Zishen Wan

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RESEARCH INTERESTS

Research Areas: Computer Architecture, VLSI, Physical AI, Neuro-Symbolic AI, Autonomous Machine, Machine Learning for Systems, Reliability, Algorithm-Hardware Co-Design, System-Technology Co-Optimization

Research Vision: My research lies at the intersection of **Computer Architecture**, **VLSI**, and **Physical AI**. I co-design **systems**, **architectures**, and **solid-state silicon** for autonomous machines and embodied intelligence, with the vision to advance **physical intelligence** – enhancing machines' **performance**, **efficiency**, and **resilience** in sensing, learning, reasoning, and planning, paving the way for **next-generation embodied agentic systems**.

PROFESSIONAL EXPERIENCE

2026-present **Harvard University, Cambridge, MA, USA**
Postdoctoral fellow, School of Engineering and Applied Science (SEAS)
— Advisor: Prof. Vijay Janapa Reddi

EDUCATION

2020-2025 **Georgia Institute of Technology, Atlanta, GA, USA**
— Ph.D., School of Electrical and Computer Engineering (ECE) GPA: 4.0/4.0
— Advisor: Prof. Arijit Raychowdhury, Prof. Tushar Krishna

2018-2020 **Harvard University, Cambridge, MA, USA**
— M.S., School of Engineering and Applied Science (SEAS) GPA: 3.95/4.0

2014-2018 **Harbin Institute of Technology, Harbin, China**
— B.E. (Honors) in Electrical Engineering (EE) GPA: 94/100 (Rank: 2/230)

SELECTED AWARDS AND HONORS

2020 **Best Paper Award,** ACM/IEEE Design Automation Conference **(DAC)**
2020 **Best Paper Award,** IEEE Computer Architecture Letter **(CAL)**
2025 **Best Paper Award,** DARPA SRC JUMP 2.0
2024 **Best Paper Award,** DARPA SRC JUMP 2.0
2023 **Best Paper Award,** Robotic Benchmarking Workshop, IEEE International Conference on Intelligent Robots and Systems **(IROS)**
2025 **Best Poster Award,** DARPA SRC JUMP2.0 **CoCoSys** center
2024 **Best Poster Award,** DARPA SRC JUMP2.0 **CoCoSys** center
2023 **Best Poster Award,** IBM IEEE AI Compute Symposium **(AICS)**
2024 **Best Presentation Award,** Semiconductor Research Corporation (**SRC**) **TECHCON**
2021 **Best Presentation Award**, DAC Young Fellow Forum
2023 **IEEE Micro Top Picks**, Honorable Mention
2021 **ACM SIGDA Research Highlights** Nominee
2024 **Rising Star** in Cyber-Physical Systems (CPS)
2023 **Rising Star** in Machine Learning and Systems (MLSys)
2025 **1st Place, DAC PhD Forum**
2022 **1st Place, ACM Student Research Competition (SRC)** at ESWEEK 2022
2023 **Roger P. Webb Graduate Research Assistant Excellence Award**, Georgia Tech
2025 **Baidu PhD Fellowship** (10 worldwide)
2022 **CRNCH PhD Fellowship**, Center for Novel Computing Hierarchies, Georgia Tech
2022 **Qualcomm Fellowship**
2022 **DAC Young Fellow**, ACM/IEEE Design Automation Conference **(DAC)**
2021 **DAC Young Fellow**, ACM/IEEE Design Automation Conference **(DAC)**
2018 **Chiang Chen Overseas Graduate Fellowship** (10 worldwide)

SELECTED PROJECTS

Heterogenous system architecture design and programmable system-on-chip for neuro-symbolic cognitive intelligence

— REASON (*HPCA'26*), CompSys (*ASPLOS'26*), Programmable SoC Tapeout (*JSSC'26*), CogSys (*HPCA'25*), NSFlow (*DAC'25*), NeSyBench (*ISPASS'24*, *TCASAI'24*)

System architecture and agile SoC design flow for generalized autonomy acceleration

— ReCA (*ASPLOS'25*), EmbodiedPerf (*ISPASS'25*), TAMP (*ICCAD'25*), SLAM SoC (*CICC'22*), AutoPilot (*MICRO'22*)

Energy-/safety-aware system architecture for low-power and reliable physical intelligence

— MulBerry (*ASPLOS'24*), Berry (*DAC'23*), DroneFI (*DAC'21*), FortiSky (*DATE'26*), ROSFI (*DATE'23*, *TCAD'23*), VAP (*Communication of the ACM*)

BOOKS

Synthesis Lectures on Computer Architecture
"Robotic Computing on FPGAs"
Shaoshan Liu, **Zishen Wan**, Bo Yu, Yu Wang
In Synthesis Lectures on Computer Architecture (Morgan & Claypool Publishers), pp.1-218, 2021

