

Siddhant Gautam

Michigan State University – East Lansing, MI

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siddhant-gautam

Professional Summary

Ph.D. student with expertise in machine learning and signal processing for image reconstruction and denoising in MRI and X-ray CT.

Research Interests

Computational Imaging, Signal Processing, Deep Learning, Inverse Problems, Medical Imaging, Image Reconstruction.

Education

Ph.D.: Michigan State University, East Lansing, MI, USA Aug. 2020 – Present

Computational Mathematics, Science and Engineering

GPA: 3.78/4.00

Advisor: Dr. Saiprasad Ravishankar

M.S.: Indian Institute of Technology Madras, Chennai, India Jul. 2017 – Jun. 2020

Electrical Engineering

Thesis: *"Soil Moisture Retrieval Using Sliced Regression Inversion Technique"*

GPA: 7.58/10.00

Advisor: Dr. Uday K. Khankhoje

B.Tech.: National Institute of Technology Allahabad, Prayagraj, India Jul. 2013 – Jun. 2017

Electronics and Communication Engineering

Thesis: *"Design of Microstrip Antenna Array for Energy Harvesting"*

GPA: 8.60/10.00

Advisor: Dr. Yogendra K. Prajapati

Work Experience

Jun. 2022 – Aug. 2022: Dolby Laboratories, Sunnyvale, CA - Video Processing Research Intern

Project: *Residual Encoding Using Neural Field for Image Sequence Modeling*

Mentor: Dr. Guan-Ming Su

Awards and Honors

2025: Outstanding Graduate Student Award, Department of CMSE, Michigan State University. Recognized as the top doctoral student by the faculty committee, received a USD 1000 stipend, a graduation medal, and formal university recognition.

- 2024:** CMSE Ginther Outstanding Research Award, Michigan State University
- 2023:** Best Student Paper Award Finalist, Optica Imaging Congress, Optica Conference
- 2021:** Best Paper Award, CMSE Research Symposium, MSU
- 2020:** Best Master's Thesis Award, presented by the IEEE Geoscience and Remote Sensing Society (GRSS) - Kerala, India Chapter.

Publications

Peer-Reviewed Journal Articles

- **S. Gautam**, M. L. Klasky, B. T. Nadiga, T. Wilcox, G. Salazar, and S. Ravishankar. "Learning Robust Features for Scatter Removal and Reconstruction in Dynamic ICF X-Ray Tomography." *Optics Express*, vol. 33, no. 13, pp. 21741–21758, 2025. doi:10.1364/OE.565478

Peer-Reviewed Conference Papers

- S. Liang, I. R. Alkhouri, **S. Gautam**, Q. Qu, and S. Ravishankar. "UGoDIT: Unsupervised Group Deep Image Prior Via Transferable Weights." *Advances in Neural Information Processing Systems (NeurIPS)*, 2025.
- **S. Gautam**, A. Li, and S. Ravishankar. "Patient-Adaptive and Learned MRI Data Undersampling Using Neighborhood Clustering." *ICASSP 2024 - IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 2081–2085. doi:10.1109/ICASSP48485.2024.10446528
- A. Choudhary, G. Su, and **S. Gautam**. "Residual Encoding Using Neural Field for Image Sequence Modeling." *Asilomar Conference on Signals, Systems, and Computers*, IEEE, 2023. doi:10.1109/IEEECONF59524.2023.10476959
- **S. Gautam**, S. V. Chidambaram, N. Gunturu, and U. K. Khankhoje. "Retrieval of Soil Moisture Using Sliced Regression Inversion Technique." *Progress in Electromagnetic Research Symposium (PIERS)*, IEEE, 2019. doi:10.1109/PIERS-Spring 46901.2019.9017425

Works Under Review / Submitted

- **S. Gautam**, A. Li, P. Agarwal, A. K. Attili, M. Sayadi, J. A. Fessler, N. Seiberlich, and S. Ravishankar. "Scan-Adaptive Subset-Based MRI Undersampling Using a Dictionary of Learned Patterns." to be submitted to *Magnetic Resonance in Medicine (MRM)*, 2025.
- A. Dhar, **S. Gautam**, and S. Ravishankar. "Pre-Optimized Mask-Guided Scan-Adaptive MRI Undersampling." Submitted to *ISMRM Annual Meeting*, 2026.
- **S. Gautam**, A. Li, J. A. Fessler, N. Seiberlich, and S. Ravishankar. "Scan-Adaptive Undersampling for Dynamic Cardiac MRI Using a Collection of Learned Sampling Patterns." Submitted to *ISMRM Annual Meeting*, 2026.
- A. Dhar*, **S. Gautam***, and S. Ravishankar. "Learning Scan-Adaptive MRI Undersampling Patterns with Pre-Optimized Mask Supervision." Submitted to *ICASSP*, 2026. (* equal contribution) Preprint: arXiv:2509.16846.
- **S. Gautam**, A. Li, N. Seiberlich, J. A. Fessler, and S. Ravishankar. "Scan-Adaptive MRI Undersampling Using Neighbor-Based Optimization (SUNO)." Submitted to *IEEE Transactions on Computational Imaging (TCI)*, 2025. Preprint: arXiv:2501.09799.

