

Yuanbo Guo

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South Bend, Indiana, USA

RESEARCH INTERESTS

Efficient and reliable AI systems. My research pioneers hardware design as a new way to understand and close AI performance gaps across population groups. I also establish new uses for model compression, transforming tools for making AI smaller into tools for making it work better for more people.

EDUCATION

University of Notre Dame

Ph.D. Candidate, Computer Science and Engineering

Advisor: Prof. Yiyu Shi

M.S., Computer Science and Engineering

Advisor: Prof. Yiyu Shi

Notre Dame, Indiana, USA

Expected May 2027

January 2026

Tsinghua University

B.S., Computer Science and Technology

Advisor: Prof. Wenjian Yu

Beijing, China

July 2021

RESEARCH EXPERIENCE

Doctoral Research, University of Notre Dame

August 2021 – Present

Advisor: Prof. Yiyu Shi

- **Established a new research direction for AI hardware.** Revealed hardware design as a source of performance gaps between population groups, bringing hardware into a problem previously approached mainly through data and algorithms (Nature Electronics, 2024).
- **Turned hardware imperfections into an advantage for AI.** Contributed to FairXbar, which uses hardware behavior normally treated as a source of error to help reduce performance gaps between population groups (DATE 2025).
- **Pioneered a new use for quantization.** FairQuantize demonstrates that a tool built to make AI smaller can also make its predictions more consistent across groups. This establishes a new application of compression in medical AI (MICCAI 2024).
- **Created an AI assistant that puts these ideas to work.** FairCompressAgent translates users' goals into tested ways of making models smaller and more consistent across groups, bringing this research toward practical use beyond specialist researchers (ICFPT 2026; invited paper).
- **Extended this new direction to model factorization.** FairLRF shows that breaking a model into simpler parts can reduce performance gaps between groups, turning another efficiency technique into a method for improving AI (arXiv preprint; under review).
- **Translated compression research into working systems.** Adapted FairPrune for practical deployment and ran compressed models on desktop computers, GPUs, and small devices, connecting research ideas to real computing platforms.

Undergraduate Research, Tsinghua University

October 2019 – July 2021

Advisor: Prof. Wenjian Yu

- **Brought AI into chip-design prediction.** Developed CNN-Cap models to estimate electrical interactions between chip wires, contributing to ICCAD (2021) and ACM TODAES (2023) publications.
- Improved prediction accuracy over a conventional estimation method on two chip technologies, demonstrating the value of AI for a task traditionally solved with hand-designed approximations.
- Conducted thesis research supported by the Undergraduate Innovation and Entrepreneurship Training Program.

PEER REVIEWED PUBLICATIONS

- [1] **Yuanbo Guo** and Yiyu Shi. FairCompressAgent: An Agentic Framework for Fairness-Aware Model Compression for FPGA Deployment. *International Conference on Field Programmable Technology (ICFPT)*, 2026. **Invited paper**
- [2] Sohan Salahuddin Mugdho, **Yuanbo Guo**, Ethan G. Rogers, Weiwei Zhao, Yiyu Shi, and Cheng Wang. FairXbar: Improving the Fairness of Deep Neural Networks with Non-Ideal In-Memory Computing Hardware. *Design, Automation and Test in Europe Conference (DATE)*, pp. 1–7, 2025. [DOI](#)
Acceptance rate: **24.8%**
- [3] **Yuanbo Guo***, Zheyu Yan*, Xiaoting Yu, Qingpeng Kong, Joy Xie, Kevin Luo, Dewen Zeng, Yawen Wu, Zhenge Jia, and Yiyu Shi. Hardware Design and the Fairness of a Neural Network. *Nature Electronics*, vol. 7, pp. 714–723, 2024. [DOI](#)
Journal impact factor: **42.3**
- [4] **Yuanbo Guo**, Zhenge Jia, Jingtong Hu, and Yiyu Shi. FairQuantize: Achieving Fairness Through Weight Quantization for Dermatological Disease Diagnosis. *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, LNCS 15010, pp. 329–338, 2024. [DOI](#)
Acceptance rate: **30.0%**
- [5] Dingcheng Yang, Haoyuan Li, Wenjian Yu, **Yuanbo Guo**, and Wenjie Liang. CNN-Cap: Effective Convolutional Neural Network-Based Capacitance Models for Interconnect Capacitance Extraction. *ACM Transactions on Design Automation of Electronic Systems*, vol. 28, no. 4, pp. 1–22, 2023. [DOI](#)
Journal impact factor: **2.8**
- [6] Dingcheng Yang, Wenjian Yu, **Yuanbo Guo**, and Wenjie Liang. CNN-Cap: Effective Convolutional Neural Network Based Capacitance Models for Full-Chip Parasitic Extraction. *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, pp. 1–9, 2021. [DOI](#)
Acceptance rate: **23.5%**

