

# PROFESSOR DI WU

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🏠 www.unarylab.com  
🎓 <https://scholar.google.com/citations?user=v6DNkTAAAAAJ>  
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## APPOINTMENT

<b>Assistant Professor</b>   <i>Electrical and Computer Engineering</i> University of Central Florida	08/2023 – Present Orlando, FL, USA
<b>Joint Assistant Professor</b>   <i>Computer Science</i> University of Central Florida	08/2023 – Present Orlando, FL, USA

## RESEARCH INTEREST

- Computer architecture  
— performance, efficiency, etc.
- Emerging computing  
— unary, neuromorphic, quantum, photonic, etc.
- Domain specific acceleration  
— artificial intelligence, brain computer interface, etc.
- Heterogeneous system  
— Compute Express Link, multi-GPU, etc.

## EDUCATION




<b>Doctor of Philosophy</b>   <i>Electrical and Computer Engineering</i> University of Wisconsin–Madison • Advisor: Prof. Joshua San Miguel • Thesis: Power-Efficient Computer Architecture via Unary and Approximate Computing 🏆 <b>Harold Peterson Outstanding Dissertation Award</b>	09/2017 – 07/2023 Madison, WI, USA
<b>Master of Engineering</b>   <i>Microelectronics</i> Fudan University	09/2012 – 01/2015 Shanghai, China
<b>Bachelor of Science</b>   <i>Microelectronics</i> Fudan University	09/2007 – 07/2012 Shanghai, China

## EMPLOYMENT

<b>Research Assistant</b> Department of Electrical and Computer Engineering, UW–Madison	09/2017 – 07/2023 Madison, WI, USA
<b>Research Intern</b> Cerebras Systems	05/2022 – 09/2022 Sunnyvale, CA, USA
<b>Research Intern</b> Cerebras Systems	05/2020 – 09/2020 Sunnyvale, CA, USA
<b>Research Intern</b> Meta (Formerly Facebook)	05/2019 – 09/2019 Palo Alto, CA, USA
<b>Digital Circuit Engineer</b> HiSilicon	03/2015 – 05/2017 Shanghai, China
<b>Research Assistant</b> State Key Laboratory of ASIC and System, Fudan University	09/2012 – 01/2015 Shanghai, China

## HONORS AND AWARDS










<b>IEEE Micro Top Pick Honorable Mention</b> <a href="#">🔗</a> 1 of the 24 publications selected from all computer architecture publications in 2024	2025
<b>Harold Peterson Outstanding Dissertation Award</b> <a href="#">🔗</a> UW–Madison	2024
<b>Distinguished Artifact Evaluation Award</b> <a href="#">🔗</a> ASPLOS	2024
<b>Machine Learning and Systems Rising Star</b> <a href="#">🔗</a> MLCommons	2023
<b>Capstone PhD Teaching Award Nomination</b> UW–Madison	2022
<b>Grainger Wisconsin Distinguished Graduate Fellowship</b> 1 of the 3 PhD students selected from College of Engineering, UW–Madison	2022
<b>Student Travel Award</b> ISCA	2022
<b>Dissertator Travel Award (twice)</b> UW–Madison	2022
<b>Ph.D. Forum</b> DAC	2021





<b>IEEE Micro Top Pick</b> 	2021
1 of the 12 publications selected from all computer architecture publications in 2020	
<b>Gerald Holdridge Outstanding Teaching Assistant Award</b>	2020
UW–Madison	
<b>Chancellor’s Opportunity Fellowship</b>	2019
UW–Madison	
<b>Qualcomm Innovation Fellowship Finalist</b> 	2019
Qualcomm	
<b>Foxconn SmartCity Competition Winner</b>	2019
Foxconn	
<b>Student Research Travel Award</b>	2019
UW–Madison	
<b>Student Research Competition Travel Award</b>	2019
ASPLOS	
<b>Student Travel Award</b>	2019
ASPLOS	
<b>Hiran Mayukh Award</b> 	2018
UW–Madison	
<b>Rising Star Award</b>	2015
HiSilicon	
<b>National Scholarship (ranking 1/67)</b>	2015
Fudan University	
<b>Excellent Student Union Leader</b>	2010
Fudan University	
<b>Third Prize Freshman Scholarship (ranking 3/45)</b>	2007
Fudan University	

