Zishen Wan

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RESEARCH INTERESTS

Research Areas: Computer Architecture, VLSI, Autonomous Machine, Embodied AI, Reliability, Algorithm-Hardware Co-Design, System-Technology Co-Optimization
Research Vision: My research is at the intersection of VLSI, computer architecture, and embedded systems. I build hardware and system for autonomous machines and embodied intelligence through cross-stack system-architecture-hardware-technology co-design and co-optimization, with the vision to advance their performance, efficiency, resilience, and trustworthy.

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)

PROFESSIONAL EXPERIENCE

2020- **Georgia Institute of Technology, Atlanta, GA, USA**
Graduate Research Assistant

2018-2020 **Harvard University, Cambridge, MA, USA**
Graduate Research Assistant

2018 **Massachusetts Institute of Technology, Cambridge, MA, USA**
Graduate Research Assistant

2016-2018 **Harbin Institute of Technology, Harbin, China**
Undergraduate Research Assistant

2017 **National Tsing-Hua University, Hsinchu, Taiwan**
Visiting Student

2017 **National Chiao-Tung University, Hsinchu, Taiwan**
Visiting Student

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.

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.

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)**

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
100 winners out of ~4000 thesis submissions
2018 **Outstanding Graduates**, HIT
Top 1% of all undergraduates
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
2018 **Chiang Chen Overseas Graduate Fellowship**
10 of all undergraduates and graduates in China, $50,000/year
2018 **China Telecom Fellowship**
5 of all undergraduates and graduates in HIT
2016 **Siemens Fellowship**
30 of all undergraduates and graduates in HIT
2015 **Johnson Electric Fellowship**
15 of all undergraduates and graduates in HIT
2015-2018 **First Class Academic Excellence Fellowship**
Top 3% of all undergraduates in HIT

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

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

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), March 2025
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), March 2025

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), March 2025

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

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

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), Nov 2024

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), September 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), June 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), May 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), May 2024
Acceptance Rate: 13%
Best Poster Award, IBM IEEE AI Compute Symposium

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), May 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), May 2024
Best Paper Award, IROS Robotic Benchmarking Workshop

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), May 2024

ICLR 2024 (Workshop) "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), May 2024

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), April 2024
Acceptance Rate: 24%
Selected for presentation at SRC TECHCON 2024
Best Presentation Award, SRC TECHCON 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, June 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), November 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), July 2023
Acceptance Rate: 23%

ISCA 2023 (Workshop) "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), June 2023

MLSys 2023 (Workshop) "Towards Cognitive AI Systems: A Survey and Perspective on Neuro-Symbolic AI"
Zishen Wan, Che-Kai Liu, Hanchen Yang, Chaojian Li, Haoran You, Yonggan Fu, Cheng Wan, Tushar Krishna, Yingyan (Celine) Lin, Arijit Raychowdhury
In Workshop on Systems for Next-Gen AI Paradigms, Conference on Machine Learning and Systems (MLSys), June 2023

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), March 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), March 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), February 2023
Acceptance Rate: 33% (205/629)

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), November 2022

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), October 2022
2023 IEEE Micro Top Picks, Honorable Mention
Acceptance Rate: 22% (83/369)

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), July 2022
Acceptance Rate: 23% (231/987)

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

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 Conference on Artificial Intelligence Circuits and Systems (AICAS), June 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), June 2022
Acceptance Rate: 29% (24/83)

NVMW 2022 (Workshop) "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), May 2022

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), April 2022
Acceptance Rate: 41% (97/235)

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), March 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), December 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 Conference on Artificial Intelligence Circuits and Systems (AICAS), June 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 Conference on Artificial Intelligence Circuits and Systems (AICAS), June 2021

ICLR 2021 (Workshop) "ActorQ: Quantization for Actor-Learner Distributed Reinforcement Learning"
Max Lam*, Sharad Chitlangian*, Srivatsan Krishnan*, Zishen Wan, Gabriel Barth-Maron, Aleksandra Faust, Vijay Janapa Reddi
In Hardware-Aware Efficient Training (HEAT) Workshop, International Conference on Learning Representations (ICLR), May 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), July 2020
Best Paper Award
ACM SIGDA Research Highlights Nominee
Acceptance Rate: 23% (228/984)

MLSys 2020 (Workshop) "Quantized Reinforcement Learning (QuaRL)"
Srivatsan Krishnan*, Sharad Chitlangian*, Max Lam*, Zishen Wan, Aleksandra Faust, Vijay Janapa Reddi
In Resource-Constrained Machine Learning Workshop, Conference on Machine Learning and System (MLSys), March 2020

Journal Publications

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

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), Dec, 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), July, 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), July 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), June 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), March 2020
Best Paper Award

JJAP 2019 "Electrically Tunable Temporal Imaging in a Graphene-Based Waveguide"
Peng Xie, Yu Wen, Zishen Wan, Xinyu Wang, Jiarui Liu, Wenqiang Yang, Xiaofeng Li, Yishan Wang
In Japanese Journal of Applied Physics, 58(5):050914, April 2019

Preprints

Preprint 2021 "AutoSoC: Automating Algorithm-SoC Co-design for Aerial Robots"
Srivatsan Krishnan, Thierry Tambe, Zishen Wan, Vijay Janapa Reddi
arXiv preprint arXiv:2109.05683, 2021

Preprint 2019 "Adaptivfloat: A Floating-point Based Data Type for Resilient Deep Learning Inference"
Thierry Tambe, En-yu Yang, Zishen Wan, Yuntian Deng, Vijay Janapa Reddi, Alexander Rush, David Brooks, Gu-Yeon Wei

arXiv preprint arXiv:1909.13271, 2019

SELECTED TALKS

"Tailored Computing: Domain-Specific Architecture for Embodied Autonomous Machines"

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

"Demystifying NeuroSymbolic AI via Workload Characterization and Software-Hardware Co-Design"

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

"Edge Computing on Aerial Robots"

Nov 2021 ACM Student Research Competition (SRC) at ICCAD, Online

Sep 2020 Georgia Tech Integrated Circuits and System Research 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), *2024*

IEEE JETCAS IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS), *2024*

IEEE IoT	IEEE Internet of Things Journal (IoT), *2024*
IEEE TCAD	IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, *2023*
IEEE TBioCAS	IEEE Transactions on Biomedical Circuits and Systems (TBioCAS), *2023*
IEEE TCAS-1	IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I), *2023*
IEEE Micro	IEEE Micro, *2023*
IEEE TIM	IEEE Transactions on Instrumentation and Measurement (TIM), *2024*
ACM JATS	ACM Journal on Autonomous Transportation Systems (JATS), *2023*

Workshop Program Committee

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	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)

SKILLS

Programming	Python, C/C++, Verilog/SystemVerilog, MATLAB
ML Framework	Pytorch, TensorFlow, Keras, Caffe
Tool	Virtuoso, Design Compiler, Innovus, Calibre, Vivado, Quartus, OrCAD, MultiSim, Altium Designer, Unreal Engine, AirSim