Yuyang Hu

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BIOGRAPHY

I am a **third-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, image restoration and large-scale optimization.

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

EMPLOYMENT

Google AI, Mountain View, CA Dec 2025 – Now
Research Scientist in Google Computational Imaging Team (LUMA)

EDUCATION

Washington University in St. Louis, St. Louis, MO Aug. 2022 – Expected January 2026
Ph.D. student in Electrical Engineering
Advisor: Prof. Ulugbek Kamilov

Washington University in St. Louis, St. Louis, MO Aug. 2020 – May 2022
M.S. in Electrical Engineering GPA: 4.0/4.0
Advisor: Prof. Ulugbek Kamilov

Nanjing Tech University, Nanjing, China Sep. 2016 – Jun. 2020
B.S. in Electronic and Information Engineering GPA: 3.79/4.0
Advisor: Prof. Yaping Bao

INTERNSHIP

Google AI, Mountain View, CA Feb 2025 – Now
Student Researcher in Google Computational Imaging Team (LUMA)
Host: Dr. Mauricio Delbracio

Mitsubishi Electric Research Laboratories (MERL), Boston, MA May 2024 – Aug. 2024
Research intern in MERL Computer Vision Group
Host: Dr. Suhas Lohit

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 PROJECTS

- **Training-free Guidance for Diffusion model via Inference-Time scaling** (Google Internship)
  - Proposed Kernel Density Steering (KDS), a novel technique to guide sampling-based restoration methods toward high-quality solutions at inference time.
  - Used KDS to effectively guide the posterior sampling, significantly improving the performance of diffusion models on various image restoration tasks. (arXiv:2507.05604). **Accepted to NeurIPS 2025**.
- **Multimodal Diffusion Models for Cloud Removal** (MERL Internship)
  - Designed a novel diffusion bridge model that leverages Synthetic Aperture Radar (SAR) data to remove clouds from optical satellite imagery.
  - Introduced an attention-based fusion mechanism to effectively integrate cross-modal information, achieving state-of-the-art cloud removal results. The work is published in **IEEE TGRS (IF: 8.6)**.
- **Implicit Restoration Priors for Imaging Inverse Problems** (WashU CIG & Google Research)
  - Pioneered a new class of plug-and-play priors by generalizing Regularization-by-Denoising (RED) to leverage any pre-trained image restoration network.
  - Developed a suite of algorithms (DRP, ShaRP, ADOBI) for solving inverse problems using deterministic priors, stochastic priors, and diffusion bridge models.
  - This core research resulted in multiple publications, including **ICLR 2024** and **ICML 2025**.
- **Self-Supervised Parallel MRI Reconstruction** (WashU CIG)
  - Developed 'SPICER', a framework for jointly reconstructing MRI images and calibrating coil sensitivities in a self-supervised manner, eliminating the need for ground-truth data.
  - The work was published in **Magnetic Resonance in Medicine** (2024) and **ICCVW 2021**.

PUBLICATIONS

Preprints: (*'∗' indicates equal contribution*)

1. **Y. Hu***, A. Peng*, W. Gan, U. S. Kamilov. "ADOBI: Adaptive Diffusion Bridge for Blind Inverse Problems with Application to MRI Reconstruction." arXiv:2411.16535, 2024.

Published: (*'∗' indicates equal contribution*)

13. **Y. Hu**, K. Mei, M. Sahraee-Ardakan, U. S. Kamilov, P. Milanfar, M. Delbracio. "Kernel Density Steering: Inference-Time Scaling via Mode Seeking for Image Restoration." **NeurIPS 2025**.

12. **Y. Hu**, S. Lohit, U. S. Kamilov, T. K. Marks. "Multimodal Diffusion Bridge with Attention-Based SAR Fusion for Satellite Image Cloud Removal." **IEEE TGRS**.

11. **Y. Hu**, A. Peng, W. Gan, P. Milanfar, M. Delbracio, U. S. Kamilov. "Stochastic Deep Restoration Priors for Imaging Inverse Problems." **ICML 2025**.

10. C. Park*, W. Gan*, Z. Zou, **Y. Hu**, Z. Sun, U. S. Kamilov. "A Structured Pruning Algorithm for Model-based Deep Learning." **J. Math. Imaging Vis.**, vol. 67, no. 21, 2025.

9. **Y. Hu**, M. Delbracio, P. Milanfar, U. S. Kamilov. "A Restoration Network as an Implicit Prior." **ICLR 2024**.

8. **Y. Hu***, W. Gan*, et al. "SPICER: Self-Supervised Learning for MRI with Automatic Coil Sensitivity Estimation." **MRM**, vol. 92, no. 3, 2024.

7. **Y. Hu**, S. Kothapalli, et al. "DiffGEPCI: 3D MRI Synthesis from mGRE Using 2.5D Diffusion." **ISBI 2024**.

6. W. Gan, S. Shoushtari, **Y. Hu**, et al. "Block Coordinate Plug-and-Play for Blind Inverse Problems." **NeurIPS 2023**.

5. S. Shoushtari, J. Liu, **Y. Hu**, U. S. Kamilov. "Deep Model-Based Architectures for Inverse Problems under Mismatched Priors." **IEEE JSAIT**.

4. H. An, U. S. Kamilov, **Y. Hu**, et al. "Self-supervised MRI Without Ground Truth." **US Patent App. 17/968,541**.

3. W. Gan, C. Ying, **Y. Hu**, et al. "Self-Supervised Deep Equilibrium Models." **IEEE TCI**, vol. 9, 2023.

2. **Y. Hu**, J. Liu, X. Xu, U. S. Kamilov. "Monotonically Convergent Regularization by Denoising." **ICIP 2022**.

1. **Y. Hu***, W. Gan*, et al. "SS-JIRCS: Self-Supervised MRI Without Ground Truth." **ICCVW 2021**.

PROFESSIONAL ACTIVITIES

Reviewer:

- **Conferences:** NeurIPS, ICML, ICLR, CVPR
- **Journals:** IEEE TMI, IEEE TIP, IEEE TCI

Teaching Experience

- Assistant Instructor, ESE 415 Optimization, WashU, Spring 2023.
- Assistant Instructor, ESE 513 Large-Scale Optimization, WashU, Fall 2022.

STUDENT SUPERVSION

Co-supervised with Prof. Kamilov at WashU

- Albert Peng (B.S. student, now PhD student at Caltech)