Embodied AI Systems
"Embodied AI Robotic Systems"
Yiming Gan, Bo Yu, **Zishen Wan**, Shaoshan Liu
In Publishing House of Electronics Industry, pp.1-224, Nov 2024

Machine Learning Systems
"Machine Learning Systems – Principles and Practices of Engineering AI Systems"
Vijay Janapa Reddi, Matthew Stewart, Ikechukwu Uchendu, Itai Shapira, Marcelo Rovai, Jayson Lin, Jeffrey Ma, Korneel Van den Berghe, **Zishen Wan**, Srivatsan Krishnan, Shvetank Prakash, Mark Mazumder, Colby Banbury, Jason Yik, Jessica Quaye, *et al*
Open-Source Online Book, pp. 1-2602, 2025 (17K+ GitHub Stars)

SELECTED PUBLICATIONS

Pre-prints

arXiv "SLM-Mux: Orchestrating Small Language Models for Reasoning"
Chenyu Wang*, **Zishen Wan***, Hao Kang, Emma Chen, Zhiqiang Xie, Tushar Krishna, Vijay Janapa Reddi, Yilun Du
arXiv preprint arXiv:2510.05077, 2025

arXiv "QuArch: A Benchmark for Evaluating LLM Reasoning in Computer Architecture"
Shvetank Prakash, Andrew Cheng, Arya Tschand, Mark Mazumder, Varun Gohil, Jeffrey Ma, Jason Yik, **Zishen Wan**, Jessica Quaye, Elisavet Lydia Alvanaki, Avinash Kumar, Chandrashis Mazumdar, Tuhin Khare, Alexander Ingare, Ikechukwu Uchendu, Radhika Ghosal, Abhishek Tyagi, Chenyu Wang, Andrea Mattia Garavagno, Sarah Gu, Alice Guo, Grace Hur, Luca Carloni, Tushar Krishna, Ankita Nayak, Amir Yazdanbakhsh, Vijay Janapa Reddi
arXiv preprint arXiv:2510.22087, 2025

arXiv "Efficient Mixture-of-Agents Serving via Tree-Structured Routing, Adaptive Pruning, and Dependency-Aware Prefill-Decode Overlap"
Zijun Wang*, Yijiahao Qi*, Hanqiu Chen, **Zishen Wan**, Gongjin Sun, Dongyang Li, Shuyi Pei, Cong (Callie) Hao
arXiv preprint arXiv:2512.18126, 2025

arXiv "ADDT: A Digital Twin Framework for Proactive Safety Validation in Autonomous Systems"
Bo Yu*, Chaoran Yuan*, **Zishen Wan***, Jie Tang, Fadi Kurdahi, Shaoshan Liu
arXiv preprint arXiv:2504.09461, 2025

Conference Publications

ASPLOS'26 "Compositional AI Beyond LLMs: System Implications of Neuro-Symbolic-Probabilistic Architectures"

Zishen Wan, Hanchen Yang, Jiayi Qian, Ritik Raj, Joongun Park, Chenyu Wang, Arijit Raychowdhury, Tushar Krishna
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2026
Best Paper Award, DARPA SRC JUMP 2.0, 2025

ASPLOS'26 "CREATE: Cross-Layer Resilience Optimization for Efficient yet Reliable Embodied AI Systems"
Tong Xie, Yijiahao Qi, Jinqi Wen, **Zishen Wan**, Yanchi Dong, Zihao Wang, Shaofei Cai, Yitao Liang, Tianyu Jia, Yuan Wang, Runsheng Wang, Meng Li
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2026

HPCA'26 "REASON: Accelerating Probabilistic Logical Reasoning for Neuro-Symbolic Intelligence"
Zishen Wan, Che-Kai Liu, Jiayi Qian, Hanchen Yang, Arijit Raychowdhury, Tushar Krishna
In IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2026

DATE'26 "FortiSky: Enhancing Adversarial and Bit-Error Robustness for Efficient Autonomous Systems"
Zishen Wan, Karthik Swaminathan, Nandhini Chandramoorthy, Pin-Yu Chen, Tushar Krishna, Vijay Janapa Reddi, Arijit Raychowdhury
In Design, Automation and Test in Europe Conference (DATE), 2026

DATE'26 "SATA: Sparsity-Aware Scheduling for Selective Token Attention"
Zhenkun Fan, **Zishen Wan**, Che-Kai Liu, Ashwin Lele, Win-San (Vince) Khwa, Bo Zhang, Meng-Fan (Marvin) Chang, Arijit Raychowdhury
In Design, Automation and Test in Europe Conference (DATE), 2026

ASP-DAC'26 "HDLxGraph: Bridging Large Language Models and HDL Repositories via HDL Graph Databases"
Pingqing Zheng, Jiayin Qin, Fuqi Zhang, Niraj Chitla, **Zishen Wan**, Shang Wu, Yu (Kevin) Cao, Caiwen Ding, Yang (Katie) Zhao
In Asia and South Pacific Design Automation Conference (ASP-DAC), 2026

