

RESEARCH INTERESTS

Inverse Problems in Medical Imaging

Accelerated MRI, Motion Correction, CT Reconstruction, Dynamic Imaging, *etc.*

Representation Learning, Generative Modeling, Optimization

Implicit Neural Representation, Diffusion Models, Plug-and-Play Prior *etc.*

EDUCATION

ShanghaiTech University

Ph.D. Candidate in Computer Science

Shanghai, China

2021 - Exp. 12/2026

- Advisor: Prof. Yuyao Zhang

Wuhan University of Technology

B.E. in Computer Science and Technology

Wuhan, China

2017 - 2021

AWARDS AND HONORS

China National Scholarship (\approx \$4,300)

12/2025

Ministry of Education

Outstanding Student (Top 5%)

12/2024

ShanghaiTech University

Outstanding Student (Top 5%)

12/2023

ShanghaiTech University

PUBLICATIONS

Pre-prints (** indicates equal contribution)

4. C. Du, **X. Tian**, Q. Wu, M. Liu, J. Yu, H. Wei, Y. Zhang, "Plug-and-Play Diffusion Meets ADMM: Dual-Variable Coupling for Robust Medical Image Reconstruction", Pre-print, arXiv:2602.23214, 2026.
3. M. Liu, **X. Tian**, C. Du, Q. Wu, H. Wei, Y. Zhang, "Resolving Blind Inverse Problems under Dynamic Range Compression via Structured Forward Operator Modeling", Pre-print, arXiv:2603.01890, 2026.
2. T. Yu, **X. Tian**, J. Yang, D. He, J. Yu, X. Wang, Y. Zhang, "SPIDER: Structure-Preferential Implicit Deep Network for Biplanar X-ray Reconstruction." Pre-print, arXiv:2507.04684, 2025.
1. C. Du*, X. Lin*, Q. Wu, **X. Tian**, Y. Su, Z. Luo, H. Wei, S. Zhou, J. Yu, Y. Zhang, "DPER: Diffusion Prior Driven Neural Representation for Limited-Angle and Sparse-View CT Reconstruction." Pre-print, arXiv:2404.17890, 2024.

Journal Publications (** indicates equal contribution)

4. L. Chen*, **X. Tian***, J. Wu, R. Feng, G. Lao, Y. Zhang, H. Wei, "Joint Coil Sensitivity and Motion Correction in Parallel MRI with a Self-Calibrating Score-Based Diffusion Model." *Medical Image Analysis*, vol. 102, 103502, 2025.
3. **X. Tian**, J. Wu, G. Lao, C. Du, C. Jiang, Y. Li, J. Zhang, H. Wei, Y. Zhang, "Self-Supervised Denoising for High-dimensional Magnetic Resonance Image." *Biomedical Signal Processing and Control*, vol. 104, 107451, 2025.
2. L. Chen*, **X. Tian***, J. Wu, G. Lao, Y. Zhang, H. Wei, "COLLATOR: Consistent Spatial-Temporal Longitudinal Atlas Construction via Implicit Neural Representation." *Medical Image Analysis*, vol. 100, 103396, 2024.

1. **X. Tian**, Z. Dong, X. Lin, Y. Gao, H. Wei, Y. Ma, J. Yu, Y. Zhang, “Zero-Shot Image Denoising for High-Resolution Electron Microscopy.” *IEEE Transactions on Computational Imaging*, vol. 10, pp. 1462-1475, 2024.

Conference Publications (** indicates equal contribution)

