

Joseph Shenouda

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Research Interests

Deep Learning, Implicit Neural Representations, Large Language Models, Signal Processing

Education

University of Wisconsin-Madison	2027 (Expected)
Ph.D. Electrical and Computer Engineering	
Advisors: Robert D. Nowak & Kangwook Lee	
University of Wisconsin-Madison	2023
M.S. Electrical and Computer Engineering	
Advisors: Robert D. Nowak & Kangwook Lee	
Rutgers University	2021
B.S. Electrical and Computer Engineering	
Summa Cum Laude	

Publications

- **A New Neural Kernel Regime: On the Inductive Bias of Multi-Task Learning**
Julia Nakhleh, **Joseph Shenouda**, Robert D. Nowak
Neural Information Processing Systems (NeurIPS) (2024)
[paper](#)
- **Variation Spaces for Multi-Output Neural Networks: Insights on Multi-Task Learning and Network Compression**
Joseph Shenouda, Rahul Parhi, Kangwook Lee, Robert D. Nowak
Journal of Machine Learning Research (JMLR) (2024)
[paper](#)
- **ReLU's Are Sufficient for Learning Implicit Neural Representations**
Joseph Shenouda, Yamin Zhou, Robert D. Nowak
International Conference on Machine Learning (ICML) (2024)
[paper](#)
- **A Continuous Transform for Localized Ridgelets**
Joseph Shenouda, Rahul Parhi, Robert D. Nowak
Sampling Theory and Applications Conference (SampTA) (2023)
[paper](#)
- **A Guide to Reproducible Research in Signal Processing and Machine Learning**
Joseph Shenouda and Waheed U. Bajwa.
IEEE Signal Processing Magazine (2023)
[paper](#).

Workshop Papers

- **A Representer Theorem for Vector-Valued Neural Networks: Insights on Weight Decay Regularization and Widths of DNNs**
Joseph Shenouda, Rahul Parhi, Kangwook Lee, Robert D. Nowak
ICML Duality Principles for Modern ML Workshop (2023)

- **A Better Way to Decay: Proximal Gradient Training Algorithms for Neural Nets**
Liu Yang, Jifan Zhang, **Joseph Shenouda**, Dimitris Papailiopoulos, Kangwook Lee, Robert D. Nowak.
Neural Information Processing Systems (NeurIPS) OPT-ML Workshop (2022)
[paper](#)

Preprints

- **PathProx: A Proximal Gradient Algorithm for Weight Decay Regularized Deep Neural Networks**
Liu Yang, Jifan Zhang, **Joseph Shenouda**, Dimitris Papailiopoulos, Kangwook Lee, Robert D. Nowak
[arXiv](#)

Selected Talks

- **ReLUs Are Sufficient for Learning Implicit Neural Representations** June 2024
University of Wisconsin-Madison (Summer SILO)
- **Vector-Valued Variation Spaces and Width Bounds for DNNs** October 2023
University of Wisconsin-Madison (MLOPT Idea Seminar)
- **A Representer Theorem for Vector-Valued Neural Networks** July 2023
ICML Duality Principles for Modern Machine Learning Workshop ([Video](#))
- **A Continuous Transform for Localized Ridgelets** July 2023
Sampling Theory and Applications Conference (SampTA)

Teaching

University of Wisconsin-Madison

- (Teaching Assistant) **ECE/CS 761: Mathematical Methods in Machine Learning** Spring 2024
Delivered 3 lectures throughout the semester and organized weekly problem solving sessions.
- (Teaching Assistant) **ECE 203: Signals, Information and Computation** Fall 2024
Prepared weekly lab assignments and assisted students through weekly office hours.
- (Teaching Assistant) **ECE 888: Nonparametric Methods in Data Science** Spring 2025

Experience

NEC Research Labs: Machine Learning Research Intern Summer 2025

- Developing mathematical foundations for in-context learning in Large Language Models (LLMs).

MIT Lincoln Laboratory: Summer Research Intern Summer 2021

Los Alamos National Laboratory: Electrical Engineer Intern Summer 2020

Service

- Reviewer: JMLR, TMLR, NeurIPS 2024, ICLR 2024
- Organizer for Systems Information Learning Optimization (SILO) Seminar at University of Wisconsin-Madison

Awards and Memberships

ECE 2025 TA Teaching Excellence Award
ECE 2021 Wisconsin Distinguished Graduate Fellowship-Richardson
JJ Slade Scholar
Tau Beta Pi