

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) <ul style="list-style-type: none">• SMART Fellow• Chancellor's Distinguished Fellow• GAANN Fellow	PhD (Computer Science) Expected: May 2024
University of Maryland, Baltimore County (UMBC) <ul style="list-style-type: none">• Meyerhoff Scholar• NSA Scholar	BS (Computer Engineering) May 2018 (Cum Laude)

PROFESSIONAL EXPERIENCE

Google Software Engineering Intern <i>Software Engineering Intern under Dr. Jaswanth Sreeram</i> <ul style="list-style-type: none">• Participate in a 13-week internship program for the Google XLA TPU Backend Compiler team.• Developed Low Level Instruction analysis tool to identify performance gaps in compiler heuristics.• Participated in internal Core Machine Learning (ML) training program, "Core ML University".	Jun. 2023 – Sep 2023
Google Software Engineering Intern <i>Software Engineering Intern under Dr. Ayub Gubran</i> <ul style="list-style-type: none">• Participate in a 14-week internship program for the Google gChips Architecture Team.• Developed System Verilog based tools for architects to utilize in debugging/analysis of SoCs files.• Participated in Google Intern Mentorship Program during weeks 5 - 12.	Jun. 2022 – Sep 2022
Intel OneAPI Graduate Student Software Internship <i>Software Engineering Research Intern</i> <ul style="list-style-type: none">• Participate in a 3 month internship to extend existing research project to Intel OneAPI.• Extend existing compiler infrastructure to produce Data Parallel C++ device code to run on CPU, GPU, and FPGA.	Oct 2021 – Feb 2022
Google Computer Science Research Mentorship Program (CSRMP) <i>Research Mentee under Dr. Jan Wassenberg</i> <ul style="list-style-type: none">• Participate in a 12-week virtual workshop to navigate Computer Science Research.• Discuss and collaborate one on one with research faculty at google.• Discuss roadblocks and possible solutions to producing novel computing research.	Sep 2021 – Dec 2021
Facebook (Meta) 2021 Amplified Program <i>Above & Beyond Computer Science Program</i> <ul style="list-style-type: none">• Participate in a three-part virtual workshop over the course of six weeks.• Review technical concepts important to the interviewing process.	June 2021 - Aug 2021
ARMY CYBER DWD Internship <i>Software Engineering Intern.</i> <ul style="list-style-type: none">• 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.	May 2019 – Aug 2019
Extreme Storage and Computer Architecture Lab (ESCAL) <i>Graduate research assistant to Dr. Hung-Wei Tseng.</i> <u>Optimizing memory hierarchy for mixed precision computing</u> <ul style="list-style-type: none">• Developed an GPGPU-sim extension to enable more accurate simulation of NVIDIA's half-precision	Aug 2018 – Present

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.

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

May 2016 - 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**, Bazel, Makefile, CMake, html, MPI, php, Arduino, OpenMP, Open MPI, TensorFlow, Sklearn, 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, Hongbo Rong. "Embedding a DSL in SYCL for Productive and Performant Tensor Computing on Heterogeneous Devices". Poster presentation delivered at the 10th International Workshop on OpenCL (IWOCCL) and SYCL, Remotely, May 11, 2022.

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 Symposium 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.

REFERENCES

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