## PUBLICATIONS


+ – Student \* – Collaborator × – Advisor

### Conference

- [1] Leveraging Photonic Interconnects for Scalable and Efficient Fully Homomorphic Encryption  
Dewan Saiham, **Di Wu**, Sazadur Rahman\*  
*Government Microcircuit Applications & Critical Technology Conference*, 2025
- [2] LoAS: Fully Temporal-Parallel Datatflow for Dual-Sparse Spiking Neural Networks  
Ruokai Yin, Youngeun Kim, **Di Wu**, Priyadarshini Panda\*  
 *International Symposium on Microarchitecture*, 2024, DOI: 10.1109/MICRO61859.2024.00084
- [3] Evaluating Unary GEMM for Low-Precision AI: Toward Scalable Energy-Efficient DL Accelerators  
Prabhu Vellaisamy, Harideep Nair, **Di Wu**, Shawn Blanton\*, John Paul Shen\*  
*IEEE Computer Society Annual Symposium on VLSI*, 2024, DOI: 10.1109/ISVLSI61997.2024.00126
- [4] ALISA: Accelerating Large Language Model Inference via Sparsity-Aware KV Caching  
Youpeng Zhao, **Di Wu**, Jun Wang\*  
 *International Symposium on Computer Architecture*, 2024, DOI: 10.1109/ISCA59077.2024.00077
- [5] Carat: Unlocking Value-Level Parallelism for Multiplier-Free GEMMs  
Zhewen Pan, Joshua San Miguel<sup>×</sup>, **Di Wu**  
 *International Conference on Architectural Support for Programming Languages and Operating Systems*, 2024, DOI: 10.1145/3620665.3640364  
 **IEEE Micro Top Pick Honorable Mention 2025 (24 from all computer architecture papers)**  
 **Distinguished Artifact Evaluation Award**  
[Open-source artifact](#) 
- [6] uBrain: A Unary Brain Computer Interface  
**Di Wu**, Jingjie Li, Zhewen Pan, Younghyun Kim\*, Joshua San Miguel<sup>×</sup>  
 *International Symposium on Computer Architecture*, 2022, DOI: 10.1145/3470496.3527401
- [7] uSystolic: Byte-Crawling Unary Systolic Array  
**Di Wu**, Joshua San Miguel<sup>×</sup>  
 *International Symposium on High-Performance Computer Architecture*, 2022, DOI: 10.1109/HPCA53966.2022.00010  
[Open-source software: uSystolic-Sim](#) 
- [8] When Dataflows Converge: Reconfigurable and Approximate Computing for Emerging Neural Networks  
**Di Wu**, Joshua San Miguel<sup>×</sup>  
*International Conference on Computer Design*, 2021, DOI: 10.1109/ICCD53106.2021.00014

