Zishen Wan

Georgia Institute of Technology | Klaus 2305, 266 Ferst Drive, Atlanta, GA 30332, USA
+1 (857) 999-6367 | zishenwan@gatech.edu | https://zishenwan.github.io

RESEARCH INTERESTS

Research Areas: Computer Architecture, VLSI, Autonomous Machine, Embodied AI, Reliability, Algorithm-Hardware Co-Design, System-Technology Co-Optimization
Research Vision: My research lies at the intersection of VLSI, computer architecture, and cognitive intelligence. I co-design systems, architectures, and solid-state hardware for autonomous machines and neuro-symbolic AI, with the vision to enhance physical agents' performance, efficiency, and resilience, as well as their cognitive capabilities in learning, reasoning, and planning, paving the way for next-gen embodied agentic applications.

EDUCATION

2020-Present **Georgia Institute of Technology, Atlanta, GA, USA**
Ph.D., School of Electrical and Computer Engineering (ECE)
- *Advisor:* Prof. Arijit Raychowdhury, Prof. Tushar Krishna
- *Research Topic:* Efficient and Reliable System, Architecture, and Technology Co-Design for Autonomous Machines and Cognitive Intelligence
- *GPA:* 4.0/4.0

2018-2020 **Harvard University, Cambridge, MA, USA**
M.S., School of Engineering and Applied Science (SEAS)
- *Advisor:* Prof. Vijay Janapa Reddi
- *Research Topic:* Reliability and Domain-Specific SoC of Autonomous Machines
- *GPA:* 3.95/4

2014-2018 **Harbin Institute of Technology (HIT), Harbin, China**
B.E. with High Honors, Department of Electrical Engineering (EE)
- *GPA:* 93.5/100 (Rank: 2/230)

SELECTED AWARDS AND HONORS

2020 **Best Paper Award** in ACM/IEEE Design Automation Conference **(DAC)**
Paper ranked highest among 228 accepted papers out of 984 submissions that year

2020 **Best Paper Award** in IEEE Computer Architecture Letter **(CAL)**
Paper ranked highest among 42 accepted papers that year

2024 **Best Paper Award** in DARPA SRC JUMP 2.0
Paper selected as the best publication by JUMP 2.0 Centers consisting of 140+ PIs

2023 **Best Paper Award** in Workshop of IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**
Paper ranked highest among 40 submissions in Robotics Benchmarking Workshop at IROS 2023.

2025 **Best Poster Award,** DARPA SRC JUMP2.0 **CoCoSys** center
Poster ranked highest in DRAPA SRC JUMP2.0 Center for Co-Design of Cognitive Systems (CoCoSys) annual summit.

2024 **Best Poster Award,** DARPA SRC JUMP2.0 **CoCoSys** center
Poster ranked highest in DRAPA SRC JUMP2.0 Center for Co-Design of Cognitive Systems (CoCoSys) annual summit.

2023 **Best Poster Award,** IBM IEEE AI Compute Symposium **(AICS)**
Paper ranked highest among 34 accepted posters at AICS'23.

2024 **Best Presentation Award,** Semiconductor Research Corporation (**SRC**) **TECHCON**

Paper presentation ranked highest among over 200 accepted papers

2021 **Best Presentation Award**, DAC Young Fellow Forum

2023 **IEEE Micro Top Picks**, Honorable Mention
Recognition of "the most significant research papers in computer architecture based on novelty and potential for long-term impact, published in the top computer architecture conferences of 2022"

2021 **ACM SIGDA Research Highlights Nominee**
Nominee out of top 10 papers published in ACM SIGDA sponsored conferences in 2020.

2024 **Cyber-Physical Systems (CPS) Rising Star**
A cohort of 35 PhD students and postdocs among the rising generation of researchers at cyber-physical systems, selected by University of Virginia in 2024 cohort.

2023 **Machine Learning and Systems (MLSys) Rising Star**
A cohort of 35 PhD students among the rising generation of researchers at interactions of ML and systems, selected by MLCommons, Google, and Harvard in 2023 cohort.

2025 **1st Place, DAC PhD Forum**
Ranked 1st of 42 participants in ACM/IEEE Design Automation Conference (DAC) PhD Forum.

2022 **1st Place, ACM Student Research Competition**
Ranked 1st of 40 participants in ACM Student Research Competition at Embedded Systems Week (ESWEEK), represented SIGBED in ACM Grand Finals.

