

Yuyang Hu

Email: h.yuyang@wustl.edu
Phone: (+1)314-309-9631
Homepage: <https://huyuyang.github.io/>
Google Scholar: [google scholar link](#)

BIOGRAPHY

I am a **second-year Ph.D.** student at the Department of Electrical and System Engineering, **Washington University in St. Louis (Wash U)**, working under the supervision of **Dr. Ulugbek Kamilov**. My research goal is to develop fast, efficient, and interpretable algorithms for solving large-scale imaging problems. My recent work is focusing on inverse problems and large-scale optimization.

Research Interests: Computational Imaging, Signal and Image Processing, Optimization, Deep Learning

EDUCATION

Washington University in St. Louis, St. Louis, MO Ph.D. student in Electrical Engineering	Aug. 2022 – Expected 2026
Washington University in St. Louis, St. Louis, MO M.S. in Electrical Engineering Advisor: Prof. Ulugbek Kamilov	Aug. 2020 – May 2022 GPA: 4.0/4.0
Nanjing Tech University, Nanjing, China B.S. in Electronic and Information Engineering Advisor: Prof. Yaping Bao	Sep. 2016 – Jun. 2020 GPA: 3.79/4.0

AWARDS

- WUSTL ESE Outstanding Master's Research, 2023
- WUSTL Dean's Select PhD Fellowship, 2021
- NJTECH U Outstanding Graduate (top 2%), 2020
- NJTECH U First-Class Scholarship (top 5%), 2016-2017, 2017-2018, 2018-2019

RESEARCH EXPERIENCE

- **Reconstruction for Parallel MRI Without Groundtruth (WashU CIG)**
 - Used deep learning for joint parallel MRI reconstruction and coil sensitivity calibration without using the ground-truth images [1], [b 6.].
- **ASYNCR Regularization by Denoising (RED) with unbounded delay (WashU CIG)**
 - Proposed asynchronous parallel settings (with unbounded delay) where a cluster of processors is considered, which simultaneously implements stochastic gradients and block-coordinate decomposition to image recovery tasks.
- **Monotonically Convergent Regularization by Denoising (WashU CIG)**

- Proposed a new monotone RED (MRED) algorithm [b 5.] that can offer stable convergence for nonconvex data-fidelity terms and expansive deep image denoisers. MRED is the first RED method which is guaranteed to converge for any denoiser—irrespective of its expansiveness.
- **A Restoration Network as an Implicit Prior (WashU CIG & Google Research)**
 - Image denoisers have been shown to be powerful priors for solving inverse problems in imaging. In this work, we introduce a generalization of these methods that allows any image restoration network to be used as an implicit prior. This work offers a step forward for solving inverse problems by enabling the use of powerful pre-trained restoration models as priors.

PUBLICATIONS

Pre-print: (*' indicates equal contribution)

- [2] **Y. Hu***, W. Gan*, C. Ying, T. Wang, C. Eldeniz, J. Liu, Y. Chen, H. An, and U. S. Kamilov, “SPICE: Self-Supervised Learning for MRI with Automatic Coil Sensitivity Estimation.” **arXiv:2210.02584, preprint, 2022**
- [1] C. Park*, W. Gan*, Z. Zou, **Y. Hu**, Z. Sun, U. S. Kamilov “A Structured Pruning Algorithm for Model-based Deep Learning.” **arXiv:2311.02003, preprint, 2023**

In Press:

- [2] **Y. Hu**, M. Delbraccio, P. Milanfar, and U. S. Kamilov, “A Restoration Network as an Implicit Prior.” **Proc. Int. Conf. Learn. Represent. (ICLR 2024)**
- [1] **Y. Hu**, S. V. Kothapalli, W. Gan, A. Sukstanskii, G. F. Wu, M. Goyal, D. Yablonskiy, U. S. Kamilov, “DiffGPCI: 3D MRI Synthesis from mGRE Signals using 2.5D Diffusion Model.” **Proc. Int. Symp. Biomedical Imaging 2021. (ISBI 2024)**

Published: (*' indicates equal contribution)

- [b 6.] **Y. Hu***, W. Gan*, C. Eldeniz, J. Liu, Y. Chen, H. An, and U. S. Kamilov, “SS-JIRCS: Self-Supervised Joint Image Reconstruction and Coil Sensitivity Calibration in Parallel MRI without Ground Truth,” **Proc. IEEE Int. Conf. Comp. Vis. Workshops (ICCVW 2021)(Oct 11-17)**, pp. 4048-4056.
- [b 5.] **Y. Hu**, J. Liu, X. Xu, and U. S. Kamilov, “Monotonically Convergent Regularization by Denoising.” **Proc. IEEE Int. Conf. Image Proc. (ICIP 2022) (Bordeaux, France, October 16-19)**, pp. 426-430.
- [b 4.] W. Gan, C. Ying, P. Eshraghi, T. Wang, C. Eldeniz, **Y. Hu**, J. Liu, Y. Chen, H. An, and U. S. Kamilov, “Self-Supervised Deep Equilibrium Models for Inverse Problems with Theoretical Guarantees,” **IEEE Trans. Comput. Imag.**, vol. 9, pp. 796-807, 2023.
- [b 3.] H. An, U. S. Kamilov, **Y. Hu**, W. Gan, J. Liu, C. Eldeniz, Y. Chen, “Self-supervised joint image reconstruction and coil sensitivity calibration in parallel mri without ground truth,” **US Patent App. 17/968,541**
- [b 2.] S. Shoushtari, J. Liu, **Y. Hu**, and U. S. Kamilov, “Deep Model-Based Architectures for Inverse Problems under Mismatched Priors.” **IEEE J. Sel. Areas Inf. Theory, in press.**
- [b 1.] W. Gan, S. Shoushtari, **Y. Hu**, J. Liu, H. An, and U. S. Kamilov, “Block Coordinate Plug-and-Play Methods for Blind Inverse Problems,” **Proc. Ann. Conf. Neural Information Processing Systems (NeurIPS 2023) (New Orleans, LA, December 10-December 16)**, in press.

PROFESSIONAL SERVICE

Reviewer:

- IEEE Transaction on Medical Imaging (TMI).
- IEEE Transaction on Computational Imaging (TCI).
- IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR).
- International Symposium on Computational Sensing (ISCS)

Course Grader:

- ESE 417 Introduction to Machine Learning and Pattern Classification, Wash U. 2021 Fall.
- ESE 415 Optimization, Wash U. 2022 Spring.

Assistant instructor:

- ESE 513 Large-Scale Optimization, Wash U. 2022 Fall.
- ESE 415 Optimization, Wash U. 2023 Spring.