HPCA'25 "CogSys: Efficient and Scalable Neuro-Symbolic Cognition System via Algo-HW Co-Design"
Zishen Wan[*], Hanchen Yang[*], Ritik Raj[*], Che-Kai Liu, Ananda Samajdar, Arijit Raychowdhury, Tushar Krishna
In International Symposium on High-Performance Computer Architecture (HPCA), 2025
Best Paper Award, DARPA SRC JUMP 2.0, 2024

ASPLOS'25 "ReCA: Integrated Acceleration for Real-Time and Efficient Embodied Autonomous Agents"
Zishen Wan, Yuhang Du, Mohamed Ibrahim, Jiayi Qian, Jason Jabbour, Yang (Katie) Zhao, Tushar Krishna, Arijit Raychowdhury, Vijay Janapa Reddi
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2025
Selected as IAP (Industry-Academia Partnership) Highlight

ASPLOS'25 "OctoCache: Caching Voxels for Accelerating 3D Occupancy Mapping in Autonomous Systems"
Peiqing Chen, Minghao Li, **Zishen Wan**, Yu-Shun Hsiao, Minlan Yu, Vijay Reddi, Alan Liu
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2025

MICRO'25 "RTGS: Real-Time 3D Gaussian Splatting SLAM via Multi-Level Redundancy Reduction"
Leshu Li, Jiayin Qin, Jie Peng, **Zishen Wan**, Huaizhi Qu, Ye Han, Pingqing Zheng, Hongsen Zhang, Yu (Kevin) Cao, Tianlong Chen, Yang (Katie) Zhao
In ACM/IEEE International Symposium on Microarchitecture (MICRO), 2025

DAC'25 "NSFlow: End-to-End FPGA Framework with Scalable Dataflow Arch for Neuro-Symbolic AI"
Hanchen Yang[*], **Zishen Wan**[*], Ritik Raj, Joongun Park, Ziwei Li, Ananda Samajdar, Arijit Raychowdhury, Tushar Krishna
In ACM/IEEE Design Automation Conference (DAC), 2025

DAC'25 "ReaLM: Reliable and Efficient LLM Inference with Statistical Algorithm-Based Fault Tolerance"
Tong Xie, Jiawang Zhao, **Zishen Wan**, Zuodong Zhang, Yuan Wang, Runsheng Wang, Ru Huang, Meng Li
In ACM/IEEE Design Automation Conference (DAC), 2025

ISPASS'25 "Generative AI in Embodied Systems: System-Level Analysis of Perf, Efficiency and Scalability"
Zishen Wan, Jiayi Qian, Yuhang Du, Jason Jabbour, Yilun Du, Yang (Katie) Zhao, Arijit Raychowdhury, Tushar Krishna, Vijay Janapa Reddi
In IEEE International Symposium on Perf. Analysis of Systems and Software (ISPASS), 2025

ISPASS'25 "SCALE-Sim v3: A Cycle-Accurate Systolic Accelerator Simulator for System Analysis"

Ritik Raj, Sarbartha Banerjee*, Nikhil Srinivas*, **Zishen Wan***, Jianming Tong*, Ananda Samajdar, Tushar Krishna
In IEEE International Symposium on Perf. Analysis of Systems and Software (ISPASS), 2025

ICCAD'25 "HyDra: SOT-CAM Based Vector Symbolic Macro for Hyperdimensional Computing"
Mizanur Nayan, Che-Kai Liu, **Zishen Wan**, Arijit Raychowdhury, Azad J Naeemi
In 44th IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2025

NeuS'25 "Efficient Processing of Neuro-Symbolic AI: A Tutorial and Case Study"
Zishen Wan, Che-Kai Liu, Hanchen Yang, Ritik Raj, Arijit Raychowdhury, Tushar Krishna
In International Conference on Neuro-symbolic Systems (NeuS), 2025
Selected as Oral Presentation (Top 3%)

ISCAS'25 "Characterization and Mitigation of ADC Noise by Reference Tuning in RRAM-Based CIM"
Ying-Hao Wei*, **Zishen Wan***, Brian Crafton, Samuel Spetalnick, Arijit Raychowdhury
In IEEE International Symposium on Circuits and Systems (ISCAS), 2025

ASPLOS'24 "MulBERRY: Enabling Bit-Error Robustness for Energy-Efficient Multi-Agent Auto Systems"
Zishen Wan, Nandhini Chandramoorthy, Karthik Swaminathan, Pin-Yu Chen, Kshitij Bhardwaj, Vijay Janapa Reddi, Arijit Raychowdhury
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2024
Best Poster Award, IBM IEEE AI Compute Symposium 2023

