

# YIQUIU SUN

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## RESEARCH INTEREST

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

## EDUCATION

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**University of Illinois Urbana-Champaign**

*Ph.D in Computer Science*

· Advisor: Saugata Ghose

**Champaign, IL**

*Expected May 2026*

**University of Michigan**

*B.S.E in Computer Engineering, Summa Cum Laude*

· Advisor: Mark Brehob

**Ann Arbor, MI**

*Sep. 2019 - May 2021*

**Shanghai Jiao Tong University, UM-SJTU Joint Institute**

*Bachelor of Engineering in Electrical and Computer Engineering*

· Advisor: Weikang Qian

**Shanghai, China**

*Sep. 2017 - Aug. 2021*

## PUBLICATIONS

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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

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**Programming Models for Processing-In-Memory**

*Advisor: Prof. Saugata Ghose*

- Design a detailed simulator for RACER, a cost-effective Processing-Using-Memory architecture
- Explore the implementation of data-parallel programming models framework on RACER
- Identify new design points for Processing-In-Memory architectures by analyzing the benefits and trade-offs with different programming models

**Urbana, IL**

*Jan. 2022 - present*

**Stochastic Circuits Implementation of Filter Banks Used in Hearing Aids**

*Advisor: Prof. John P. Hayes*

- 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

**Ann Arbor, MI**

*May 2020 - Aug. 2021*

**Application of Deep Learning Algorithms on Transmuter**

*Advisor: Prof. Trevor Mudge*

- Simulated RNN for the Transmuter architecture on gem5
- Optimized computer performance (GFLOPs) by 20% and total runtime (ms) by 50% through parallelism

**Ann Arbor, MI**

*Jan. 2020 - Aug. 2020*

## PROJECT EXPERIENCE

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**Codelet-based Compiler Optimization Space Exploration**

*With Intel Corporation, Advisor: Prof. David Kuck*

- 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

**Urbana, IL**

*Nov. 2021 - present*

**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. Weikang Qian* 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

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

## 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

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