2023 **Roger P. Webb Graduate Research Assistant Excellence Award**, Georgia Tech
Recognition of Graduate Research Assistant (GRA) who have demonstrated excellent research performance. 2-4 students each year in Georgia Tech School of ECE.

2025 **Baidu PhD Fellowship**
10 students worldwide each year in AI-related research areas.

2022 **CRNCH PhD Fellowship**, Center for Novel Computing Hierarchies, Georgia Tech
2-4 graduate students each year in Georgia Tech College of Engineering and College of Computing

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 of all undergraduates and graduates in China, $50,000/year

PUBLICATIONS

(* Indicates Equal Contributions)

Book

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, Jun 2021

MLSys TinyML
"Machine Learning Systems with TinyML"
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, By the Community, With the Community, For the Community

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

Research Artifacts

DAC PhD Forum "Tailored Computing: Domain-Specific Systems and Hardware for Embodied Autonomous Intelligence"
Zishen Wan, Vijay Janapa Reddi, Tushar Krishna, Arijit Raychowdhury
Design Automation Conference (DAC) PhD Forum, 2025
1st Place in ACM/IEEE DAC PhD Forum

ACM SRC Grand Final "Intelligence in Robotic Computing: Agile Design Flows for Building Efficient and Resilient Autonomous Machines"
Zishen Wan, Vijay Janapa Reddi, Arijit Raychowdhury
ACM Student Research Competition (SRC), Grand Final, 2023
1st Place in ACM/SIGBED Student Research Competition (SRC)

Conference Publications

ASPLOS 2026 "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 Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2026
Acceptance Rate: 10%

ASP-DAC 2026 "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
Acceptance Rate: 29%

MICRO 2025 "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
Acceptance Rate: 20%

HPCA 2025 "CogSys: Efficient and Scalable Neurosymbolic Cognition System via Algorithm-Hardware 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
Acceptance Rate: 21%
Best Paper Award, DARPA SRC JUMP 2.0, 2024

ASPLOS 2025 "ReCA: Integrated Acceleration for Real-Time and Efficient Cooperative Embodied Autonomous Agents"
Zishen Wan, Yuhang Du, Mohamed Ibrahim, Jiayi Qian, Jason Jabbour, Yang (Katie) Zhao, Vijay Janapa Reddi, Tushar Krishna, Arijit Raychowdhury
In ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2025
Acceptance Rate: 11%
Selected as IAP (Industry-Academia Partnership) Highlight

ASPLOS 2025 "OctoCache: Caching Voxels for Accelerating 3D Occupancy Mapping in Autonomous Systems"

Peiqing Chen, Minghao Li, Zishen Wan, Yu-Shun Hsiao, Minlan Yu, Vijay Janapa Reddi, Zaoxing (Alan) Liu
In ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2025
Acceptance Rate: 11%

DAC 2025 "NSFlow: An End-to-End FPGA Framework with Scalable Dataflow Architecture 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
Acceptance Rate: 20%

DAC 2025 "ReaLM: Reliable and Efficient Large Language Model 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
Acceptance Rate: 20%

ISPASS 2025 "Generative AI in Embodied Systems: System-Level Analysis of Performance, 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 Performance Analysis of Systems and Software (ISPASS), 2025
Acceptance Rate: 28%

ISPASS 2025 "SCALE-Sim v3: A Modular Cycle-Accurate Systolic Accelerator Simulator for End-to-End System Analysis"
Ritik Raj, Sarbartha Banerjee*, Nikhil Srinivas*, Zishen Wan*, Jianming Tong*, Ananda Samajdar, Tushar Krishna
In IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2025
Acceptance Rate: 28%

ICCAD 2025 "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
Acceptance Rate: 23%

NeuS 2025 "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

ISCAS 2024 "Characterization and Mitigation of ADC Noise by Reference Tuning in RRAM-Based Compute In-Memory"
Ying-Hao Wei*, Zishen Wan*, Brian Crafton, Samuel Spetalnick, Arijit Raychowdhury
In IEEE International Symposium on Circuits and Systems (ISCAS), 2024

ICCAD 2024 "Thinking and Moving: An Efficient Computing Approach for Integrated Task and Motion Planning in Cooperative Embodied AI Systems"
Zishen Wan, Yuhang Du, Mohamed Ibrahim, Yang (Katie) Zhao, Tushar Krishna, Arijit Raychowdhury