11. C. Du, Q. Wu, **X. Tian**, J. Yu, Y. Zhang, H. Wei, “Improving 2D Diffusion Models for 3D Medical Imaging with Inter-Slice Consistent Stochasticity.” *Int. Conf. on Learning Representations (ICLR 2026)*.
★ Poster [Acceptance Rate: $\approx 28\%$]
10. **X. Tian**, L. Chen, Q. Wu, X. Wang, J. Feng, Y. Zhang, H. Wei, “Unsupervised Motion-Compensated Decomposition for Cardiac MRI Reconstruction via Neural Representation.” *Proc. of the AAAI Conf. on Artificial Intelligence (AAAI 2026)*, in press.
★ Poster [Acceptance Rate: $4167/23680 = 17.6\%$]
9. J. Yang*, Y. Cao*, **X. Tian**, Y. Zhang, H. Wei, “NICE: Neural Implicit Craniofacial Model for Orthognathic Surgery Prediction” *Proc. of the AAAI Conf. on Artificial Intelligence (AAAI 2026)*, in press.
★ Poster [Acceptance Rate: $4167/23680 = 17.6\%$]
8. S Cui, Y. Lian, **X. Tian**, Y. Huang, J. Yu, Y. Zhang, X. Cai, “Full-Wave Inversion for Speed-of-Sound Imaging in Ultrasound Tomography via Self-Supervised Learning” *Proc of IEEE Int. Ultrasonics Symp. (IUS 2025)*, pp. 1–4.
7. Q. Wu*, C. Du*, **X. Tian**, J. Yu, Y. Zhang, H. Wei, “Moner: Motion Correction in Undersampled Radial MRI with Unsupervised Neural Representation.” *Int. Conf. on Learning Representations (ICLR 2025)*.
★ Spotlight [Acceptance Rate: $587/11500 = 5.1\%$]
6. X. Li, **X. Tian**, X. Zhao, H. Wei, and Y. Zhang, “Accelerated 3D Thermometry Field Reconstruction from Tri-Planar Images via Cross-View Implicit Representation,” *Proc. IEEE Int. Symp. Biomed. Imag. (ISBI 2025)*, pp. 1–5.
★ Oral Presentation
5. **X. Tian**, L. Chen, Q. Wu, C. Du, J. Shi, H. Wei, Y. Zhang, “Unsupervised Self-prior Embedding Implicit Neural Representation for Iterative Sparse-View CT Reconstruction.” *Proc. of the AAAI Conf. on Artificial Intelligence (AAAI 2025)*.
★ Poster [Acceptance Rate: $3032/12957 = 23.4\%$]
4. X. Lin*, C. Du*, Q. Wu, **X. Tian**, J. Yu, Y. Zhang, H. Wei, “Zero-Shot Low-Field MRI Enhancement via Denoising Diffusion Driven Neural Representation.” in *Proc. Med. Image Comput. Comput. Assist. Interv. (MICCAI 2024)*, Marrakesh, 2024.
3. S. Lai, **X. Tian**, Q. Wu, C. Du, X. Xu, H. Wei, X. Guan, and Y. Zhang, “Reconstructing Knee CT Volumes from Biplanar X-Rays via Self-Supervised Neural Field.” *Proc. IEEE Int. Symp. Biomed. Imag. (ISBI 2024)*, pp. 1–5.
2. C. Jiang*, **X. Tian***, Y. Li, J. Wu, X. Mu, L. Zhang, and Y. Zhang, “Self-Supervised High-Dimensional Magnetic Resonance Image Denoising Using Super-Resolved Single Noisy Image.” *Proc. IEEE Int. Symp. Biomed. Imag. (ISBI 2023)*, pp. 1–5.
1. **X. Tian**, Q. Wu, H. Wei, Y. Zhang, “Noise2SR: Learning to Denoise from Super-resolved Single Noisy Fluorescence Image.” in *Proc. Med. Image Comput. Comput. Assist. Interv. (MICCAI 2022)*, pp. 334–343, Singapore, 2022.

RESEARCH EXPERIENCE

Unsupervised Reconstruction for Cardiac MRI [AAAI'26]

3/2025 – Present

- Proposed an unsupervised reconstruction framework for free-breathing cardiac MRI, to mitigate motion artifacts from arrhythmia and failed breath holds.
- Decomposed dynamic sequences into a static template and time-varying deformation fields, modeled with INRs and optimized using undersampled k -space data.
- Achieved high temporal resolution reconstruction (20-40ms) enabling precise cardiac

and respiratory motion modeling validated on multi-vendor in vivo data (Siemens Avanto, UIH uMR 790).

MRI Motion Correction [ICLR'25 (Spotlight)][MedIA'25] 9/2024 – Present

- Physiological motion during long MRI acquisitions often causes severe artifacts, undermining image quality and diagnostic reliability.
- Proposed unsupervised methods that unifies physics-based motion modeling and diffusion priors, enabling motion-free image directly from corrupted k -space data.
- Achieved SOTA performance on multi-sequence (2D/3D) in vivo data from a UIH uMR 790 scanner, markedly enhancing robustness in complex clinical scenarios.

SNR-Robust Reconstruction for Sparse-View CT [AAAI'25] 9/2024 – 12/2025

- Proposed an unsupervised method that integrates INRs with PnP optimization, enabling stable optimization and high-fidelity recovery.
- Outperformed prior unsupervised and supervised methods across diverse dose levels and acquisition settings, with strong cross-condition generalization.

Self-Supervised Image Denoising [TCF'24][BSPC'25][MICCAI'22] 2021 – 2024

- Integrated super-resolution techniques to preserve fine structural details and introduced a random sub-sampling strategy to disrupt spatial noise correlations
- **Representative applications:**
 - 1) Poisson–Gaussian denoising (*e.g.*, fluorescence imaging);
 - 2) High-dimensional medical imaging (*e.g.*, BOLD fMRI, DWI);
 - 3) Ultra-low SNR imaging (*e.g.*, transmission electron microscopy (TEM)).

TEACHING
EXPERIENCE

CS270B: Advanced Digital Image Processing Spring 2023
ShanghaiTech University

- Position: Teaching Assistant
- Instructor: Prof. Yuyao Zhang

ACADEMIC
SERVICES

Journal Reviewer for:

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Expert Systems with Applications (ESWA)

Conference Reviewer/PCs for:

- ICML / CVPR / ECCV / AAI
- MICCAI / IEEE ISBI

SKILLS

Languages: Mandarin (native), English (fluent).
Programming: Python, MATLAB, L^AT_EX.

REFERENCES

Prof. Yuyao Zhang

Associate Professor, ShanghaiTech University

Relationship: Advisor

Email: zhangyy8@shanghaitech.edu.cn

Tel: +86-21-20684863

Address: 393 HuaXia RD, Pudong, Shanghai, 201210