Abenezer Wudenhe

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RESEARCH INTEREST

- Accelerator hardware including GPGPU, TPU, FPGA, and embedded devices
- Application specific domains including machine learning, data mining, and bioinformatics
- Memory architecture for accelerating data dependent application and near/in data processing

EDUCATION

University of California, Riverside (UCR) — PhD (Computer Science)
- SMART Fellow — Expected: May 2024
- Chancellor's Distinguished Fellow
- GAANN Fellow

University of Maryland, Baltimore County (UMBC) — BS (Computer Engineering)
- Meyerhoff Scholar — May 2018 (Cum Laude)
- NSA Scholar

PROFESSIONAL EXPERIENCE

Extreme Storage and Computer Architecture Lab (ESCAL) — 2018 Aug – Present
Graduate research assistant to Dr. Hung-Wei Tseng.
Optimizing memory hierarchy for mixed precision computing
- Developed an GPGPU-sim extension to enable more accurate simulation of NVIDIA's half-precision computation and evaluation of the overhead.
- Developed a set of Rodinia benchmarks to utilize the half-precision support
- Accelerate the performance of GPU kernels with reasonable accuracy using CUDA.

TPUPoint: Profiler and optimizer for TPU cloud
- Designed and developed an automatic profiling and optimization tool for Google's TPU-based ML Cloud Platform.
- Achieved up to 1.12x speedup for programmer's optimizations using TensorFlow.
- Ported a set of MLPerf applications to Google's TPU Cloud Platform.

ARMY CYBER DWD Internship — 2019 May – Aug 2019
Software Engineering Intern.
- Assessed new technologies for ARMY Big Data Platform.
- Evaluated the potential and cost of machine learning application.
- Explored Amazon Kinesis tool for data stream processing for reduction of database overhead.

University of Michigan Lab 4PROGRESS REU — 2017 May - Aug 2017
Undergraduate research assistant to Dr. Chad Jenkins
- Applied cluster computing methods to robotic visualization techniques and object recognition.
- Utilized computer networking and Message Passing Interface (OpenMPI) for applications.
- Developed GPU accelerated image rendering using Nvidia drivers and CUDA programing.

Electroencephalograph (EEG) Study on Image Formation — 2016 May - Aug 2016
Undergraduate research assistant to Dr. Fow-Sen Choa
- Examined a new approach to link single measurement with behaviors that can monitor brain functions reproducibly without repeating measurements.

- Organized data management from experiments.
- Programed MATLAB model for 3D graph plotting and analysis.

TECHNICAL SKILLS

- Experience programming in **C, C++, python**, **CUDA**, html, MPI, php, Arduino, OpenMP, Open MPI, TensorFlow, Skilearn, Javascript, NodeJS
- Experience writing technical documents using LaTex, BibTex, Word
- Experience with Xilinx Design Tool, MATLAB, Cadence's Allegro Design Entry CIS, Atmel Studio

PUBLICATION

A. Wudenhe, Hung-Wei Tseng. "TPUPoint: Automatically Characterizing Hardware Accelerated Data Center Machine Learning Program Behavior". In IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2021), 2021.

Q. Meng, D. Gupta, **A. Wudenhe**, X. Du, L. Hong, F. Choa. "Three-Dimensional EEG Signal Tracking for Reproducible Monitoring of Self-Contemplating Imagination". In Advances in Science, Technology and Engineering Systems Journal (ASTESJ), 2017.

CONFERENCE PRESENTATIONS

A. Wudenhe, Hung-Wei Tseng. "Characterizing Hardware Accelerated Data Center Machine Learning". Poster presentation delivered at the Career Workshop for Women and Minorities in Computer Architecture (CWWMCA20) in conjunction with IEEE/ACM International Simposium on Microarchitecture (MICRO-53), San Diego, CA, October 17, 2020.

A. Wudenhe, Jinyoung Choi, Yu-Ching Hu, Hung-Wei Tseng. "What Can Intelligent SSDs Do for machine Learning" Poster presentation delivered at the Non-Volatile Memory Workshop (NVMW19), San Diego, CA, March 10-12, 2019.

A. Wudenhe. "Three-dimensional EEG signal tracking for reproducible brain activity monitoring". Poster presentation delivered at the Institute of Electrical and Electronics Engineers (IEEE) Signal Processing in Medicine and Biology Symposium (SPMB16), Philadelphia, PA., December 3, 2016.

A. Wudenhe, F. Avila-Soto, A. Beri, E.Valenzuela. "Parallelization for Fast Image Reconstruction using the Stochastic Origin Ensemble Method for Proton Beam Therapy". Poster presentation delivered at the UMBC Summer Undergraduate Research Fest (SURF), Baltimore, MD, August 5, 2015.

PROFESSIONAL ACTIVITIES

IEEE President 2017 – 2018

- Conduct and coordinate meetings between Baltimore IEEE branch
- Supervise workshops and socials
- Facilitate outreach in STEM fields to minority schools in Baltimore
- Lead circuit design workshops

REFERENCES

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