

EDUCATION

Michigan State University

East Lansing, MI

B.S. in Mathematics, Advanced

2020-2024

B.S. in Physics

Minor in Computational Mathematics, Science and Engineering

Minor in Chinese

GPA: 4.00/4.00

Relevant Coursework: Graduate Level Numerical Analysis, High Dimensional Probability, Fourier Analysis, Advanced Signal Processing, Bayesian Statistical Methods

PAPERS

1. S. Liang*, E. Bell*, A. Ghosh, and S. Ravishankar, “Pruning Unrolled Networks (PUN) at Initialization for MRI Reconstruction Improves Generalization,” to appear in *Proc. of the 58th Asilomar Conference on Signals, Systems, and Computers*, 2024.
2. I.R. Alkhouri*, S. Liang*, E. Bell, R. Wang, Q. Qu, and S. Ravishankar, “Image Reconstruction Via Autoencoding Sequential Deep Image Prior,” *The Thirty-eighth Annual Conference on Neural Information Processing Systems*, 2024. <https://openreview.net/forum?id=K1EG2ABzNE>.
3. S. Liang*, E. Bell*, Q. Qu, R. Wang, and S. Ravishankar, “Analysis of Deep Image Prior and Exploiting Self-Guidance for Image Reconstruction,” 2024. <https://doi.org/10.48550/arXiv.2402.04097>. In submission to *IEEE Transactions on Computational Imaging*.
4. E. Bell, M.T. McCann, and M. Klasky, “Supervised Reconstruction for Silhouette Tomography,” *Electronic Imaging*, 2024. <https://doi.org/10.2352/EI.2024.36.5.MLSI-298>.
5. E. Bell*, S. Liang*, Q. Qu and S. Ravishankar, “Robust Self-Guided Deep Image Prior,” *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2023. <https://doi.org/10.1109/ICASSP49357.2023.10096631>.

* indicates equal contribution.

RESEARCH EXPERIENCE

Los Alamos National Laboratory | Los Alamos, NM
Mentors: Marc Klasky, Michael McCann, and Daniel Serino

May 2024 - Present,
May 2023 - Aug. 2023

- Develop machine learning algorithms for inverse problems in X-ray tomography and hydrodynamic testing, including 3D reconstruction and parameter estimation.
- Design and implement deep learning architectures and pipelines using PyTorch Lightning and train them on a computing cluster.

Signals, Learning, and Imaging Group | East Lansing, MI
Advisor: Saiprasad Ravishankar

Sep. 2021 - May 2024

- Collaborated with graduate students and post-docs to develop new machine learning methods for imaging applications such as MRI.
- Worked on projects involving self-supervised learning, diffusion models, and combinatorial optimization.
- Proved new results about the training dynamics of unsupervised neural networks.

MSU Mathematics REU | East Lansing, MI
Advisors: Teena Gerhardt and Matthew Hedden

May 2021 - Jul. 2021

- Worked with a team of undergraduates to prove new results in combinatorial knot theory and write a final [technical report](#).
- Computed invariants of interest for large classes of knots and links using Monte Carlo methods and backtracking tree search.

Yang Group | East Lansing, MI
Advisor: Yang Yang

Aug. 2020 - May 2021

- Trained machine learning architectures for solving inverse problems arising from PDEs, toward applications such as full waveform inversion.
- Studied design of network architectures for image deconvolution by performing systematic ablation studies.

MSU Math Dept. Organized Research Projects | East Lansing, MI
Semester long research projects on selected topics.

- **Matching Hodge Structures** Spring 2022
Advised by François Greer. Used computational techniques in algebraic geometry to discover examples of complex manifolds with compatible Hodge structures.
- **Relational Graph Neural Networks** Fall 2021
Advised by Matthew Hirn. Adapted the popular MagNet architecture to exploit relational information in addition to directional information in graph data.
- **Federated Optimization for Decentralized Learning** Spring 2021
Advised by Ming Yan. Analyzed convergence properties of common federated optimization algorithms and empirically evaluated best and worst case scenarios for each algorithm in decentralized learning problems.

TEACHING

- **Undergraduate Learning Assistant**, Honors Linear Algebra (MTH 317H) Fall 2022

AWARDS AND HONORS	<ul style="list-style-type: none"> • Michigan State University Alumni Distinguished Scholar Aug. 2020 - May 2024 MSU's most competitive merit scholarship (15 awarded per class of ~10,000 students) • Michigan State University Board of Trustees Award May 2024 • Dr. Paul and Wilma Dressel Endowed Scholarship Apr. 2024 & Apr. 2022 • Best Presentation Award, LANL Theoretical Division Student Symposium Aug. 2023 • Dr. Marshall and Barbara Hestenes Endowed Scholarship Apr. 2023 • Third Prize, MSU Herzog Problem Solving Competition Apr. 2023 • R.E. Phillips Memorial Scholarship Apr. 2021 • Top 500 Scorer, 2020 William Lowell Putnam Mathematical Competition Feb. 2020
ACADEMIC SERVICE	Reviewer for 2025 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) Nov. 2024
	MSU Math Dept. Undergraduate Studies Committee Student Representative Aug. 2022 - May 2024
	MSU Math Dept. "Discovering America" Student Leader Jan. 2023 - May 2024 Led outings and social events for a group of ~20 exchange students in the math department.
	MSU Data Science Conference Student Volunteer Nov. 2022 & Nov. 2023
OTHER PROJECTS AND CODE	Predicting Gene Regulation and Expression with Graph Neural Networks Apr. 2024 Code, data, pre-trained models, and technical report are publically available on GitHub .
	Sampling the Deep Image Prior Dec. 2023 Technical report on incorporating untrained neural networks into diffusion sampling schemes (particularly Langevin dynamics), with insights into the implicit prior distribution.
SKILLS	Languages: English (native), Mandarin Chinese (elementary).
	Programming Languages: Python, C++, MATLAB, R.