In ACM/IEEE International Conference on Computer-Aided Design (ICCAD), 2024
Acceptance Rate: 24%

ESWEEK 2024 "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

DAC 2024 "Algorithm-Hardware Co-Design of Distribution-Aware Logarithmic-Posit Encodings for Efficient DNN Inference"
Akshat Ramachandran, Zishen Wan, Geonhwa Jeong, John Gustafson, Tushar Krishna
In ACM/IEEE Design Automation Conference (DAC), 2024
Acceptance Rate: 21%

ISPASS 2024 "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 Performance Analysis of Systems and Software (ISPASS), 2024
Acceptance Rate: 34%
Best Poster Award, DARPA SRC JUMP2.0 CoCoSys Center 2024

ASPLOS 2024 "MulBERRY: Enabling Bit-Error Robustness for Energy-Efficient Multi-Agent Autonomous Systems"
Zishen Wan, Nandhini Chandramoorthy, Karthik Swaminathan, Pin-Yu Chen, Kshitij Bhardwaj, Vijay Janapa Reddi, Arijit Raychowdhury
In ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024
Acceptance Rate: 13%
Best Poster Award, IBM IEEE AI Compute Symposium 2023

ASPLOS 2024 "ORIANNA: An Accelerator Generation Framework for Optimization-based Robotic Applications"
Yuhui Hao, Yiming Gan, Bo Yu, Qiang Liu, Yinhe Han, Zishen Wan, Shaoshan Liu
In ACM Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024
Acceptance Rate: 13%

ICRA 2024 "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

DATE 2024 "H3DFact: Heterogeneous 3D Integrated CIM for Factorization with 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
Acceptance Rate: 24%
Best Presentation Award, SRC TECHCON 2024

ICCAD 2023 "SEE-MCAM: Scalable Multi-bit FeFET Content Addressable Memories 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
Acceptance Rate: 23%

DAC 2023 "BERRY: Bit Error Robustness for Energy-Efficient Reinforcement 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
Acceptance Rate: 23%

DATE 2023 "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
Acceptance Rate: 24%

DATE 2023 "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
Acceptance Rate: 24%

ISSCC 2023 "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
Acceptance Rate: 33%

ICCAD 2022 "On Resilience and Robustness of Autonomous Systems"
Zishen Wan, Karthik Swaminathan, Pin-Yu Chen, Nandhini Chandramoorthy, Arijit Raychowdhury
In 41st IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2022
Acceptance Rate: 23%

MICRO 2022 "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
2023 IEEE Micro Top Picks, Honorable Mention
Acceptance Rate: 22%

DAC 2022 "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
Acceptance Rate: 23%

AICAS 2022 "Robotic Computing on FPGAs: Current Progress, Research Challenges, and Opportunities"

Zishen Wan, Ashwin Lele, Bo Yu, Shaoshan Liu, Yu Wang, Vijay Janapa Reddi, Cong (Callie) Hao, Arijit Raychowdhury
In IEEE International Conf on Artificial Intelligence Circuits and Systems (AICAS), 2022

ISPASS 2022 "Roofline Model for UAVs: A Bottleneck Analysis Tool for Onboard Compute Characterization of Autonomous Unmanned Aerial Vehicles"
Srivatsan Krishnan, Zishen Wan, Kshitij Bhardwaj, Ninad Jadhav, Aleksandra Faust, Vijay Janapa Reddi
In IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2022
Acceptance Rate: 29%

CICC 2022 "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
Acceptance Rate: 41%

DATE 2022 "FRL-FI: Transient 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
Acceptance Rate: 25%

ASP-DAC 2022 "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), January 2022
(Invited Paper)

DAC 2021 "Analyzing and Improving Fault Tolerance of Learning-Based Navigation System"
Zishen Wan, Aqeel Anwar, Yu-Shun Hsiao, Tianyu Jia, Vijay Janapa Reddi, Arijit Raychowdhury
In 58th ACM/IEEE Design Automation Conference (DAC), 2021
Acceptance Rate: 23%
Best Presentation Award as DAC Young Fellow

AICAS 2021 "An Energy-Efficient Quad-Camera 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

AICAS 2021 "iELAS: An ELAS-Based Energy-Efficient Accelerator for Real-Time Stereo Matching on FPGA Platform"
Tian Gao*, Zishen Wan*, Yuyang Zhang, Bo Yu, Yanjun Zhang, Shaoshan Liu, Arijit Raychowdhury
In IEEE International Conf on Artificial Intelligence Circuits and Systems (AICAS), 2021

