

SHIRIN SHOUSHARI

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SUMMARY

I am a fourth-year Ph.D. candidate in Electrical and Systems Engineering at Washington University in St. Louis, advised by Prof. Ulugbek S. Kamilov. My research develops **optimization-driven deep learning methods** for imaging inverse problems, focusing on **robustness to distribution shift**, **out-of-distribution detection**, and **adaptation across data domains**. I combine **optimization theory** with **generative and score-based models** to design algorithms that are both **computationally efficient** and **reliable under model mismatch and real-world variations**.

RESEARCH INTERESTS

Computational Imaging, Imaging Inverse Problems, Optimization, Out-of-Distribution Shift, Robust and Adaptive Deep Learning, Generative Models, Score-based Methods.

EDUCATION

Washington University in St. Louis, St. Louis, MO, USA.

Jan. 2022 - Expected 2026

Ph.D. Candidate in Electrical & Systems engineering

Advisor: Prof. Ulugbek S. Kamilov

Sharif University of Technology, Tehran, Iran.

Aug. 2018 - Feb. 2021

M.Sc. in Electrical Engineering, Communication Systems

Advisors: Prof. Arash Amini and Prof. Hoda Mohammadzadeh

Sharif University of Technology, Tehran, Iran.

Aug. 2012 - May. 2017

B.Sc. in Electrical Engineering

Advisor: Prof. Hamid Behroozi

SELECTED PUBLICATIONS

- **S. Shoushtari**, Y. Wang, X. Shi, M. S. Asif, U. S. Kamilov. *EigenScore: OOD Detection using Covariance in Diffusion Models*, arXiv 2025. [\[link\]](#)[\[code\]](#)
- C. Park, **S. Shoushtari**, H. An, U. S. Kamilov. *Measurement Score-Based Diffusion Model*, arXiv 2025. [\[link\]](#)[\[code\]](#)
- **S. Shoushtari**, E. P. Chandler, M. S. Asif, U. S. Kamilov. *Unsupervised Detection of Distribution Shift in Inverse Problems using Diffusion Models*, arXiv 2025. [\[link\]](#)[\[code\]](#)
- E. P. Chandler, **S. Shoushtari**, B. Wohlberg, U. S. Kamilov. *Closed-Form Approximation of the Total Variation Proximal Operator*, TCI 2025. [\[link\]](#)
- **S. Shoushtari***, J. Liu*, E. P. Chandler, M. S. Asif, U. S. Kamilov. *Prior Mismatch and Adaptation in PnP-ADMM with a Nonconvex Convergence Analysis*, ICML 2024. [\[link\]](#)[\[code\]](#)[\[acceptance rate: 2609/9653=27.03%\]](#)
- W. Gan, **S. Shoushtari**, Y. Hu, J. Liu, H. An, and U. S. Kamilov. *Block Coordinate Plug-and-Play Methods for Blind Inverse Problems*, NeurIPS 2023. [\[link\]](#)[\[code\]](#)[\[acceptance rate: 3222/12343=26.1%\]](#)
- C. Park*, **S. Shoushtari***, W. Gan, and U. S. Kamilov. *Convergence of Nonconvex PnP-ADMM with MMSE Denoisers*, CAMSAP 2023. [\[link\]](#)[\[Best paper award finalist\]](#)
- Z. Zou*, J. Liu*, **S. Shoushtari**, Y. Wang, W. Gan, U. S. Kamilov. *FLAIR: A Conditional Diffusion Framework with Applications to Face Video Restoration*, WACV 2025. [\[link\]](#)[\[code\]](#)
- E. P. Chandler, **S. Shoushtari**, J. Liu, M. S. Asif, and U. S. Kamilov. *Overcoming Distribution Shifts in Plug-and-Play Methods with Test-Time Training*, CAMSAP 2023. [\[link\]](#)
- **S. Shoushtari**, J. Liu, and U. S. Kamilov. *DOLPH: Diffusion Models for Phase Retrieval*, Asilomar 2023. [\[link\]](#)
- **S. Shoushtari**, J. Liu, Y. Hu, and U. S. Kamilov. *Deep Model-based Architectures for Inverse Problems under Mismatched Priors*, JSAIT 2022. [\[link\]](#)

- J. Liu, X. Xu, W. Gan, **S. Shoushtari**, and U. S. Kamilov. *Online deep equilibrium learning for regularization by denoising*, NeurIPS 2022. [\[link\]](#)[\[code\]](#)[\[Acceptance rate: 2665/10411 = 26%\]](#)
- **S. Shoushtari**, H. Mohammadzadeh, and A. Amini. *Emotion Recognition Using Sparse Graph Analysis of Brain Connectivity*, ICBME 2021. [\[link\]](#)[\[Selected best paper \(4th place\)\]](#)

HONORS AND AWARDS

- IEEE CAMSAP Student Paper Award Finalist (2023)
- Dean's Honorary Award, Student Union (2014)
- National Entrance Exam (Iran): Top 0.01% B.Sc. (2012); Top 0.1% M.Sc. (2018)
- National Elite Foundation Fellow (2012)

RESEARCH HIGHLIGHTS

- **Developed optimization-driven deep learning methods for imaging inverse problems, including provably convergent model-based architectures under prior and measurement mismatch.**
- **Proposed diffusion-based frameworks for inverse problems and distribution-shift analysis, including new score-based algorithms and OOD-detection tools that leverage covariance structure in posterior score fields.**
- **Designed adaptive and test-time learning strategies for domain shift and model mismatch in computational imaging, improving robustness across acquisition settings and measurement models.**
- **Applied model-based and generative reconstruction methods to scientific imaging domains, including neutron scattering (SANS), NMR spectroscopy, video restoration, and quantitative MRI.**

PRESENTATION & TALKS

- “Out-of-Distribution Detection via Uncertainty Quantification”, Asilomar 2025, Pacific Grove, CA, USA.
- “PnP Restoration with Domain Adaptation for Accelerated SANS”, Gordon Research Seminar 2024, Newry, ME, USA.
- “Diffusion Models for Phase Retrieval in Computational Imaging”, Asilomar 2023, Pacific Grove, CA, USA.

TEACHING EXPERIENCE

Teaching Assistant: Signals & Systems (2025), Optimization (2023), Statistical Learning (2018)

PROFESSIONAL SERVICES

Reviewer for journals: IEEE TSP, IEEE TCI, IEEE TMI.

Reviewer for conferences: CVPR, Neurips, ICLR, ISCS, ICASSP, Asilomar, AISTATS, AAAI.

STUDENT SUPERVISION

- Co-supervised 3 M.S. students in Prof. Kamilov's lab on topics in diffusion models, inverse problems, and scientific imaging.
- Mentored 5 undergraduate students in imaging, deep learning, and model-based reconstruction.
- Guided students on research design, implementation, and conference paper preparation.