ASPLOS'24 "ORIANNA: Accelerator Generation Framework for Optimization-based Robotic Applications"
Yuhui Hao, Yiming Gan, Bo Yu, Qiang Liu, Yinhe Han, **Zishen Wan**, Shaoshan Liu
In ACM Conf on Arch Support for Programming Languages & Operating Systems (ASPLOS), 2024

DAC'24 "Algo-HW Co-Design of Distribution-Aware Log-Posit Encodings for Efficient DNN Inference"
Akshat Ramachandran, **Zishen Wan**, Geonhwa Jeong, John Gustafson, Tushar Krishna
In ACM/IEEE Design Automation Conference (DAC), 2024

ICCAD'24 "Thinking and Moving: An Efficient Computing Approach for Integrated Task and Motion Planning in Cooperative Embodied AI Systems"
Zishen Wan, Yuhang Du, Mohamed Ibrahim, Katie Zhao, Tushar Krishna, Arijit Raychowdhury
In ACM/IEEE International Conference on Computer-Aided Design (ICCAD), 2024

ISPASS'24 "Towards Cognitive AI Systems: Workload and Characterization of Neuro-Symbolic AI"
Zishen Wan, Che-Kai Liu, Hanchen Yang, Ritik Raj, Chaojian Li, Haoran You, Yonggan Fu, Cheng Wan, Ananda Samajdar, Yingyan Lin, Tushar Krishna, Arijit Raychowdhury
In IEEE International Symposium on Perf. Analysis of Systems and Software (ISPASS), 2024
Best Poster Award, DARPA SRC JUMP2.0 CoCoSys Center 2024

DATE'24 "H3DFact: Heterogeneous 3D Integrated CIM for Holographic Perceptual Representations"
Zishen Wan*, Che-Kai Liu*, Mohamed Ibrahim, Hanchen Yang, Samuel Spetalnick, Tushar Krishna, Arijit Raychowdhury
In Design, Automation and Test in Europe Conference (DATE), 2024
Best Presentation Award, SRC TECHCON 2024

ESWEEK'24 "Neuro-Symbolic Architecture Meets Large Language Models: A Memory-Centric Perspective"
Mohamed Ibrahim, **Zishen Wan**, Haitong Li, Priyadarshini Panda, Tushar Krishna, Pentti Kanerva, Yiran Chen, and Arijit Raychowdhury
In Embedded Systems Week (ESWEEK), 2024

ICRA'24 "RobotPerf: An Open-Source, Vendor-Agnostic, Benchmarking Suite for Evaluating Robotics Computing System Performance"
Victor Mayoral-Vilches, Jason Jabbour, Yu-Shun Hsiao, **Zishen Wan**, Alejandra Martinez-Farina, Martino Crespo-Alvarez, Matthew Stewart, Juan Manuel Reina-Munoz, Prateek Nagras, Gaurav Vikhe, Mohammad Bakhshalipour, Martin Pinzger, Stefan Rass, Smruti Panigrahi, Giulio Corradi, Niladri Roy, Phillip B. Gibbons, Sabrina M. Neuman, Brian Plancher, Vijay Janapa Reddi
In IEEE International Conference on Robotics and Automation (ICRA), 2024
Best Paper Award, IROS Robotic Benchmarking Workshop 2023

DAC'23 "BERRY: Bit Error Robustness for Energy-Efficient Learning-Based Autonomous Systems"
Zishen Wan, Nandhini Chandramoorthy, Karthik Swaminathan, Pin-Yu Chen, Vijay Janapa Reddi, Arijit Raychowdhury
In ACM/IEEE Design Automation Conference (DAC), 2023

DATE'23 "MAVFI: An End-to-End Fault Analysis Framework with Anomaly Detection and Recovery for Micro Aerial Vehicles"
Yu-Shun Hsiao*, **Zishen Wan***, Tianyu Jia, Radhika Ghosal, Abdulrahman Mahmoud Arijit Raychowdhury, David Brooks, Gu-Yeon Wei, Vijay Janapa Reddi
In Design, Automation and Test in Europe Conference (DATE), 2023

ICCAD'23 "SEE-MCAM: Scalable Multi-bit FeFET CAM for Energy Efficient Associative Search"
Shengxi Shou, Che-Kai Liu, Sanggeon Yun, **Zishen Wan**, Kai Ni, Mohsen Imani, X. Sharon Hu, Jianyi Yang, Cheng Zhuo, Xunzhao Yin
In 42nd IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2023

DATE'23 "Real-Time Fully Unsupervised Domain Adaptation for Lane Detection in Autonomous Driving"
Kshitij Bhardwaj, **Zishen Wan**, Arijit Raychowdhury, Ryan Goldhahn
In Design, Automation and Test in Europe Conference (DATE), 2023