DAC 2020 "Algorithm-Hardware Co-Design of Adaptive Floating-Point Encodings for Resilient Deep Learning 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
Best Paper Award
ACM SIGDA Research Highlights Nominee

Acceptance Rate: 23%

Journal Publications

Frontiers in Science 2025 "Artificial Intelligence Hardware: Quo Vadis?"
Kaushik Roy, Adarsh Kosta, Tanvi Sharma, Shubham Negi, Deepika Sharma, Utkarsh Saxena, Sourjya Roy, Anand Raghunathan, Zishen Wan, Samuel Spetalnick, Che-Kai Liu, Arijit Raychowdhury
In *Fronters in Science, 2025*

TCASAI 2024 "Towards Efficient Neuro-Symbolic AI: From Workload Characterization to Hardware Architecture"
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 Most Cited Paper in all TCASAI Papers

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

JATS 2024 "Benchmarking Test-Time DNN Adaptation at Edge with Compute-In-Memory"
Zhenkun Fan*, Zishen Wan*, Che-Kai Liu, Anni Lu, Kshitij Bhardwaj, Arijit Raychowdhury
In *ACM Journal on Autonomous Transportation Systems (JATS), Special Issue on Full-Stack Codesign for Robust AI-enabled Autonomous Transportation Systems, 2024*

TCAD 2023 "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 and Systems (TCAD), 2023

JSSC 2023 "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 2022 "QuaRL: Quantization for Fast and Environmentally Sustainable Reinforcement Learning"
Srivatsan Krishnan*, Max Lam*, Sharad Chitlangian*, Zishen Wan, Gabriel Barth-Maron, Aleksandra Faust, Vijay Janapa Reddi
In Transactions on Machine Learning Research (TMLR), 2022

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

CAL 2020 "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
Best Paper Award

Workshop Publications

ICLR 2024 "Scaling Compute Is Not All You Need for Adversarial Robustness"
Edoardo Debenedetti, Zishen Wan, Maksym Andriushchenko, Vikash Sehwag, Kshitij Bhardwaj, Bhavya Kailkhura
In Workshop on Reliable and Responsible Foundation Models, International Conference on Learning Representations (ICLR), 2024

RAS 2024 "ResGNN: A Generic Framework for Measuring Graph Neural Network Resilience Against Faults and Attacks in Hardware Systems"
Hanqiu Chen, Zishen Wan, Cong (Callie) Hao
In 1st IEEE RAS in Data Centers Summit, 2024

ISCA 2023 "VPP: The Vulnerability-Proportional Protection Paradigm Towards Reliable Autonomous Machines"
Zishen Wan, Yiming Gan, Bo Yu, Shaoshan Liu, Arijit Raychowdhury, Yuhao Zhu
In International Workshop on Domain Specific System Architecture (DOSSA), International Symposium on Computer Architecture (ISCA), 2023

ICML 2022 "Multi-Task Federated Reinforcement Learning with Adversaries"
Aqeel Anwar, Zishen Wan, Arijit Raychowdhury
In Adversarial Machine Learning Workshop, International Conference on Machine Learning (ICML), 2022

NVMW 2022 "RRAM-ECC: Improving Reliability of RRAM-Based Compute In-Memory"
Zishen Wan*, Brian Crafton*, Samuel Spetalnick, Jong-Hyeok Yoon, Arijit Raychowdhury
In 13th Annual Non-Volatile Memories Workshop (NVMW), 2022

Pre-Prints

arXiv "Cross-Layer Design of Vector-Symbolic Computing: Bridging Cognition and Brain-Inspired Hardware Acceleration"
Shuting Du, Mohamed Ibrahim, Zishen Wan, Luqi Zheng, Boheng Zhao, Zhenkun Fan, Che-Kai Liu, Tushar Krishna, Arijit Raychowdhury, Haitong Li
arXiv preprint arXiv:2508.14245, 2025

ADDITIONAL AWARDS AND HONORS

2025 **PhD Forum** Attendee at MICRO 2025
10 selected PhD students in computer architecture present dissertation research.

2025 **WAIC Yunfan Rising Star Award Nominee**
15 researchers under the age of 30 are selected each year in AI-related research fields.

