

# 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
<b>Joint Assistant Professor</b>   <i>Computer Science</i> University of Central Florida	08/2023 – Present

## 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 <ul style="list-style-type: none"><li>• Advisor: Prof. Joshua San Miguel</li><li>• Thesis: Power-Efficient Computer Architecture via Unary and Approximate Computing</li></ul> 🏆 <b>Harold Peterson Outstanding Dissertation Award</b>	09/2017 – 07/2023
<b>Master of Engineering</b>   <i>Microelectronics</i> Fudan University	09/2012 – 01/2015
<b>Bachelor of Science</b>   <i>Microelectronics</i> Fudan University	09/2007 – 07/2012

## EMPLOYMENT

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

## HONORS AND AWARDS

<b>Amar Mukherjee Best Paper Award of ISVLSI</b> 🔗	2025
<b>IEEE Micro Top Pick Honorable Mention</b> 🔗	2025
<b>Harold Peterson Outstanding Dissertation Award at UW–Madison</b> 🔗	2024
<b>Distinguished Artifact Evaluation Award of ASPLOS</b> 🔗	2024
<b>Machine Learning and Systems Rising Star</b> 🔗	2023
<b>Capstone PhD Teaching Award Nomination at UW–Madison</b>	2022
<b>Grainger Wisconsin Distinguished Graduate Fellowship at UW–Madison</b>	2022
<b>Student Travel Award of ISCA</b>	2022
<b>Dissertator Travel Award at UW–Madison</b>	2022
<b>Ph.D. Forum of DAC</b>	2021
<b>IEEE Micro Top Pick</b> 🔗	2021
<b>Gerald Holdridge Outstanding Teaching Assistant Award at UW–Madison</b>	2020
<b>Chancellor’s Opportunity Fellowship at UW–Madison</b>	2019
<b>Qualcomm Innovation Fellowship Finalist</b> 🔗	2019
<b>Foxconn SmartCity Competition Winner</b>	2019
<b>Student Research Travel Award at UW–Madison</b>	2019
<b>Student Research Competition Travel Award of ASPLOS</b>	2019

Student Travel Award of ASPLOS	2019
Hiran Mayukh Award at UW-Madison 	2018
Rising Star Award at HiSilicon	2015
National Scholarship at Fudan University (1/67)	2015
Excellent Student Union Leader at Fudan University	2010
Third Prize Freshman Scholarship at Fudan University (3/45)	2007

## PUBLICATIONS


+ – Student   \* – Collaborator   × – Advisor

### Conference


- [1] Can Photonic Interconnects be used for High-Throughput Memory Access in FHE Accelerators?  
Dewan Saiham, Mariam Rabadi, **Di Wu**, Sazadur Rahman\*  
*International Symposium on Low Power Electronics and Design*, 2025
- [2] Catwalk: Unary Top-K for Efficient Ramp-No-Leak Neuron Design for Temporal Neural Networks  
Devon Lister<sup>+</sup>, Prabhu Vellaisamy, John Shen<sup>\*</sup>, **Di Wu**  
*IEEE Computer Society Annual Symposium on VLSI*, 2025  
 **Amar Mukherjee Best Paper Award**
- [3] Leveraging Photonic Interconnects for Scalable and Efficient Fully Homomorphic Encryption  
Dewan Saiham, **Di Wu**, Sazadur Rahman\*  
*Government Microcircuit Applications & Critical Technology Conference*, 2025
- [4] 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
- [5] Exploration of Unary Arithmetic-Based Matrix Multiply Units for Low Precision DL Accelerators  
Prabhu Vellaisamy, Harideep Nair, **Di Wu**, Shawn Blanton<sup>\*</sup>, John Paul Shen\*  
*IEEE Computer Society Annual Symposium on VLSI*, 2024, DOI: 10.1109/ISVLSI61997.2024.00126
- [6] 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
- [7] 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 (24 from all computer architecture papers)**  
 **Distinguished Artifact Evaluation Award**  
Open-source software: [artifact](#) 
- [8] uBrain: A Unary Brain Computer Interface  
**Di Wu**, Jingjie Li, Zhewen Pan, Younghyun Kim<sup>\*</sup>, Joshua San Miguel<sup>×</sup>  
 *International Symposium on Computer Architecture*, 2022, DOI: 10.1145/3470496.3527401
- [9] 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](#) 
- [10] 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
- [11] UNO: Virtualizing and Unifying Nonlinear Operations for Emerging Neural Networks  
**Di Wu**, Jingjie Li, Setareh Behrooz, Younghyun Kim<sup>\*</sup>, Joshua San Miguel<sup>×</sup>  
*International Symposium on Low Power Electronics and Design*, 2021, DOI: 10.1109/ISLPED52811.2021.9502473
- [12] 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
- [13] uGEMM: Unary Computing Architecture for GEMM Applications  
**Di Wu**, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim<sup>\*</sup>, Joshua San Miguel<sup>×</sup>  
 *International Symposium on Computer Architecture*, 2020, DOI: 10.1109/ISCA45697.2020.00040  
 **IEEE Micro Top Pick (12 from all computer architecture papers)**  
Open-source software: [UnarySim](#) 

