Siddhant Gautam

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siddhant-gautam

Professional Summary

Ph.D. candidate in Computational Mathematics, Science and Engineering at Michigan State University. My research focuses on computational imaging, inverse problems, and learning-based acquisition and reconstruction methods for MRI and X-ray CT. I develop optimization-driven and physics-informed deep learning frameworks for adaptive sampling and accelerated imaging.

Research Interests

Computational imaging; inverse problems; signal processing; optimization; machine learning; deep learning.

Education

Ph.D.: **Michigan State University**, East Lansing, MI, USA   *Aug. 2020 – Present*
Computational Mathematics, Science and Engineering
Thesis: *"Scan-Adaptive Undersampling and Deep Reconstruction for Accelerated MR Imaging"*
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

2026: Ginther Research Fellowship, MSU CMSE. Competitive departmental fellowship awarded to top CMSE graduate students based on prior research achievements, proposed research impact, and faculty support.

2025: Outstanding Graduate Student Award, College of Engineering, 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, Boston, MA, USA

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 Chapter, India.

Publications

Peer-Reviewed Journal Articles

○ **S. Gautam**, A. Li, N. Seiberlich, J. A. Fessler, and S. Ravishankar. "Scan-Adaptive MRI Undersampling Using Neighbor-Based Optimization (SUNO)." *IEEE Transactions on Computational Imaging (TCI)*, 2025. doi:10.1109/TCI.2026.3653330.

○ **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. OpenReview.

○ **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

Preprints and Works Under Review

○ **S. Gautam**, A. Li, P. Agarwal, A. K. Attili, J. A. Fessler, N. Seiberlich, and S. Ravishankar. "Scan-Adaptive Dynamic MRI Undersampling Using a Dictionary of Efficiently Learned Patterns." arXiv: arXiv:2602.13984, 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) arXiv: arXiv:2509.16846.

Workshop Papers and Presentations (Non-Archival)

- A. Dhar, **S. Gautam**, and S. Ravishankar. *"Pre-Optimized Mask-Guided Scan-Adaptive MRI Undersampling."* 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."* ISMRM Annual Meeting, 2026.
- **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**
Adaptive Sampling and Learning-Based Reconstruction for MRI   *2020-Present*
Advisor: Dr. Saiprasad Ravishankar

- Developed the SUNO framework for scan-adaptive Cartesian MRI undersampling using offline sampling-pattern optimization and nearest-neighbor based test-time mask selection.
- Proposed efficient optimization techniques for sampling design, including iterative coordinate descent (ICD) and randomized batched ICD (RB-ICD), enabling scalable learning of scan-adaptive masks for static and dynamic MRI.
- Designed model-based deep learning reconstruction methods integrating physics-based data consistency with spatiotemporal neural priors (e.g., MostNet) for accelerated dynamic cardiac MRI.

LANL Collaboration   **Michigan State University**

Machine Learning for Dynamic X-Ray Tomography Reconstruction   *2020-2024*

- Developed encoder–decoder deep learning frameworks for robust density reconstruction from noisy and scatter-corrupted X-ray radiographs in dynamic ICF experiments.
- Investigated physics-inspired and self-supervised feature learning strategies for scatter removal and improved reconstruction accuracy under unknown noise conditions.
- Validated learned reconstruction approaches on synthetic hydrodynamic simulations in collaboration with Los Alamos National Laboratory (LANL).

Master's Thesis   **IIT Madras**

Soil Moisture Retrieval via Sliced Regression   *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)