2024 **3rd Place, ACM/SIGMICRO Student Research Competition**
Ranked 3rd of 40 participants in ACM student research competition at IEEE/ACM International Symposium on Microarchitecture (MICRO)

2022 **3rd Place, ACM/SIGDA Student Research Competition**
Ranked 3rd of 40 participants in ACM student research competition at International Conference on Computer-Aided Design (ICCAD), declined

2025 **Student Travel Award**, International Symposium on High-Performance Computer Architecture **(HPCA)**
2024 **Student Travel Award**, International Symposium on Microarchitecture **(MICRO)**
2024 **Student Travel Award**, Conference on Machine Learning and Systems **(MLSys)**
2024 **Student Travel Award**, IEEE International Symposium on Performance Analysis of Systems and Software (**ISPASS**)
2024 **Student Travel Award**, ACM International Conference on Architectural Support for Programming Languages and Operating Systems **(ASPLOS)**
2024 **Student Travel Award**, IEEE International Solid-State Circuits Conference **(ISSCC)**
2023 **Student Travel Award**, International Symposium on Computer Architecture **(ISCA)**
2023 **Student Travel Award**, Conference on Machine Learning and Systems **(MLSys)**
2018 **Best Undergraduate Thesis Award**, HIT
2018 **Chunhui Innovation Achievement Award** (First Class), HIT
3 of all undergraduates in HIT, highest student academic honor in HIT
2017 **Innovation and Entrepreneurship Award**, Ministry of Industry and Information, China
2016 **Outstanding Student Award** of Heilongjiang Province, China
Top 1% of over 500,000 undergraduates in Heilongjiang Province
2016 **1st Place**, National Undergraduate Mathematical Contest in Modeling, China
Team leader, 294 winners out of ~32000 teams, ranked 1st among ~600 HIT teams

SELECTED TALKS

"Tailored Computing: Domain-Specific Architecture for Embodied Autonomous Machines"
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, DARPA SRC JUMP 2.0, 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, Chinese Academy of Sciences (Prof. Yunji Chen), Online

"System Implications and Opportunities for Compositional Neuro-Symbolic-Probabilistic AI"
Sept 2025 Seminar Talk, Georgia Institute of Technology (Host: Prof. Alexey Tumanov), Atlanta, GA

"Demystifying NeuroSymbolic AI via Workload Characterization and Software-Hardware Co-Design"
Jul 2025 Seminar Talk, Purdue University (Host: Prof. Anand Raghunathan, Prof. Kaushik Roy), 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), Online
Mar 2025 CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, DARPA SRC JUMP 2.0, Atlanta, GA
Jan 2025 Guest Lecture, Georgia Tech ECE8893 Parallel Programming for FPGAs (Host: Prof. Callie Hao), Atlanta, GA
Jan 2025 Georgia Tech Computer Architecture Research Seminar (Arch-Whisky), Atlanta, GA
Nov 2024 ACM Student Research Competition, International Symposium on Microarchitecture (MICRO), Austin, TX
Aug 2024 Invited Talk, University of Minnesota, Twin Cities (host: Prof. Katie Zhao), Minneapolis, MN
May 2024 Young Professional Symposium, Conference on Machine Learning and Systems (MLSys), 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, DARPA SRC JUMP 2.0, 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, DARPA SRC JUMP 2.0, Atlanta, GA
May 2023	Georgia Tech 3D Systems Packaging Research Center Spring Meeting, Atlanta, GA

"Intelligence in Robotic Computing: Agile Design Flows for Efficient and Resilient Autonomous Systems"

Nov 2024	Invited Talk, University of Central Florida Computer Architecture Seminar (host: Prof. Di Wu), Orlando, FL
Nov 2024	Senior Student Talk, MICRO Workshop on Robotics Acceleration with Computing Hardware, Austin, TX
Sept 2024	ESWEEK (Embedded Systems Week) 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, DARPA SRC JUMP 2.0, 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 Efficient and Intelligent Computing (EIC) Lab (Host: Prof. Celine Lin), Atlanta, GA
Feb 2023	CRNCH (Center for Research into Novel Computing Hierarchies) Annual Summit, Atlanta, GA
Nov 2022	ACM Student Research Competition (SRC) at ICCAD 2022, San Diego, CA

"Heterogenous 3D Integrated Compute-In Memory for Neuro-Symbolic Computing"

Sept 2024	Semiconductor Research Corporation (SRC) TECHCON, Austin, TX

"System-Architecture-Technology Cross-Layer Design for Autonomous and Embodied Intelligence"