- [9] UNO: Virtualizing and Unifying Nonlinear Operations for Emerging Neural Networks  
**Di Wu**, Jingjie Li, Setareh Behrooz, Younghyun Kim\*, Joshua San Miguel<sup>×</sup>  
*International Symposium on Low Power Electronics and Design*, 2021, DOI: 10.1109/ISLPED52811.2021.9502473
- [10] Normalized Stability: A Cross-Level Design Metric for Early Termination in Stochastic Computing  
**Di Wu**, Ruokai Yin, Joshua San Miguel<sup>×</sup>  
*Asia and South Pacific Design Automation Conference*, 2021, DOI: 10.1145/3394885.3431549
- [11] uGEMM: Unary Computing Architecture for GEMM Applications  
**Di Wu**, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim\*, Joshua San Miguel<sup>×</sup>  
 *International Symposium on Computer Architecture*, 2020, DOI: 10.1109/ISCA45697.2020.00040  
 **IEEE Micro Top Pick 2021 (12 from all computer architecture papers)** [Open-source software: UnarySim](#) 
- [12] Approximate Hardware Techniques for Energy-Quality Scaling Across the System  
 Younghyun Kim\*, Joshua San Miguel<sup>×</sup>, Setareh Behrooz, Tianen Chen, Kyuin Lee, Yongwoo Lee, Jingjie Li, **Di Wu**  
*International Conference on Electronics, Information, and Communication*, 2020, DOI: 10.1109/ICEIC49074.2020.9051208
- [13] SECO: A Scalable Accuracy Approximate Exponential Function Via Cross-Layer Optimization  
**Di Wu**, Tianen Chen, Chienfu Chen, Oghenefego Ahia, Joshua San Miguel<sup>×</sup>, Mikko Lipasti\*, Younghyun Kim\*  
*International Symposium on Low Power Electronics and Design*, 2019, DOI: 10.1109/ISLPED.2019.8824959
- [14] In-Stream Stochastic Division and Square Root via Correlation  
**Di Wu**, Joshua San Miguel<sup>×</sup>  
 *Design Automation Conference*, 2019, DOI: 10.1145/3316781.3317844
- [15] Convergence-Optimized Variable Node Structure for Stochastic LDPC Decoder  
 Qichen Zhang, Yun Chen, **Di Wu**, Xiaoyang Zeng, Yeong-luh Ueng  
*International Conference on Acoustics, Speech and Signal Processing*, 2016, DOI: 10.1109/ICASSP.2016.7472936
- [16] An Area-Efficient Architecture for Stochastic LDPC Decoder  
 Qichen Zhang, Yun Chen, **Di Wu**, Xiaoyang Zeng, Yeong-luh Ueng  
*International Conference on Digital Signal Processing*, 2015, DOI: 10.1109/ICDSP.2015.7251868
- [17] Latency-Optimized Stochastic LDPC Decoder for High-Throughput Applications  
**Di Wu**, Yun Chen, Qichen Zhang, Lirong Zheng, Xiaoyang Zeng, Yeong-luh Ueng  
*International Symposium on Circuits and Systems*, 2015, DOI: 10.1109/ISCAS.2015.7169329
- [18] A High-Throughput LDPC Decoder for Optical Communication  
**Di Wu**, Yun Chen, Yuebin Huang, Yeongluh Ueng, Lirong Zheng, Xiaoyang Zeng  
*International Conference on ASIC*, 2013, DOI: 10.1109/ASICON.2013.6811973

## Journal


- [1] Synergizing Quantum Techniques with Machine Learning for Advancing Drug Discovery Challenge  
 Zhiding Liang, Zichang He, Yue Sun, Dylan Herman, Qingyue Jiao, Yanzhang Zhu<sup>+</sup>, Weiwen Jiang\*, Xiaowei Xu\*, **Di Wu**, Marco Pistoia\*, Yiyu Shi\*  
*Scientific Reports* 14 (2025), p. 31216, DOI: 10.1038/s41598-024-82576-4
- [2] uGEMM: Unary Computing for GEMM Applications  
**Di Wu**, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim\*, Joshua San Miguel<sup>×</sup>  
*IEEE Micro* 41.3 (2021), pp. 50–56, DOI: 10.1109/MM.2021.3065369  
 **IEEE Micro Top Pick Issue 2021**
- [3] In-Stream Correlation-Based Division and Bit-Inserting Square Root in Stochastic Computing  
**Di Wu**, Ruokai Yin, Joshua San Miguel<sup>×</sup>  
*IEEE Design & Test* 38.6 (2021), pp. 53–59, DOI: 10.1109/MDAT.2021.3050716
- [4] Strategies for Reducing Decoding Cycles in Stochastic LDPC Decoders  
**Di Wu**, Yun Chen, Qichen Zhang, Yeong-luh Ueng, Xiaoyang Zeng  
*IEEE Transactions on Circuits and Systems II: Express Briefs* 63.9 (2016), pp. 873–877, DOI: 10.1109/TCSII.2016.2535038
- [5] An Efficient Multirate LDPC-CC Decoder With a Layered Decoding Algorithm for the IEEE 1901 Standard  
 Yun Chen, Qichen Zhang, **Di Wu**, Changsheng Zhou, Xiaoyang Zeng  
*IEEE Transactions on Circuits and Systems II: Express Briefs* 61.12 (2014), pp. 992–996, DOI: 10.1109/TCSII.2014.2362721

