Zhewen Pan

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Education

University of Wisconsin-Madison, Electrical and Computer Engineering — 2022 - Present
PhD

- Advisor: Joshua San Miguel
- Research interest: Efficient Architectures and Systems

University of Wisconsin-Madison, Electrical and Computer Engineering — 2020 - 2022
Master of Science in Computer Engineering, GPA: 3.94/4

- Relevant coursework: Computer Architecture, Operating Systems, Compilers, High Performance Computing.

Purdue University, Electrical and Computer Engineering — 2016 - 2020
Bachelor of Science with Highest Distinction, GPA: 3.99/4

- Relevant coursework: Computer Organization, ASIC Design, Statistical Machine Learning.

Awards & Honors

Best Paper Honorable Mention, ISCA	2025
IEEE Micro Top Picks Honorable Mention	2025
First Place, Google "Sustainability for AI Datacenters" N+1 Institute Reverse Pitch Competition Scholarship	2024
Department of ECE Gerald Holdridge Teaching Excellence Award, UW-Madison	2024
Distinguished Artifact Award, ASPLOS	2024
Second Place, ACM Student Research Competition (SRC) Grand Finals Grad Division	2023
Gold Medal, ACM Student Research Competition (SRC) SIGMICRO Grad Division	2023
gem5 Boot Camp Travel Grant	2022
ISCA Student Travel Grant	2022
Wisconsin Distinguished Graduate Fellowship - Schneider	2022

Publications – Conferences

Zhewen Pan, Joshua San Miguel. **The XOR Cache: A Catalyst for Compression**. *International Symposium on Computer Architecture (ISCA)*, 2025. [paper]. 🏆Best Paper Honorable Mention.

Zhewen Pan, Joshua San Miguel, Di Wu. **Carat: Unlocking Value-Level Parallelism in GEMMs**. *ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, 2024. [paper]. 🏆IEEE Micro Top Picks 2025 Honorable Mention & 🏆Distinguished Artifact Award

Di Wu, Jingjie Li, Zhewen Pan, Younghyun Kim, Joshua San Miguel. **uBrain: A Unary Brain Computer Interface**. *International Symposium on Computer Architecture (ISCA)*, 2022. [paper].

Publications – Workshops

Zhewen Pan, Joshua San Miguel. **The XOR Cache: A Catalyst for Compression**. *ACM Student Research Competition (SRC) Co-located w/ MICRO*, 2023. 🏆The ACM SRC 2023 SIGMICRO gold medal & grand finals second place

Zhewen Pan, Di Wu, Joshua San Miguel. **T-MAC: Temporal Multiplication with Accumulation**. *The 4th Young Architect Workshop (YArch) Co-located w/ ASPLOS*, 2022.

Research

Harnessing Fault Tolerance for Sustainability — Oct 2024 - Present

- Characterizing memory failure patterns over time and developing models to estimate carbon emissions from aging hardware.
- Mapping error-tolerant data to aging memory cells to extend hardware lifetime and reduce embodied carbon.

🏆Google "Sustainability for AI Datacenters" N+1 Institute Reverse Pitch Competition Scholarship, first place

XOR Cache: A Catalyst for Compression — Sep 2022 - Nov 2024

- Identified cross-level value redundancy in caches and reframed it as an opportunity for compression.
- Designed a compressed cache that co-locates similar lines using XOR pairing, enhancing compressibility and therefore efficiency.

Carat: Unlocking Value-Level Parallelism in GEMMs Dec 2021 - Mar 2023

- Introduced value-level parallelism to reduce redundant computation by processing only unique input values in AI workloads.
- Designed an accelerator that reuses results via temporal subscription and value delivery, for efficient multiplier-free execution.

uBrain: Unary Computing Brain Computer Interface Oct 2021 - Mar 2022

- Designed and synthesized unary hardware modules and performed regression analysis on efficiency statistics.

Scalable Deadlock-Freedom Network-on-Chip Jan 2021 - May 2021

- Characterized deadlock criticality based on the impact of positive feedback loops between congestion and deadlock formation.
- Proposed and evaluated a scalable subactive deadlock-removal scheme based on packet bypassing using gem5-Garnet.

Employment

Arm Inc May 2021 - Aug 2021
System IP Interconnect Performance Modeling Intern *Austin, TX (Remote)*

- Developed a test suite for Coherent Mesh Interconnect performance modeling flow and evaluated associated tooling.

Professional Service

ISCA Undergrad Architecture Workshop (uArch) Mentor 2023, 2025
MICRO Artifact Evaluation Program Committee 2022

Teaching

Teaching Assistant, UW-Madison, ECE/CS 552: Introduction to Computer Architecture Fall 2023, Spring 2024, Spring 2025
Teaching Assistant, UW-Madison, ECE 554: Digital Engineering Laboratory Spring 2022
Teaching Assistant, Purdue, ECE 270: Digital System Design Spring 2020
Teaching Assistant, Purdue, ECE 362: Microprocessor Systems and Interfacing Spring 2019
Teaching Assistant, Purdue, ECE 270: Digital System Design Spring 2018
Teaching Assistant, Purdue, ENGR 131: Transforming Ideas to Innovation I Fall 2017