Nov 2024	Invited Talk, Harvard University Nano-Design Research Group (host: Prof. Gage Hills), Cambridge, MA
Aug 2024	Invited Talk, Lawrence Livermore National Laboratory (host: Dr. Kshitij Bhardwaj), Livermore, CA

"Efficient Algorithm-Hardware Co-Design for Robotic Mapping and Localization"

Mar 2023	Guest Lecture, Georgia Tech ECE8893 Parallel Programming for FPGAs (Host: Prof. Callie Hao), Atlanta, GA
Feb 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, DARPA SRC JUMP, Purdue University, West Lafayette, IN
Mar 2022	Guest Lecture, Georgia Tech ECE8893 Parallel Programming for FPGAs (Host: Prof. Callie Hao), Atlanta, GA
Feb 2022	CRNCH (Center for Research into 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, DARPA SRC JUMP 2.0, Atlanta, GA
Feb 2024	CRNCH (Center for Research into Novel Computing Hierarchies) Annual Summit, Atlanta, GA

May 2023	CoCoSys (Center for the Co-Design of Cognitive Systems) Annual Summit, DARPA SRC JUMP 2.0, Atlanta, GA
Nov 2022	ACM Student Research Competition (SRC) at ESWEEK 2022, Online
Jun 2022	COMPSAC Plenary Panel, Torino, Italy (Online)
Oct 2021	CBRIC (Center for Brain-Inspired Computing) Annual Summit, DARPA SRC JUMP, Purdue University, West Lafayette, IN, USA (Online)
Aug 2021	CBRIC (Center for Brain-Inspired Computing) Industry Talk, DARPA SRC JUMP, Online
Jul 2020	Harvard Architecture, Circuits and Compilers Lab, Online

ACADEMIC SERVICE

Research Working Group

ML Commons	ML Commons (MLPerf) Resilience and Robustness Research Working Group, Co-founder, *2022*

Conference Reviewer

MLSys	Conference on Machine Learning and Systems (MLSys), *2025*
ICRA	International Conference on Robotics & Automation (ICRA), *2025*
DAC	IEEE/ACM Design Automation Conference (DAC), *2023, 2024*
ESWEEK	IEEE/ACM Embedded Systems Week (ESWEEK), *2023*
ICCAD	IEEE/ACM International Conference on Computer-Aided Design (ICCAD), *2022*
NPC	IFIP International Conference on Network and Parallel Computing (NPC), *2022*

Journal Reviewer

IEEE JSSC	IEEE Journal of Solid-State Circuits (JSSC)
IEEE JETCAS	IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS)
IEEE IoT	IEEE Internet of Things Journal (IoT)
IEEE TCAD	IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems
IEEE TBioCAS	IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)
IEEE TCAS-1	IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I)
IEEE Micro	IEEE Micro
IEEE CAL	IEEE Computer Architecture Letter (CAL)
IEEE TIM	IEEE Transactions on Instrumentation and Measurement (TIM)
ACM JATS	ACM Journal on Autonomous Transportation Systems (JATS)
ACM TCPS	ACM Transactions on Cyber-Physical Systems (TCPS)

Workshop Program Committee

ArchEAI@ISCA	Workshop on Architecture Support for Embodied AI Systems, International Symposium on Computer Architecture (ISCA), *2025*
SCOPE@ICLR	Workshop on Scalable Optimization for Efficient and Adaptive Foundation Models, Thirteenth International Conference on Learning Representations (ICLR), *2025*
CAV@ASPLOS	Workshop on Compute Platforms for Autonomous Vehicles, IEEE/ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), *2024*

Artifact Evaluation Committee

HPCA	IEEE/ACM International Symposium on High-Performance Computer Architecture (HPCA), *2025*
ISCA	IEEE/ACM International Symposium on Computer Architecture (ISCA), *2023, 2024*
MICRO	IEEE/ACM International Symposium on Microarchitecture (MICRO), *2022, 2023*
ASPLOS	IEEE/ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), *2022, 2023*
MLSys	Conference on Machine Learning and Systems (MLSys), *2023*
IISWC	IEEE International Symposium on Workload Characterization (IISWC), *2022*

Workshop / Special Session / Tutorial Organizer

ESWEEK Special Session, ACM Embedded Systems Week (ESWEEK), *2024*

ICCAD Special Session, IEEE/ACM International Conference on Computer-Aided Design (ICCAD), *2024*

