MA** Jun 2016 – Dec 2017

- Built several projects in C and Assembly to run on a 32,000 core approximate-arithmetic SIMD mesh
- Developed a neural network inference and training demo with real-time ImageNet classification in .04W/fps
- Created a real-time optical flow computer vision demo that ran at 50 FPS, using only 0.25W

Meta Company *Augmented Reality Prototype Engineer Intern* **Redwood Shores, CA** Jan 2016

Prose LLC *Android Developer* **Seattle, WA** Jun 2015 – Jan 2016

RSenApps Inc. *CEO, Founder* **Seattle, WA** Jan 2012 – Aug 2015

- Generated $60k+ in revenue from app sales, advertising, and in-app purchases from 12 published Android apps
- Open Mic+ was downloaded 4 million times and Commandr was downloaded 1.5 million times

Publications

35th ACM Intl. Conf. on Object-Oriented Programming Systems, Lanugages, and Applications (OOPSLA) 2020

"A Sparse Iteration Space Transformation Framework for Sparse Tensor Algebra" (30 pages) doi.org/10.1145/3428226

Ryan Senanayake, Changwan Hong, Ziheng Wang, Amalee Wilson, Stephen Chou, Shoaib Kamil, Saman Amarasinghe, Fredrik Kjolstad

Awards

1st Place MIT Charles and Jennifer Johnson Thesis Award ($1k) **Cambridge, MA** Jul 2020

Selected by faculty out of all 2020 Computer Science Master theses

Binance Decentralized Exchange Competition $60k prize **Global** Apr 2018 – Jun 2018

Project: Novel multi-chain consensus implementation to allow trading cryptocurrencies

Facebook Global Hackathon Finalist **Menlo Park, CA** Nov 2015

Project: Facial recognition and Eulerian Video Magnification for heart rate detection in AR

Projects

Shotoclock.io: COVID-19 Vaccine Appointment Availability Notifier (JS) Jan 2021 – May 2021

SMS/email/twitter notifications based on zipcode/radius for appointments scraped from multiple sources

FashionModel: Intelligent Clothing Search with Computer Vision (Python, Keras) Oct 2017 – Aug 2018

LSTM-based captioning model and convolutional feature-recognition models to allow for intelligent search

KeyChain: Distributed Authentication on the Ethereum Blockchain (Java, Solidity, JS) Mar 2018 – May 2018

Ethereum contract, Android app, and sample web app that demos trustless auth and recovery with a "web of trust"

Raft Distributed Consensus Algorithm (Go) Mar 2018 – May 2018

A complete implementation based on the Stanford paper which produces results equivalent to Paxos

Lock-free Single-writer Multiple-reader Ranged SkipList Data Structure (Java) Mar 2017 – May 2017

New lock-free data structure that was used to filter "packets" by accept/reject regions and scaled to 64 CPUs