- [14] Approximate Hardware Techniques for Energy-Quality Scaling Across the System  
Younghyun Kim\*, Joshua San Miguel<sup>×</sup>, Setareh Behroozi, Tianen Chen, Kyuin Lee, Yongwoo Lee, Jingjie Li, **Di Wu**  
*International Conference on Electronics, Information, and Communication*, 2020, DOI: 10.1109/ICEIC49074.2020.9051208
- [15] 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
- [16] 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
- [17] 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
- [18] 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
- [19] 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
- [20] 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 (12 from all computer architecture papers)**
- [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] Syndrilla: Simulating Decoders for Quantum Error Correction using PyTorch  
Yanzhang Zhu<sup>+</sup>, Chen-Yu Peng, Yun Hao Chen, Siyuan Niu\*, Yeong-Luh Ueng\*, **Di Wu**  
*IEEE International Conference on Quantum Computing and Engineering*, 2025  
[Open-source software: Syndrilla](#) 
- [2] 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
- [3] 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)
- [4] 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)

- [5] T-MAC: Temporal Multiplication with Accumulation  
 Zhewen Pan, **Di Wu**, Joshua San Miguel<sup>×</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)  
[Open-source software: Industry adoption: Automatic Mixed Precision – cbfloat16](#) 

## INVITED TALKS

<b>Salvage Deep Learning Efficiency: A Unary Computing Approach</b>	
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
<b>Unary Computing for Power-Efficient Computer Architecture</b>	
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

<b>Instructor</b>	
EEL4742C (Embedded Systems), UCF	SP 2025
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
<b>Teaching Assistant</b>	
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
<b>Guest Lecturer</b>	
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

<b>Panelist</b>	
NSF Medium Panel in Division of Computer and Network Systems (CNS)	2024
IEEE Workshop on Quantum Intelligence, Learning & Security (QUILLS)	2024
<b>Committee</b>	
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, 2026
Program Committee of ISCA	2024, 2025
Program Committee of MICRO	2025
Program Committee of IISWC	2023, 2025
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 Transactions on Emerging Topics in Computing (TETC)  
IEEE Transactions on Very Large Scale Integration (VLSI) Systems (TVLSI)  
IEEE Signal Processing Letters (SPL)  
Journal of Network and Computer Applications (JNCA)  
npj Quantum Information

## FUNDING

#### Awarded

AMD Developer Cloud Credit: \$2k	2025
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

#### 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

#### Professor Joshua San Miguel

jsanmiguel@wisc.edu

#### Professor Younghyun Kim

younghyun.kim@wisc.edu

#### Professor John Paul Shen

jpshen@cmu.edu

#### Professor Timothy Sherwood

sherwood@cs.ucsb.edu

#### Professor Ulya R. Karpuzcu

ukarpuzcu@umn.edu

PhD advisor  
University of Wisconsin–Madison  
PhD committee member  
University of Wisconsin–Madison  
Carnegie Mellon University  
University of California, Santa Barbara  
University of Minnesota, Twin Cities