Panelist

COMPSAC IEEE Computers, Software & Applications Conference (COMPSAC), *2022*

Outreach Activity

CASA Steering Committee, Computer Architecture Student Association (CASA), *2024, 2025*

ISSCC News and Media Team, *2024*

IEEE Entrep. Steering Committee, IEEE Entrepreneurship of China Region, *2023*

MEDIA COVERAGE

SRC News	Wan Wins First Place at DAC 2025 Ph.D. Forum (08/2025)
GaTech News	Wan Wins First Place at Premier Computing Ph.D. Forum (07/2025)
GaTech News	CoCoSys Develops Groundbreaking Neuro-Symbolic AI Chip (05/2025)
SRC News	SRC Highlights: CoCoSys Featured in Fortune (01/2025)
MIT TR News	New Adaptive Protection Paradigm to Improve the Reliability of Robot Computing Systems (01/2025)
Fortune News	Generative AI can't shake its reliability problem, some say 'neurosymbolic AI' is the answer (12/2024)
CoCoSys News	Zishen Wan: Research Scholar Spotlight from DARPAR SRC JUMP2.0 Program (12/2024)
ACM News	MICRO 2024 Trip Report: Success at Scale (11/2024)
TechXplore	Balancing cost and reliability in autonomous machine design (10/2024)
GaTech News	ECE Students Take Home Top Honors at TECHCON 2024 (10/2024)
ACM News	Hallucination vs Creativity, Public Digital Currencies, and Reliable Autonomous Machines (09/2024)
TechSpot News	Number Representations in Computer Hardware: Fundamentals Matter (06/2024)
GaTech News	ECE Benchmarking Making Major Advances in Machine Learning (04/2024)
GaTech News	Wan Recognized for Energy-Saving Research on Autonomous Systems (01/2024)
GaTech News	The Year in Artificial Intelligence and Machine Learning (12/2023)
SemiEng News	Scalable And Compact Multi-Bit CAM Designs Using FeFETs (10/2023)
GaTech News	Wan Selected as Machine Learning and Systems Rising Star (09/2023)
RobotReport	RobotPerf Benchmarks compare robotics computing performance (09/2023)
GaTech News	Celebrating ISCA's 50th: Georgia Tech's Contributions, Impact, and Reflections on 50 Years of Computer Architecture Innovation (07/2023)
GaTech News	Wan Wins Computing Machinery Student Research Competition (12/2022)
Google AI Blog	Quantization for Fast and Environmentally Sustainable Reinforcement Learning (09/2022)
MarkTech Post	A Novel Reinforcement Learning Training Paradigm to Speed Up Actor-Learner Distributed RL Training (09/2022)
GaTech News	Wan Selected for IEEE/ACM DAC Honors (01/2022)

MENTORSHIP

2024-present	**Yuhang Du**, Fudan Univ BS | Next Move: Visiting student at Stanford
2024-2025	**Jiayi Qian**, Georgia Tech MS | Next Move: PhD student at Georgia Tech
2024-2025	**Chenyu Wang**, Princeton MS | Next Move: PhD student at Harvard
2023	**Che-Kai Liu**, Zhejiang Univ BS | Next Move: PhD student at Georgia Tech
2022-2024	**Zhenkun Fan**, Georgia Tech MS | Next Move: PhD student at Georgia Tech
2022-2023	**Ying-Hao Wei**, Georgia Tech MS | Next Move: Memory Engineer at Micron

2021-2022 **Katarine Emanuela Klitzke**, Georgia Tech BS | Next Move: SoC Engineer at Microsoft **(Forbes 30 under 30 Award)**
2020 **Prateek Pinisetti**, Harvard BS | Next Move: CTO/cofounder at Kirana AI

REFERENCES

Dr. Arijit Raychowdhury
Professor and Steve W. Chaddick School Chair, School of Electrical and Computer Engineering (ECE)
Georgia Institute of Technology
Email: arijit.raychowdhury@ece.gatech.edu

Dr. Tushar Krishna
Associate Professor, School of Electrical and Computer Engineering (ECE)
Georgia Institute of Technology
Email: tushar@ece.gatech.edu

Dr. Vijay Janapa Reddi
Gordon McKay Professor, School of Engineering and Applied Science (SEAS)
Harvard University
Email: vj@eecs.harvard.edu