ISSCC'23 "A 73.53TOPS/W 14.74TOPS Heterogeneous RRAM In-Memory and SRAM Near-Memory SoC for Hybrid Frame and Event-Based Target Tracking"
Muya Chang, Ashwin Lele, Samuel Spetalnick, Brian Crafton, Shota Konna, **Zishen Wan**, Ashwin Bhat, Win-San Khwa, Yu-der Chih, Meng-Fan Chang, Arijit Raychowdhury
In IEEE International Solid-State Circuits Conference (ISSCC), 2023

MICRO'22 "Automatic Domain-Specific SoC Design for Autonomous Unmanned Aerial Vehicles"
Srivatsan Krishnan, **Zishen Wan**, Kshitij Bhardwaj, Paul Whatmough, Aleksandra Faust, Sabrina M. Neuman, Gu-Yeon Wei, David Brooks, Vijay Janapa Reddi
In 55th IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022
IEEE Micro Top Picks, Honorable Mention

DAC'22 "Improving Compute In-Memory ECC Reliability with Successive Correction"
Brian Crafton, **Zishen Wan**, Samuel Spetalnick, Jong-Hyeok Yoon, Wei Wu, Carlos Tokunaga, Vivek De, Arijit Raychowdhury
In 59th ACM/IEEE Design Automation Conference (DAC), 2022

ISPASS'22 "Roofline Model for UAVs: A Bottleneck Analysis Tool for Onboard Compute Characterization of Autonomous Unmanned Aerial Vehicles"
Srivatsan Krishnan, **Zishen Wan**, Kshitij Bhardwaj, Aleksandra Faust, Vijay Janapa Reddi
In IEEE International Symposium on Perf. Analysis of Systems and Software (ISPASS), 2022

ICCAD'22 "Analyzing and Improving Resilience and Robustness of Autonomous Systems"
Zishen Wan, Karthik Swaminathan, Nandhini Chandramoorthy, Arijit Raychowdhury
In 41st IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2022

AICAS'22 "Robotic Computing on FPGAs: Current Progress, Research Challenges, and Opportunities"
Zishen Wan, Ashwin Lele, Bo Yu, Shaoshan Liu, Yu Wang, Vijay Janapa Reddi, Callie Hao, Arijit Raychowdhury
In IEEE International Conf on Artificial Intelligence Circuits and Systems (AICAS), 2022

CICC'22 "An Energy-Efficient and Runtime-Reconfigurable FPGA-Based Accelerator for Robotic Localization Systems"
Qiang Liu*, **Zishen Wan***, Bo Yu*, Weizhuang Liu, Shaoshan Liu, Arijit Raychowdhury
In IEEE Custom Integrated Circuits Conference (CICC), 2022

DATE'22 "FRL-FI: Fault Analysis for Federated Reinforcement Learning-Based Navigation Systems"
Zishen Wan, Aqeel Anwar, Abdulrahman Mahmoud, Tianyu Jia, Yu-Shun Hsiao, Vijay Janapa Reddi, Arijit Raychowdhury
In Design, Automation and Test in Europe Conference (DATE), 2022

ASP-DAC'22 "Circuit and System Technologies for Energy-Efficient Edge Robotics"
Zishen Wan, Ashwin Lele, Arijit Raychowdhury
In Asia and South Pacific Design Automation Conference (ASP-DAC), 2022

DAC'21 "Analyzing and Improving Fault Tolerance of Learning-Based Navigation System"
Zishen Wan, Aqeel Anwar, Yu-Shun Hsiao, Vijay Janapa Reddi, Arijit Raychowdhury
In 58th ACM/IEEE Design Automation Conference (DAC), 2021
Best Presentation Award as DAC Young Fellow

AICAS'21 "An Energy-Efficient Visual System for Autonomous Machines on FPGA Platform"
Zishen Wan, Yuyang Zhang, Arijit Raychowdhury, Bo Yu, Yanjun Zhang, Shaoshan Liu

In IEEE International Conf on Artificial Intelligence Circuits and Systems (AICAS), 2021

DAC'20 "Algo-HW Co-Design of Adaptive Floating-Point Encodings for Resilient DL Inference"
Thierry Tambe, En-Yu Yang, **Zishen Wan**, Yuntian Deng, Vijay Janapa Reddi, Alexander Rush, David Brooks, Gu-Yeon Wei
In 57th ACM/IEEE Design Automation Conference (DAC), 2020
DAC Best Paper Award | ACM SIGDA Research Highlights Nominee

Journal Publications

JSSC'26 "A 40nm Programmable Heterogeneous SoC with 5.625MB/0.85MB RRAM/SRAM for Accelerating Neuro-Symbolic AI Models"
Che-Kai Liu*, **Zishen Wan***, Young-Seok Noh, Mohamed Ibrahim, Samuel D. Spetalnick, Tushar Krishna, Win-San Khwa, Ashwin Sanjay Lele, Yu-Der Chih, Meng-Fan Chang, Arijit Raychowdhury
In IEEE Journal of Solid-State Circuits (JSSC), 2026

