

# Ruokai Yin

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## RESEARCH INTERESTS

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- Computer Architecture
  - Accelerator Design
    - Systolic-Array
    - Sparse Tensor Accelerator
  - Accelerator Simulation
- Neuromorphic Computing
  - Spiking Neural Networks
- Stochastic Computing
  - Unary Computing
- Efficient Machine Learning
  - Network Compression
    - Quantization
    - Pruning

## EDUCATION

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**Ph.D. Candidate, Electrical Engineering, Yale University** Sep. 2021 — Current  
Advisor: Prof. Priyadarshini Panda

**B.S., Electrical Engineering & Computer Science & Math, University of Wisconsin - Madison** Sep. 2018 — May. 2021  
Graduate with the highest honor, GPA: 3.97/4.00

## EXPERIENCE

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**Research Assistant, ICL Lab**, advisor: Prof. Priyadarshini Panda July. 2021 — Current  
*- Work on computer architectures, systems, and algorithm co-design for neuromorphic computing.*

**Research Assistant, UW STACS Lab**, advisor: Prof. Joshua San Miguel June. 2019 — May. 2021  
*- Worked on computer architectures & systems for unary & stochastic computing.*

## PUBLICATIONS [CONFERENCE]

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### Neuromorphic Computing:

#### **MINT: Multiplier-less Integer Quantization for Spiking Neural Networks.**

Ruokai Yin, Yuhang Li, Abhishek Moitra, and Priyadarshini Panda  
Asia and South Pacific Design Automation Conference (ASP-DAC) 2024, **Nomination of Best Paper.**

#### **Wearable-based Human Activity Recognition with Spatio-Temporal Spiking Neural Networks.**

Yuhang Li, Ruokai Yin, Hyoungseob Park, Youngeun Kim, and Priyadarshini Panda  
Conference on Neural Information Processing Systems (NeurIPS) 2022 Workshop, **Spotlight Paper.**

#### **Lottery Ticket Hypothesis for Spiking Neural Networks.**

Youngeun Kim, Yuhang Li, Hyoungseob Park, Yeshwanth Venkatesha, Ruokai Yin, and Priyadarshini Panda  
European Conference on Computer Vision (ECCV) 2022, **Oral Presentation (2.7% of submitted papers).**

### Stochastic Computing:

#### **UGEMM: Unary Computing Architecture for GEMM Applications.**

Di Wu, Jingjie Li, Ruokai Yin, Hsuan Hsiao, Younghyun Kim, Joshua San Miguel  
International Symposium on Computer Architecture (ISCA) 2020, **IEEE Top-pick 2020.**

#### **Normalized stability: a cross-level design metric for early termination in stochastic computing.**

Di Wu, Ruokai Yin, Joshua San Miguel  
Asia and South Pacific Design Automation Conference (ASP-DAC) 2021

## PUBLICATIONS [JOURNAL]

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### Neuromorphic Computing:

#### **Efficient Human Activity Recognition with Spatio-Temporal Spiking Neural Networks.**

Yuhang Li, Ruokai Yin, Youngeun Kim, and Priyadarshini Panda  
Frontiers in Neuroscience, 2023.

#### **Sharing Leaky-Integrate-and-Fire Neurons for Memory-Efficient Spiking Neural Networks.**

Youngeun Kim, Yuhang Li, Abhishek Moitra, [Ruokai Yin](#), and Priyadarshini Panda  
Frontiers in Neuroscience, 2023.

**SATA: Sparsity-Aware Training Accelerator for Spiking Neural Networks.**

[Ruokai Yin](#), Abhishek Moitra, Abhiroop Bhattacharjee, Youngeun Kim, and Priyadarshini Panda  
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), 2022.

Stochastic Computing:

**uGEMM: Unary Computing for GEMM Applications.**

Di Wu, Jingjie Li, [Ruokai Yin](#), Hsuan Hsiao, Younghyun Kim, Joshua San Miguel  
IEEE Micro, 2021.

**In-Stream Correlation-Based Division and Bit-Inserting Square Root in Stochastic Computing.**

Di Wu, [Ruokai Yin](#), Joshua San Miguel  
IEEE Design & Test, 2021.

TALKS

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**SATA: Sparsity-Aware Training Accelerator for Spiking Neural Networks**

Center for Brain-Inspired Computing (C-BRIC, SRC), Nov 2022

**UnarySim and Characterizing Early Termination in Stochastic Computing**

UW Computer Architecture Industrial Affiliates 2020, Sep 2020

TEACHING EXPERIENCE

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**TA - EENG 439, Neural Networks & Learning Systems**, Fall 2023

Instructor: Prof. Priya Panda

**TA - EENG 348, Digital Systems**, Spring 2023

Instructor: Prof. Rajit Manohar

AWARDS & HONORS

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**Academic**

- John Bennett Fenn Fellowship Fund, Fall 2021 – Spring 2022
- Dean's Honor List, Fall 2018 – Spring 2021
- China National Scholarship, Fall 2016 – Spring 2017, (Highest scholarship, top 0.1%)

Yale University  
University of Wisconsin - Madison  
Southwest Jiaotong University

**Research**

- Spotlight Paper, NeurIPS Workshop on Learning from Time Series for Health, 2022
- IEEE Micro Top Pick, Computer Architecture, 2020

ACADEMIC ACTIVITIES

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**Reviewer**

- IEEE Journal on Emerging and Selected Topics in Circuits and Systems
- IEEE Transactions on Very Large Scale Integration Systems
- IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems
- AI Communications