

# HONGZE YU

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## EDUCATION

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**University of Michigan, Ann Arbor, USA**

*Aug. 2023 – Present*

Ph.D. in Electrical and Computer Engineering (GPA: 4.00/4.00)

Advisors: Prof. Yun Jiang and Prof. Jeffrey A. Fessler

**University of Michigan, Ann Arbor, USA**

*Aug. 2021 – Apr. 2023*

M.S. in Electrical and Computer Engineering (GPA: 4.00/4.00)

**University of Glasgow, UK**

*Sep. 2017 – Jun. 2021*

B.E. in Electronics and Electrical Engineering, First Class Honours (GPA: 19/22)

**University of Electronic Science and Technology of China, China**

*Sep. 2017 – Jun. 2021*

B.S. in Electronic Information Engineering (GPA: 3.97/4.00)

## RESEARCH INTERESTS

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My research focuses on optimization and machine learning algorithms for solving inverse problems, with an emphasis on MRI reconstruction. In particular, I work on implicit neural representation and score-based diffusion models for efficient, clinically feasible accelerated and quantitative MRI. My work combines MRI physics with deep learning priors and is carried out in close collaboration with clinical researchers.

## RESEARCH EXPERIENCE

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### **Bilevel-Optimized Implicit Neural Representation for Accelerated MR Reconstruction**

*Aug. 2023 – Present*

- Developed a self-supervised implicit neural representation (INR) framework for accelerated MRI reconstruction (e.g.,  $8\times$  Cartesian,  $20\times$  Poisson) with fast per-scan runtime ( $< 5$  s for 2D).
- Designed a bilevel optimization scheme for tailored scan-specific reconstruction that jointly tunes hyperparameters and network weights for both model-based and INR-based methods using only per-scan k-space data.
- Demonstrated sharper anatomy, reduced noise and residual aliasing, and improved NRMSE/SSIM compared with compressed sensing and state-of-the-art self-supervised deep learning across multiple anatomies, field strengths, and sampling patterns.
- Deployed on Microsoft Azure using Tyger framework, achieved  $2\times$  speedup compared to on-scanner hardware
- Related IP: Invention disclosure filed with the University of Michigan Tech Transfer office; patent application currently being drafted.

### **Joint Implicit Neural Representation for Fast Magnetic Resonance Fingerprinting**

*Aug. 2025 – Present*

- Developed a joint scan-specific INR that learns a shared anatomical representation for all MRF subspace coefficient images, suppressing subspace-inconsistent aliasing.
- Built a fully image-domain reconstruction pipeline (no iterative k-space data-consistency) that produces accurate, low-variance  $T_1/T_2$  maps from highly undersampled acquisitions.
- Demonstrated improved  $T_1/T_2$  map quality over low-rank dictionary-based and iterative locally low-rank reconstructions, with similar runtime to low-rank,  $\sim 25\times$  speedup vs. LLR, and 3D whole-brain MRF reconstruction in  $\sim 30$  s.

- Related IP: Invention disclosure accepted by the University of Michigan; preparing for patent application.

## Patch-Based Diffusion Models for Prostate MRI Reconstruction

*Aug. 2025 – Present*

- Adapted a patch-based diffusion inverse solver for accelerated prostate T<sub>2</sub>-weighted MRI at both 3T and 0.55T.
- Coupled patch-wise diffusion scores with multi-coil k-space data consistency to match whole-image diffusion performance with  $\sim 3\times$  faster training and  $\sim 2\times$  lower GPU memory usage.
- Achieved improved SNR and reduced aliasing artifacts over parallel imaging and compressed sensing, and collaborated with radiologists on blinded reader studies.

## PUBLICATIONS

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### Preprint

- [1] **H. Yu**, J. A. Fessler, Y. Jiang, “Bilevel Optimized Implicit Neural Representation for Scan-Specific Accelerated MRI Reconstruction”, *submitted to IEEE Transactions on Medical Imaging*, revision, 2025. [arXiv]

### In preparation

- [2] **H. Yu**, C. Keen, K. Jin, J. A. Fessler, Y. Jiang, “Joint Implicit Neural Representation for Fast Scan-Specific Magnetic Resonance Fingerprinting”, manuscript in preparation, 2025.

## CONFERENCES & WORKSHOPS

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- [1] **H. Yu**, J. Hu, M. Jaroszewicz, H. K. Hussain, V. Gulani, J. A. Fessler, Y. Jiang, “Patch-Based Diffusion Inverse Solver for T<sub>2</sub>-Weighted Prostate Imaging Reconstruction.” *ISMRM Workshop on Data Sampling and Image Reconstruction*, Sedona, 2026. Also submitted to the 2026 Annual Meeting of the ISMRM.
- [2] **H. Yu**, C. Keen, K. Jin, J. A. Fessler, Y. Jiang, “Joint Implicit Neural Representation for Fast Scan-Specific Magnetic Resonance Fingerprinting.” *ISMRM Workshop on Data Sampling and Image Reconstruction*, Sedona, 2026. Also submitted to the 2026 Annual Meeting of the ISMRM.
- [3] **H. Yu**, J. A. Fessler, Y. Jiang, “Bilevel Optimized Implicit Neural Representation for Scan-Specific Accelerated MRI Reconstruction.” *33rd Annual Meeting of the ISMRM, Hawaii, 2025. (Oral, Summa Cum Laude Award)*

## HONORS & AWARDS

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Outstanding Graduates of Sichuan Province, UESTC	2021
Outstanding Students Scholarship, UESTC	2018-2021
Academic Scholarship of Glasgow College, UESTC	2019-2021

## SKILLS

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Deep learning, implicit neural representation, diffusion models, medical imaging, MRI reconstruction, inverse problems, signal processing, optimization, PyTorch, Python, CUDA, MATLAB, Julia

## STUDENT MENTORING

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Kaixuan Jin, “Bilevel Optimized INR for 3D Cartesian MRF reconstruction”, now a B.S. student at University of Michigan *Jul. 2025 – Present*

## REFERENCES

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**Yun Jiang**

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**Jeffrey A. Fessler**

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