Frontiers in Science'25 "Breaking the Memory Wall: Next-Generation AI Hardware"
Kaushik Roy, Adarsh Kosta, Tanvi Sharma, Shubham Negi, Deepika Sharma, Sourjya Roy, Anand Raghunathan, **Zishen Wan**, Samuel Spetalnick, Che-Kai Liu, Arijit Raychowdhury
In Fronters in Science (Invited Paper), 2025

TCASAI'24 "Towards Efficient Neuro-Symbolic AI: From Workload Characterization to Hardware Arch"
Zishen Wan, Che-Kai Liu, Hanchen Yang, Ritik Raj, Chaojian Li, Haoran You, Yonggan Fu, Cheng Wan, Sixu Li, Youbin Kim, Ananda Samajdar, Yingyan (Celine) Lin, Mohamed Ibrahim, Jan M. Rabaey, Tushar Krishna, and Arijit Raychowdhury
In IEEE Transactions on Circuits and Systems for Artificial Intelligence (TCASAI), 2024
Best Paper Award, DARPA SRC JUMP 2.0, 2024
Top-1 Cited Paper in all TCASAI papers

Comm. of the ACM'24 "Moving Toward Reliable Autonomous Machines: Vulnerability-Adaptive Protection Paradigm"
Zishen Wan, Yiming Gan, Bo Yu, Shaoshan Liu, Arijit Raychowdhury, Yuhao Zhu
In *Communications of the ACM (CACM), 2024*

TCAD'23 "Silent Data Corruption in Robot Operating System: A Case for End-to-End System-Level Fault Analysis Using Autonomous UAVs"
Yu-Shun Hsiao*, **Zishen Wan***, Tianyu Jia, Radhika Ghosal, Abdulrahman Mahmoud Arijit Raychowdhury, David Brooks, Gu-Yeon Wei, Vijay Janapa Reddi
In IEEE Transactions on Computer-Aided Design of Integrated Circuits & Systems (TCAD), 2023

JSSC'23 "A Heterogeneous RRAM In-Memory and SRAM Near-Memory SoC for Fused Frame and Event-Based Target Identification and Tracking"
Ashwin Lele, Muya Chang, Samuel Spetalnick, Brian Crafton, Shota Konna, **Zishen Wan**, Ashwin Bhat, Win-San Khwa, Yu-der Chih, Meng-Fan Chang, Arijit Raychowdhury
In IEEE Journal of Solid-State Circuits (JSSC), 2023

TMLR'22 "QuaRL: Quantization for Fast and Environmentally Sustainable RL"
Srivatsan Krishnan, Max Lam, Sharad Chitlangian, **Zishen Wan**, Gabriel Barth-Maron, Aleksandra Faust, Vijay Janapa Reddi
In Transactions on Machine Learning Research (TMLR), 2022

CAM-M'21 "A Survey of FPGA-Based Robotic Computing"
Zishen Wan, Bo Yu, Thomas Li, Jie Tang, Yuhao Zhu, Arijit Raychowdhury, Shaoshan Liu
In IEEE Circuits and Systems Magazine (CAS-M), 2021

CAL'20 "The Sky Is Not the Limit: A Visual Performance Model for Cyber-Physical Co-Design in Autonomous Machines"
Srivatsan Krishnan, **Zishen Wan**, Kshitij Bhardwaj, Paul Whatmough, Aleksandra Faust, Gu-Yeon Wei, David Brooks, Vijay Janapa Reddi
In IEEE Computer Architecture Letters (CAL), 2020
CAL Best Paper Award

TEACHING EXPERIENCE

2025 **Course Developer & Teaching Staff**, Harvard new course, CS249r "Architecture 2.0: Agentic AI for Computer System Design"
2025 **Guest Lecturer**, Georgia Tech ECE8803 "Hardware-Software Co-Design for ML Systems"
2025 **Guest Lecturer**, Georgia Tech ECE8893 "Parallel Programming for FPGAs"
2024 **Guest Lecturer**, Georgia Tech ECE8893 "Parallel Programming for FPGAs"
2023 **Guest Lecturer**, Georgia Tech ECE8893 "Parallel Programming for FPGAs"
2023 **Guest Lecturer**, KSU EE6900 "Neuromorphic Computing"

ACADEMIC SERVICE

2024-present **Steering Committee**, Computer Architecture Student Association (CASA)
2022 **Co-founder**, ML Commons Resilience and Robustness Research Working Group
2026 **TPC Member**, DAC 2026
2025/2026 **ERC Member**, MLSys 2025, MLSys 2026
2026 **Workshop Organizer**, "Architecture 2.0: Agentic AI for Computing System Design", ASPLOS
2022/2024 **Special Session Organizer**, "Domain-Specific Hardware for Auto Machines", ICCAD
2024 **Special Session Organizer**, "Neuro-Symbolic Architecture Meets LLMs", ESWEEK
2025 **Panelist**, ML and Systems Rising Star Workshop
2022 **Panelist**, IEEE Computers, Software & Applications Conference (COMPSAC)
2024 **News and Media Team**, ISSCC