## Workshop

- [1] Synergizing Error Suppression, Mitigation and Correction for Fault-Tolerant Quantum Computing  
 Yanzhang Zhu<sup>+</sup>, Siyuan Niu\*, **Di Wu**  
*IEEE Workshop on Quantum Intelligence, Learning & Security, collocated with International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications* (2024), DOI: 10.1109/TPS-ISA62245.2024.00065

- [2] Exploration of Unary Arithmetic-Based Matrix Multiply Units for Low Precision DL Accelerators  
Prabhu Vellaisamy, Harideep Nair, **Di Wu**, Shawn Blanton\*, John Paul Shen\*  
*Workshop on Unary Computing, collocated with International Conference on Architectural Support for Programming Languages and Operating Systems (2024)*
- [3] xBrain: Brain-Like Computing for Explainable Brain-Computer Interfaces  
Queenly Xie<sup>+</sup>, Prabhu Vellaisamy, **Di Wu**  
*Young Architect Workshop, collocated with International Conference on Architectural Support for Programming Languages and Operating Systems (2024)*
- [4] T-MAC: Temporal Multiplication with Accumulation  
Zhewen Pan, **Di Wu**, Joshua San Miguel<sup>x</sup>  
*Young Architect Workshop, collocated with International Conference on Architectural Support for Programming Languages and Operating Systems (2022)*

## Pre-Print

- [1] Unleashing The Potential of LLMs for Quantum Computing: A Study in Quantum Architecture Design  
Zhiding Liang, Jinglei Cheng, Rui Yang, Hang Ren, Zhixin Song, **Di Wu**, Tongyang Li\*, Yiyu Shi\*  
*arXiv Pre-print (2023)*
- [2] Representation Range Needs for 16-Bit Neural Network Training  
Valentina Popescu\*, Abhinav Venigalla\*, **Di Wu**, Robert Schreiber\*  
*arXiv Pre-print (2021)*  
[Industry adoption: Automatic Mixed Precision – cbfloat16](#) 

## INVITED TALKS

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### Salvage Deep Learning Efficiency: A Unary Computing Approach

University of California, Santa Cruz	02/2025
ShanghaiTech University	12/2024
Fudan University	12/2024
Case Western Reserve University	10/2024
Peking University	08/2024
University of Minnesota Twin Cities	03/2024
University of Louisiana at Lafayette	11/2023

### Unary Computing for Power-Efficient Computer Architecture

AMD Research	07/2023
University of Central Florida	02/2023
University of California, Los Angeles	11/2022
University of California, Santa Barbara	10/2022

## TEACHING AND MENTORING

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### Instructor

EEE3342C (Digital Systems), UCF	FA 2024
EEL5796 (Big Data Computer Architecture and Systems), UCF	SP 2024
ECE697 (Capstone Project in Machine Learning and Signal Processing), UW–Madison	SU 2023

### Teaching Assistant

ECE554 (Digital Engineering Lab), UW–Madison	SP 2022
ECE454 (Mobile Computing Lab), UW–Madison	FA 2021
ECE454 (Mobile Computing Lab), UW–Madison	FA 2020
ECE554 (Digital Engineering Lab), UW–Madison	SP 2020
ECE554 (Digital Engineering Lab), UW–Madison	FA 2019
ECE554 (Digital Engineering Lab), UW–Madison	SP 2019
ECE554 (Digital Engineering Lab), UW–Madison	FA 2018
ECE552 (Introduction to Computer Architecture), UW–Madison	FA 2018

### Guest Lecturer

ECE18743 (Neuromorphic Computer Architecture & Processor Design), CMU	SP 2025
ECE757 (Advanced Computer Architecture II), UW–Madison	SP 2021
ECE757 (Advanced Computer Architecture II), UW–Madison	SP 2020
ECE752 (Advanced Computer Architecture I), UW–Madison	SP 2019