Workshop Papers and Presentations (Non-Archival)

- **S. Gautam**, A. Li, N. Seiberlich, J. Fessler, S. Ravishankar. "Scan-Adaptive MRI Undersampling Using Neighbor-based Optimization." *IMSI Workshop on Computational Imaging*, 2024.
- **S. Gautam**, A. Li, S. Ravishankar. "Patient-Adaptive and Learned MRI Data Undersampling

Using Neighborhood Clustering." *Medical Imaging Meets NeurIPS (MedNeurIPS) Workshop*, NeurIPS 2023.

- **S. Gautam**, A. Li, S. Ravishankar. "Patient-Adaptive and Learned MRI Data Undersampling Using Neighborhood Clustering." *Midwest Machine Learning Symposium (MMLS)*, 2023.
- **S. Gautam**, M. L. Klasky, and S. Ravishankar. "Scatter Removal in Dynamic X-Ray Tomography using Learned Robust Features." *Computational Optical Sensing and Imaging*, Optica, 2023.

Patents

- **Residual Encoding and Decoding Using a Neural Field**, Inventors: Guan-Ming Su, Anustup Choudhary, **Siddhant Gautam**. Filed by Dolby Laboratories, 2023. (Patent pending)

Invited Talks

- **Patient-Adaptive and Learned MRI Data Undersampling Using Neighborhood Clustering**, EECS and Radiology Department, University of Michigan, May 2024.
- **Scatter Removal in Dynamic X-Ray Tomography using Learned Robust Features**, Machine Learning for Scientific Imaging (MLSI), Electronic Imaging Symposium, Burlingame, CA, January 2024.

Technical Skills

Languages: Python, MATLAB, C++

Frameworks: PyTorch, NumPy, SciPy, Matplotlib, Scikit-Learn

Tools: Git, LaTeX

Selected Research Experience

Ph.D. Thesis

Michigan State University

2020-Present

Adaptive Sampling for Accelerated MRI Reconstruction

Advisor: Dr. Saiprasad Ravishankar

- Developed scan-adaptive Cartesian MRI undersampling patterns using signal processing and machine learning algorithms.
- Proposed a nearest-neighbor based scan-adaptive undersampling approach for knee, brain, and cardiac MRI.
- Applied deep learning based reconstruction models for undersampled MRI, targeting reduced acquisition time and improved image quality.

LANL Collaboration

Michigan State University

2020-2024

Machine Learning-Driven Density Reconstruction for X-Ray Tomography

- Built deep learning based techniques for artifact removal and scatter correction in dynamic X-ray tomography.
- Designed robust feature extractors trained on physics-informed data; validated on hydrodynamics simulations.
- Collaboration funded by Los Alamos National Laboratory (LANL).

Master's Project

IIT Madras

2019-2020

Forward Solver for 3D Electromagnetic Scattering

- Implemented 3D FEM-based forward solver for rough surface scattering.
- Developed tetrahedral mesh discretization and solved vector Helmholtz equation using vector basis functions.
- Funded by the Indian Space Research Organisation (ISRO) for Chandrayaan-2.

Master's Thesis

Soil Moisture Retrieval via Sliced Regression

IIT Madras

2018-2020

- Proposed a novel soil moisture retrieval algorithm for remote sensing using radar backscatter modeling.
- Presented work at PIERS-2019 conference, Rome; supported by ISRO for NASA-ISRO NISAR mission.

Teaching Experience

Spring 2022: Data Visualization Principles and Techniques, Michigan State University

Instructor: Dr. Devin Silvia — Teaching Assistant

Fall 2019: Engineering Electromagnetics, IIT Madras

Instructor: Dr. Uday K. Khankhoje — Teaching Assistant

Spring 2019: Computational Electromagnetics (NPTEL), IIT Madras

Instructor: Dr. Uday K. Khankhoje — Teaching Assistant

Fall 2018: Electric Circuits and Networks, IIT Madras

Instructor: Dr. Debdutta Ray — Teaching Assistant

Spring 2018: Signals and Systems, IIT Madras

Instructor: Dr. Krishna Jagannathan — Teaching Assistant

Professional Service

Societies:

- IEEE (Student Member, 2017–present)
- Optica (Student Member, 2023–present)
- ISMRM (Student Member, 2023–present)

Reviewing:

- Journals:
 - IEEE Transactions on Medical Imaging (TMI)
 - IEEE Transactions on Computational Imaging (TCI)
 - IEEE Journal of Selected Topics in Signal Processing (JSTSP)
- Conferences:
 - IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
 - IEEE International Symposium on Biomedical Imaging (ISBI)