* *Equal contribution.*

PREPRINTS

- [P1] **Yuanbo Guo**, Jun Xia, and Yiyu Shi. FairLRF: Achieving Fairness through Sparse Low Rank Factorization. *arXiv:2511.16549*, 2025. [arXiv](#)

RESEARCH SOFTWARE AND REPOSITORIES

FairQuantize github.com/guoyb17/FairQuantize

Research code accompanying FairQuantize, enabling others to explore how model compression can reduce prediction gaps in medical AI.

FairCompressAgent github.com/guoyb17/FairCompressAgent

Interactive research assistant for translating user goals into model-compression plans, testing candidate models, and explaining the results.

TECHNICAL SKILLS

Programming: Python, C/C++, Rust, MATLAB, Verilog, VHDL, and shell scripting.

Tools and platforms: PyTorch, Hugging Face, Docker, Git, CUDA, ARM64 platforms, FPGA development, etc.

HONORS AND AWARDS

Outstanding Graduate Student Teaching Award University of Notre Dame, Kaneb Center for Teaching Excellence and Graduate School. Award announcement	2026
First Prize, Physics Competition for College Students (Non-Physics Majors) Beijing, China	2018
Freshman Scholarship Tsinghua University	2017

TEACHING EXPERIENCE

University of Notre Dame

Student evaluation scores: **5.0/5.0** for **all** completed teaching assistant semesters.

Machine Learning for Embedded Systems

Fall 2026

Teaching Assistant | August 2026 – Present

- Develop and grade laboratory assignments; support student group projects and hold office hours.

Advanced Computer Architecture

Spring 2026 and Spring 2025

Teaching Assistant | January – May 2026 and January – May 2025

- Developed homework assignments and final-exam materials; graded homework, quizzes, and examinations.
- Held office hours; received unsolicited student emails commending the teaching support provided.

Computer Security

Spring 2022

Teaching Assistant | January – May 2022 | Remote instruction

- Graded homework, midterm examinations, and final examinations; held office hours.

Distributed Systems

Fall 2021

Teaching Assistant | August – December 2021

- Graded homework, assisted with final-exam assessment, and held office hours.

RESEARCH MENTORING

Pingchuan Dong

2026

Master student | Columbia University

Joy Xie

2022–2024

High school student; subsequently admitted to Massachusetts Institute of Technology.

Co-author of the Nature Electronics paper (2024).

Kevin Luo

2022–2024

High school student; subsequently admitted to Stanford University.

Co-author of the Nature Electronics paper (2024).

INDUSTRY EXPERIENCE

EdgeCortex

May – December 2025

Machine Learning Engineer Intern | Full-time, remote

- Independently set up, validated, and evaluated convolutional models and large language models on CPUs and Sakura accelerator cards in Docker environments.
- Supported compiler-team tasks; used Python, PyTorch, Hugging Face, and model quantization tools.

Tencent, Technology and Engineering Group

July – September 2020

Student Intern | Full-time, remote

- Led a five-person team developing server-side functionality and a WeChat mini-program using Tencent APIs.
- The team project received an Excellent Project distinction in the joint Tencent–Tsinghua internship program.

ACADEMIC SERVICE

Peer review: *Medical Image Computing and Computer Assisted Intervention (MICCAI)* — reviewer, 2025.

Peer review: *Smart Health* — reviewer, 2024.

FUNDING AND RESEARCH SUPPORT

Graduate School Professional Development Award, University of Notre Dame. Travel support for MICCAI 2024.

Undergraduate Innovation and Entrepreneurship Training Program, Tsinghua University. Supported undergraduate research on interconnect capacitance extraction. 2020 – 2021.