## PROFESSIONAL SERVICE

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### Panelist

NSF Medium Panel in Division of Computer and Network Systems (CNS) 2024  
IEEE Workshop on Quantum Intelligence, Learning & Security (QUILLS) 2024

### Committee

Organizing Chair of Workshop on Architecting Error Corrected Quantum Computers (ARQTEC) at HPCA 2025  
Organizing Chair of Undergrad Panel on "Charging STEM Career" at UCF 2024  
Organizing Chair of Workshop on Unary Computing (WUC) at ASPLOS 2024  
Organizing Committee of Quantum Computing for Drug Discovery Challenge at ICCAD 2023  
Program Committee of ASPLOS 2026  
Program Committee of HPCA 2024, 2025  
Program Committee of ISCA 2024, 2025  
Program Committee of MICRO 2025  
Program Committee of IISWC 2023  
Program Committee of ISPASS 2024, 2025  
Program Committee of IPDPS 2025  
Program Committee of DAC 2025  
Program Committee of ICCAD 2024  
Program Committee of DAC PhD Forum 2024  
Program Committee of ICCD 2023, 2024  
Program Committee of ICRC 2024  
Program Committee of ICA3PP 2023  
Program Committee of IEEE Workshop on Quantum Intelligence, Learning & Security (QUILLS) 2024  
Program Committee of Young Architect Workshop (YArch) 2023, 2024, 2025  
Program Committee of ASPLOS Artifact Evaluation 2020, 2021  
Program Committee of MICRO Artifact Evaluation 2021

### Mentor

UCF IEEE Engineering in Medicine and Biology Society (EMBS) Student Branch Chapter 2024  
Computer Architecture Long-term Mentoring (CALM) 2024  
Young Architect Workshop (YArch) 2023  
Undergrad Architecture Mentoring Workshop (uArch) 2023, 2024  
MICRO – "Meet a Senior PhD Student" 2020

### Journal Reviewer

ACM Transactions on Architecture and Code Optimization (TACO)  
ACM Transactions on Embedded Computing Systems (TECS)  
ACM Transactions on Reconfigurable Technology and Systems (TRETs)  
IEEE Computer Architecture Letter (CAL)  
IEEE Transactions on Circuits and Systems I (TCAS-I)  
IEEE Transactions on Computers (TC)  
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)  
IEEE Signal Processing Letters (SPL)  
Journal of Network and Computer Applications (JNCA)

## FUNDING

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### Awarded

AMD AI & HPC Fund (GPU node hours) 2024, 2025  
AMD Fund for Academic Research (Unrestricted Gift): \$100k 2024  
Quantum Computing Access at NERSC (QCAN) Program 2025

## STUDENTS

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### Current Students

Daniel Price (PhD) 2024 – Present  
Marco Kurzynski (PhD) 2024 – Present  
Yanzhang Zhu (PhD) 2024 – Present  
Zubaidah Al-Mashhadani (PhD) 2024 – Present

### Former Students

Parker McLeod (UG, AMD, full-time) 2023 – 2024  
Tyler Goldsmith (UG, AMD, full-time) 2023 – 2024  
Mustafa Nisar (UG, AMD, full-time) 2023 – 2024  
Zhewen Pan (MS, UW–Madison, PhD) 2020 – 2022  
Ruokai Yin (UG, Yale, PhD) 2019 – 2021

## REFERENCE

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### Professor Joshua San Miguel

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PhD advisor

University of Wisconsin–Madison

### Professor Younghyun Kim

younghyun.kim@wisc.edu

PhD committee member

University of Wisconsin–Madison

### Professor John Paul Shen

jpshe@cmu.edu

Carnegie Mellon University

### Professor Timothy Sherwood

sherwood@cs.ucsb.edu

University of California, Santa Barbara

### Professor Ulya R. Karpuzcu

ukarpuzc@umn.edu

University of Minnesota, Twin Cities