

# PROFESSOR DI WU

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## FACULTY APPOINTMENT

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**Assistant Professor** | *Electrical and Computer Engineering*  
University of Central Florida

Aug. 2023 – Present  
Orlando, FL, USA

**Joint Assistant Professor** | *Computer Science*  
University of Central Florida

Aug. 2023 – Present  
Orlando, FL, USA

## EDUCATION

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**Doctor of Philosophy** | *Electrical and Computer Engineering*  
University of Wisconsin–Madison

Sep. 2017 – Jul. 2023  
Madison, WI, USA

- Advisor: Joshua San Miguel
- Thesis: Power-Efficient Computer Architecture via Unary and Approximate Computing

**Master of Engineering** | *Microelectronics*  
Fudan University

Sep. 2012 – Jan. 2015  
Shanghai, China

**Bachelor of Science** | *Microelectronics*  
Fudan University

Sep. 2007 – Jul. 2012  
Shanghai, China

## RESEARCH INTEREST

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- Computer architecture  
— efficiency, etc.
- Emerging computing  
— neuromorphic, quantum, etc.
- Domain specific acceleration  
— AI, BCI, cryptography, etc.
- Heterogeneous system  
— CXL, etc.

## HONORS AND AWARDS

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**Machine Learning and Systems Rising Star**  
MLCommons

2023

**Capstone PhD Teaching Award Nomination**  
UW–Madison

2022

**Grainger Wisconsin Distinguished Graduate Fellowship**  
1 of the 3 PhD students selected from College of Engineering, UW–Madison




2022

**Student Travel Award**  
International Symposium on Computer Architecture (ISCA)

2022

<b>Dissertator Travel Award (twice)</b> Department of Electrical and Computer Engineering, UW–Madison	2022
<b>Ph.D. Forum Invitation</b> Design Automation Conference (DAC)	2021
<b>IEEE Micro Top Pick</b>  1 of the 12 publications selected from all computer architecture publications in 2020	2021
<b>Gerald Holdridge Outstanding Teaching Assistant Award</b> Department of Electrical and Computer Engineering, UW–Madison	2020
<b>Chancellor’s Opportunity Fellowship</b> UW–Madison	2019
<b>Student Research Travel Award</b> UW–Madison	2019
<b>Student Research Competition Travel Award</b> International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)	2019
<b>Student Travel Award</b> International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)	2019
<b>Qualcomm Innovation Fellowship Finalist</b>  Qualcomm	2019
<b>Foxconn SmartCity Competition Winner</b> Foxconn	2019
<b>Hiran Mayukh Award</b>  UW–Madison Computer Architecture Community	2018
<b>Rising Star Award</b> HiSilicon	2015
<b>National Scholarship (ranking 1/67)</b> Fudan University	2015
<b>Excellent Student Union Leader</b> Zhangjiang Campus, Fudan University	2010
<b>Third Prize Freshman Scholarship (ranking 3/45)</b> Fudan University	2007


**Conference**

- [1] Carat: Unlocking Value-Level Parallelism for Multiplier-Free GEMMs [Acceptance rate=18.6%]  
Zhenwen Pan, Joshua San Miguel, **Di Wu**  
*International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024*
- [2] uBrain: A Unary Brain Computer Interface [Acceptance rate=16.8%]  
**Di Wu**, Jingjie Li, Zhenwen Pan, Younghyun Kim, Joshua San Miguel  
*International Symposium on Computer Architecture (ISCA), 2022*
- [3] uSystolic: Byte-Crawling Unary Systolic Array [Acceptance rate=30.5%]  
**Di Wu**, Joshua San Miguel  
*International Symposium on High-Performance Computer Architecture (HPCA), 2022*  
[Open-source software: uSystolic-Sim](#) 
- [4] When Dataflows Converge: Reconfigurable and Approximate Computing for Emerging Neural Networks [Invited]  
**Di Wu**, Joshua San Miguel  
*International Conference on Computer Design (ICCD), 2021*
- [5] UNO: Virtualizing and Unifying Nonlinear Operations for Emerging Neural Networks [Acceptance rate=26.4%]  
**Di Wu**, Jingjie Li, Setareh Behrooz, Younghyun Kim, Joshua San Miguel  
*International Symposium on Low Power Electronics and Design (ISLPED), 2021*
- [6] Normalized Stability: A Cross-Level Design Metric for Early Termination in Stochastic Computing [Acceptance rate=30.2%]  
**Di Wu**, Ruokai Yin, Joshua San Miguel  
*Asia and South Pacific Design Automation Conference (ASP-DAC), 2021*
- [7] uGEMM: Unary Computing Architecture for GEMM Applications [Acceptance rate=18.3%]  
**Di Wu**, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim, Joshua San Miguel  
*International Symposium on Computer Architecture (ISCA), 2020*  
[Open-source software: UnarySim](#)   
 **Awarded 1 out of 12 IEEE Micro Top Picks 2021 from all computer architecture publications in 2020**
- [8] Approximate Hardware Techniques for Energy-Quality Scaling Across the System [Invited]  
Younghyun Kim, Joshua San Miguel, Setareh Behrooz, Tianen Chen, Kyuin Lee, Yongwoo Lee, Jingjie Li, **Di Wu**  
*International Conference on Electronics, Information, and Communication (ICEIC), 2020*
- [9] SECO: A Scalable Accuracy Approximate Exponential Function Via Cross-Layer Optimization [Acceptance rate=35.2%]  
**Di Wu**, Tianen Chen, Chienfu Chen, Oghenefego Ahia, Joshua San Miguel, Mikko Lipasti, Younghyun Kim  
*International Symposium on Low Power Electronics and Design (ISLPED), 2019*
- [10] In-Stream Stochastic Division and Square Root via Correlation [Acceptance rate=18.9%]  
**Di Wu**, Joshua San Miguel  
*Design Automation Conference (DAC), 2019*
- [11] 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 (ICASSP)*, 2016

