YIQIU SUN

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RESEARCH INTEREST

Processing-In-Memory, Programming Models for Novel Architectures, Hardware-Software Co-design

EDUCATION

University of Illinois Urbana-Champaign **Champaign, IL**
Ph.D in Computer Science *Expected May 2026*
· Advisor: Saugata Ghose

University of Michigan **Ann Arbor, MI**
B.S.E in Computer Engineering, Summa Cum Laude *Sep. 2019 - May 2021*
· Advisor: Mark Brehob

Shanghai Jiao Tong University, UM-SJTU Joint Institute **Shanghai, China**
Bachelor of Engineering in Electrical and Computer Engineering *Sep. 2017 - Aug. 2021*
· Advisor: Gang Zheng

PUBLICATIONS

T. J. Baker, **Y. Sun** and J. P. Hayes, "Benefits of Stochastic Computing in Hearing Aid Filterbank Design," 2021 IEEE Biomedical Circuits and Systems Conference (BioCAS), 2021, pp. 1-5, doi: 10.1109/BioCAS49922.2021.9645021.

RESEARCH EXPERIENCE

MARIMBA: MAp-Reduce In-Memory-Based Acceleration **Urbana, IL**
Advisor: Prof. Saugata Ghose *Jan. 2022 - present*
· Design a detailed simulator for RACER, a cost-effective Processing-Using-Memory architecture
· Explore the implementation of MapReduce framework on RACER
· Identify new design points for Processing-In-Memory architectures by anaylzing the benefits and trade-offs of MapReduce with in-memory-based acceleration

Stochastic Circuits Implementation of Filter Banks Used in Hearing Aids **Ann Arbor, MI**
Advisor: Prof. John P. Hayes *May 2020 - Aug. 2021*
· Implemented a stochastic circuit version of filter bank used in hearing aids and used Synopsys to synthesis the circuits
· Minimized matching error while maintaining the advantage of stochastic circuits in area

Application of Deep Learning Algorithms on Transmuter **Ann Arbor, MI**
Advisor: Prof. Trevor Mudge *Jan. 2020 - Aug. 2020*
· Simulated RNN for the Transmuter architecture on gem5
· Optimized computer performance (GFLOPs) by 20% and total runtime (ms) by 50% through parallelism

PROJECT EXPERIENCE

Codelet-based Compiler Optimization Space Exploration **Urbana, IL**
With Intel Corporation, Advisor: Prof. David Kuck *Nov. 2021 - present*
· Generalize hardware saturation rules based on different types of codelets to enlarge optimization search space of compiler
· Help develop a tool to automate codelet generation to experimental data analysis

Analyzing the Impact of Processing-in-Memory Devices on Scene Reconstruction **Urbana, IL**

Advisor: Prof. Saugata Ghose *Feb. 2022 - April 2022*
· Evaluated two different depth fusion algorithms executing on a conventional CPU + memory system and a Hybrid Memory Cube with standard CPU cores
· Designed a custom hardware accelerator for depth fusion that can be built into the logic layer of a 3D-stacked memory

Algorithms and Optimizations for Lowering Python Package APIs to AI Engine Array **Urbana, IL**
Advisor: Prof. Vikram Adve *Feb. 2022 - April 2022*
· Scheduled high-level NumPy logic onto AI engines Established specialized performance modeling for AI engines
· Designed a more exhaustive FFT design space than polyhedral model

YePai: Accelerating PageRank using FPGA **Urbana, IL**
Advisor: Prof. Deming Chen *Oct. 2021 - Dec. 2021*
· Evaluated the effectiveness of decomposing graph algorithms to expose regular memory access pattern
· Implemented the designs using the Pynq environment with HLS on a Pynq-Z2 board
· Achieved a speedup of 73x over a purely software implementation in Python

RISC-V SoC Microarchitecture Design & Optimization **Shanghai, China**
SJTU Graduation Thesis, Advisor: Prof. Gang Zheng *May 2021 - Aug. 2021*
· Implemented a 4-way Out-of-Order superscalar RISC-V processor and verified the synthesis results on Vivado
· Added an approximate computing unit to the execution stage for domain-specific optimization

HONORS AND AWARDS

Dean's List (Winter 21, Fall 20, Fall 19) **Ann Arbor, MI**
University of Michigan College of Engineering
Honorable mention in American Mathematical Contest in Modeling (MCM) **Bedford, MA**
Consortium for Mathematics and Its Application *Feb. 2019*
2017-2018 Undergraduate Excellence Scholarship **Shanghai, China**
Shanghai Jiao Tong University *Nov. 2018*
John Wu & Jane Sun Excellence Scholarship **Shanghai, China**
Shanghai Jiao Tong University *Sep. 2017*

SKILLS & ABILITIES

- **Languages/Applications**: C, C++, System Verilog, Go, CUDA, Python, MATLAB, Ocaml, Hadoop
- **Board**: Arduino, FPGA (PYNQ), PSoC
- **Architectural Simulator**: (PIM+)Ramulator, Gem5, zsim, DRAMPower

TUTORING EXPERIENCE

Undergraduate Mentor, UIUC **Urbana, IL**
· Supervised student: Tianyun Zhang, CS+Economics'23 (MARIMBA) *Jan. 2022 - Present*
Transfer Student Leader, University of Michigan **Ann Arbor, MI**
· Organized events with new incoming transfer students *August 2020 - May 2021*
Teaching Assistant, UM-SJTU Joint Institute **Shanghai, China**
· Electromagnetics (VE 230) by Prof. Sung-Liang Chen *May 2020 - August 2020*
· Honor Mathematics (VV186) by Prof. Horst Hohberger *Sep. 2019 - Dec.2019*
Writing Consultant, UM-SJTU Joint Institute **Shanghai, China**
· Guided students in academic writing and speech *September 2018 - August 2019*