Conference Reviewer: ICRA, ICLR, ESWEEK, ICCAD

Journal Reviewer: JSSC, TCAD, JETCAS, IoT, TBioCAS, TCAS-I, TCAS-II, IEEE Micro, CAL, TIM, JATS, TCPS

Workshop Program Committee: ArchEAI workshop (ISCA 2025), SCOPE workshop (ICLR 2025), Lock-LLM workshop (NeurIPS 2025), CAV workshop (ASPLOS 2024)

Artifact Evaluation Committee: HPCA 2026, HPCA 2025, ISCA 2024, ISCA 2023, MICRO 2023, ASPLOS 2023, MLSys 2023, MICRO 2022, ASPLOS 2022, IISWC 2022

GRANTS

Research Programs (Key Student Contributor)

2023-present **DARPA Semiconductor Research Cooperation (SRC) JUMP 2.0 CoCoSys Center**
2020-2022 **DARPA Semiconductor Research Cooperation (SRC) JUMP CBRIC Center**
2022-2023 **IARPA MicroE4AI Program**, "Robust Autonomy in UAVs on a Convergent Digital-Analog Ferroelectronics Platform"
2022-present **NSF OAC**, "Elements: Open-source hardware and software evaluation system for UAV"

Grants Awarded to Me

2024 **Georgia Tech CREATE-X Award**, $10,000
2023-2025 **Student Travel Award**, HPCA 2025, MICRO 2024, MLSys 2024, ISPASS 2024, ASPLOS 2024, ISSCC 2024, ISCA 2023, MLSys 2023, $8,800

TALKS

"Tailored Computing: Domain-Specific Architectures for Embodied Intelligence"
Nov 2025 Invited Talk, Tsinghua University NICS-EFC Lab (Host: Dr. Zhenhua Zhu), Online
Oct 2025 MICRO PhD Forum, International Symposium on Microarchitecture (MICRO), Seoul, Korea
Jun 2025 DAC PhD Forum, IEEE/ACM Chips to Systems Conference (DAC), San Francisco, CA
Jun 2025 Invited Talk, ISCA Workshop on Architecture Support for Embodied AI Systems, Online
Mar 2025 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
Feb 2025 Invited Talk, UIUC Coordinated Science Laboratory (CSLSC), Champaign, IL
Jan 2025 Seminar Talk, University of Washington (Host: Prof. Ang Li), Seattle, WA
Dec 2024 Seminar Talk, Institute of Computing Technology, CAS (Host: Prof. Yunji Chen), Online

"Demystifying Neuro-Symbolic AI via Characterization and SW-HW Co-Design"
Sept 2025 Seminar Talk, Georgia Institute of Technology (Host: Prof. Alexey Tumanov), Atlanta, GA
Jul 2025 Seminar Talk, Purdue University (Host: Prof. Anand Raghunathan), West Lafayette, IN
Jul 2025 Seminar Talk, University of Notre Dame (Host: Prof. Ningyuan Cao), South Bend, IN
Apr 2025 Google (Host: Dr. Suvinay Subramanian), Mountain View, CA

Mar 2025 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
Jan 2025 Georgia Tech Computer Architecture Research Seminar, Atlanta, GA
Nov 2024 ACM/SIGMICRO Student Research Competition, Austin, TX
Aug 2024 Seminar Talk, University of Minnesota, Twin Cities (Host: Prof. Yang Zhao), MN
May 2024 MLSys Young Professional Symposium, Santa Clara, CA
May 2024 International Workshop on Neuro-symbolic Systems (NeuS), UC Berkeley, Berkeley, CA
Mar 2024 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
Sept 2023 Guest Lecture, EE6900 Neuromorphic Computing (Host: Prof. Yan Fang), Atlanta, GA
May 2023 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
May 2023 Georgia Tech 3D Systems Packaging Research Center Spring Meeting, Atlanta, GA

"Intelligence in Robotic Computing: Agile Design Flows for Efficient Autonomous Systems"
Nov 2024 Invited Talk, University of Central Florida (Host: Prof. Di Wu), Orlando, FL
Nov 2024 Invited Talk, MICRO Workshop on Robotic Hardware Acceleration, Austin, TX
Sept 2024 ESWEEK PhD Forum, Raleigh, NC
May 2024 Cyber-Physical System Rising Star Workshop, University of Virginia, Charlottesville, VA
May 2024 CoCoSys (Center for the Co-Design of Cognitive Systems) Liaison Meeting, Atlanta, GA
Feb 2024 CRIDC (Career, Research, and Innovation Development Conference), Atlanta, GA
Nov 2023 IBM AI Compute Symposium, IBM T.J. Watson Research Center, Yorktown Heights, NY
Sept 2023 Georgia Tech Computer Architecture Research Seminar, Atlanta, GA
Aug 2023 ML and Systems Rising Stars Workshop, Google, Mountain View, CA
May 2023 Georgia Tech Chips Day, Atlanta, GA
Mar 2023 Georgia Tech EIC Lab (Host: Prof. Celine Lin), Atlanta, GA
Feb 2023 CRNCH (Center for Novel Computing Hierarchies) Annual Summit, Atlanta, GA
Nov 2022 ACM Student Research Competition (SRC) at ICCAD 2022, San Diego, CA