- [12] 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 (DSP)*, 2015
- [13] 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 (ISCAS)*, 2015
- [14] A High-Throughput LDPC Decoder for Optical Communication  
**Di Wu**, Yun Chen, Yuebin Huang, Yeongluh Ueng, Lirong Zheng, Xiaoyang Zeng  
*International Conference on ASIC (ASICON)*, 2013


## Journal

- [1] uGEMM: Unary Computing for GEMM Applications [Acceptance rate=9.9%]  
**Di Wu**, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim, Joshua San Miguel  
*IEEE Micro* 41.3 (2021), pp. 50–56  
 **IEEE Micro Top Pick Issue 2021**
- [2] In-Stream Correlation-Based Division and Bit-Inserting Square Root in Stochastic Computing  
**Di Wu**, Ruokai Yin, Joshua San Miguel  
*IEEE Design & Test* 38.6 (2021), pp. 53–59
- [3] 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
- [4] 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

## Workshop

- [1] T-MAC: Temporal Multiplication with Accumulation  
Zhewen Pan, **Di Wu**, Joshua San Miguel  
*Young Architect Workshop (YArch), collocated with International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)* (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)  
[Resource: Mixed-Precision Training – Data Formats – CB16 Half-Precision](#) 

## INVITED TALKS

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<b>Salvage Hardware Efficiency via Unary Computing in the Deep Learning Era</b> University of Louisiana at Lafayette	Nov. 2023 Virtual
<b>Power-Efficient Computer Architecture via Unary Computing</b> AMD Research	Jul. 2023 Virtual
<b>Unary Computing for Power-Efficient Computer Architecture</b> University of Central Florida	Feb. 2023 Orlando, FL, USA
<b>Unary Computing for Power-Efficient Computer Architecture</b> University of California, Los Angeles	Nov. 2022 Virtual
<b>uBrain: A Unary Brain Computer Interface</b> University of Central Florida	Nov. 2022 Virtual
<b>Unary Computing for Power-Efficient Computer Architecture</b> University of California, Santa Barbara	Oct. 2022 Virtual

## EMPLOYMENT

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

## TEACHING AND MENTORING

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<b>Instructor</b> ECE697 (Capston Project in Machine Learning and Signal Processing), UW–Madison	2023 Summer
<b>Teaching Assistant</b> ECE554 (Digital Engineering Lab), UW–Madison	2022 Spring
ECE454 (Mobile Computing Lab), UW–Madison	2021 Fall
ECE454 (Mobile Computing Lab), UW–Madison	2020 Fall

ECE554 (Digital Engineering Lab), UW–Madison	2020 Spring
ECE554 (Digital Engineering Lab), UW–Madison	2019 Fall
ECE554 (Digital Engineering Lab), UW–Madison	2019 Spring
ECE554 (Digital Engineering Lab), UW–Madison	2018 Fall
ECE552 (Introduction to Computer Architecture), UW–Madison	2018 Fall

### **Guest Lecturer**

ECE757 (Advanced Computer Architecture II), UW–Madison	2021 Spring
ECE757 (Advanced Computer Architecture II), UW–Madison	2020 Spring
ECE752 (Advanced Computer Architecture I), UW–Madison	2019 Spring

## PROFESSIONAL SERVICE

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### **Program Committee**

International Symposium on Computer Architecture (ISCA)	2024
International Symposium on Performance Analysis of Systems and Software (ISPASS)	2024
International Symposium on High-Performance Computer Architecture (HPCA)	2024
International Conference on Computer Design (ICCD)	2023
International Symposium on Workload Characterization (IISWC)	2023
Young Architect Workshop (YArch)	2023
International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) – Artifact Evaluation	2021
International Symposium on Microarchitecture (MICRO) – Artifact Evaluation	2021
International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) – Artifact Evaluation	2020

### **Contest Organizer**

ACM/IEEE Contest for Machine Learning on Hardware at International Conference on Computer-Aided Design (ICCAD) – Track 2: Quantum Computing for Drug Discovery Challenge	2023
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### **Program Mentor**

Young Architect Workshop (YArch)	2023
Undergrad Architecture Mentoring Workshop (uArch)	2023
International Symposium on Microarchitecture (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 (TRETTS)

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)

Journal of Network and Computer Applications (JNCA)

## FORMER STUDENTS

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**Ruokai Yin**

Department of Electrical Engineering, Yale University

2021

PhD

**Zhewen Pan**

Department of Electrical and Computer Engineering, UW-Madison

2022

PhD

## 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

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sherwood@cs.ucsb.edu

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jpshen@cmu.edu

Carnegie Mellon University

**Professor Ulya R. Karpuzcu**  
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University of Minnesota, Twin Cities