"System-Architecture-Technology Cross-Layer Design for Embodied Intelligence"
Nov 2024 Invited Talk, Harvard University Nano Lab (Host: Prof. Gage Hills), Cambridge, MA
Aug 2024 Invited Talk, Lawrence Livermore National Laboratory (Host: Dr. Kshitij Bhardwaj), CA

"Efficient Algorithm-Hardware Co-Design for Robotic Mapping and Localization"
Mar 2023 CRIDC (Career, Research, and Innovation Development Conference), Atlanta, GA
Oct 2022 IBM AI Compute Symposium, IBM T.J. Watson Research Center, Yorktown Heights, NY
Oct 2022 CBRIC (Center for Brain-Inspired Computing) Annual Summit, Purdue University, IN
Feb 2022 CRNCH (Center for Novel Computing Hierarchies) Annual Summit, Atlanta, GA

"Enabling Reliable and Safe Autonomous Systems"
Mar 2024 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
Feb 2024 CRNCH (Center for Novel Computing Hierarchies) Annual Summit, Atlanta, GA
May 2023 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, Atlanta, GA
Jun 2022 COMPSAC Plenary Panel, Torino, Italy (Online)
Oct 2021 CBRIC (Center for Brain-Inspired Computing) Annual Summit, Purdue University, IN
Aug 2021 CBRIC (Center for Brain-Inspired Computing) Industry Talk, Purdue University, IN
Jul 2020 Harvard Architecture, Circuits and Compilers Lab, Online

ADDITIONAL AWARDS AND HONORS

2025 **PhD Forum** Attendee at MICRO 2025
2025 **WAIC Yunfan Rising Star Award Nominee**
2024 **3rd Place, ACM/SIGMICRO Student Research Competition (SRC)**, MICRO 2024
2022 **3rd Place, ACM/SIGDA Student Research Competition (SRC)**, ICCAD 2022
2018 **Chunhui Innovation Achievement Award** (First Class), HIT
2017 **Innovation and Entrepreneurship Award**, Ministry of Industry and Information, China
2016 **Outstanding Student Award** of Heilongjiang Province, China
2016 **1st Place**, National Undergraduate Mathematical Contest in Modeling (Team Lead), China

MEDIA COVERAGE

GaTech Conference Spotlights Microarchitecture Research and Innovation (1/2026)
Synced Collaborative Acceleration: Multi-Robot Cooperation No Longer "Half a Beat Slow"! (10/2025)
GaTech Wan Wins First Place at Premier Computing Ph.D. Forum (07/2025)
GaTech CoCoSys Develops Groundbreaking Neuro-Symbolic AI Chip (05/2025)

MIT TR	New Adaptive Protection to Improve Reliability of Robot Computing Systems (01/2025)
Fortune	Generative AI Can't Shake Reliability Problem, 'Neuro-Symbolic AI' is the Answer (12/2024)
CoCoSys	Zishen Wan: Research Scholar Spotlight from DARPAR SRC JUMP2.0 (12/2024)
TechXplore	Balancing cost and reliability in autonomous machine design (10/2024)
GaTech	ECE Students Take Home Top Honors at TECHCON 2024 (10/2024)
ACM News	Hallucination vs Creativity, and Reliable Autonomous Machines (09/2024)
TechSpot	Number Representations in Computer Hardware: Fundamentals Matter (06/2024)
GaTech	ECE Benchmarking Making Major Advances in Machine Learning (04/2024)
GaTech	Wan Recognized for Energy-Saving Research on Autonomous Systems (01/2024)
SemiEng	Scalable And Compact Multi-Bit CAM Designs Using FeFETs (10/2023)
RobotReport	RobotPerf Benchmarks compare robotics computing performance (09/2023)
GaTech	Celebrating ISCA's 50th: Georgia Tech's Contributions, Impact, and Reflections on 50 Years of Computer Architecture Innovation (07/2023)
GaTech	Wan Wins Computing Machinery Student Research Competition (12/2022)
Google AI	Quantization for Fast and Sustainable Reinforcement Learning (09/2022)
MarkTech	Novel RL Training Paradigm to Speed Up Actor-Learner Distributed Training (09/2022)

REFERENCES

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