

Yipeng Sun

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RESEARCH PROFILE

My research lies at the intersection of inverse problems and deep learning, with a focus on medical imaging reconstruction and artifact compensation. I develop differentiable CT operators and GPU-accelerated pipelines for physics-informed training and test-time optimization. I also explore generative models for image restoration and medical foundation models.

EDUCATION

Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) <i>Dr.-Ing. in Computer Science (Focus: AI in Medical Imaging) · Advisor: Prof. Andreas Maier</i>	since 07/2023 <i>Erlangen, Germany</i>
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) <i>M.Sc. in Medical Engineering</i>	09/2020 – 06/2023 <i>Erlangen, Germany</i>
Nanjing University of Science and Technology (NJUST) <i>B.Eng. in Measurement and Control Technology and Instrumentation (Honor Graduate)</i>	09/2015 – 06/2019 <i>Nanjing, China</i>

AWARDS & HONORS

- **BVM 2026** — Paper received top review scores, invited to submit to *IJCARS* Special Issue (02/2026).
- **Honor Graduate**, Nanjing University of Science and Technology (06/2019).
- **University Scholarships** (Multiple Awards), NJUST (09/2015 – 02/2019).

GRANTS & FUNDED RESEARCH

Draco: Deep-Learning-based Arbitrary Trajectory CBCT Reconstruction — DFG Grant – Role: Participant. Total budget €330k over 3 years. Partners: Stanford University, DKFZ Heidelberg, TH Deggendorf. Fast and accurate CBCT reconstruction for arbitrary, non-circular trajectories via differentiable analytical operators and geometry-adaptive neural networks.	since 10/2025
KI4D4E: AI for 4D Tomography Data — BMBF Grant 05D23WE1 – Role: Project Leader. Sub-project budget ~€300k over 3 years. Partners: 14 international institutions. AI-driven reconstruction, artifact reduction, and visualization for synchrotron beamline end users.	since 07/2023

EXPERIENCE

Ph.D. Candidate & Project Leader — Pattern Recognition Lab, FAU Erlangen-Nürnberg – CT/CBCT reconstruction, denoising, and motion artifact compensation under extremely limited data conditions. – Differentiable CT operators and end-to-end GPU-accelerated pipelines for physics-informed training and test-time optimization. – Interpretable and controllable reconstruction methods with emphasis on trustworthy model behavior. – Self-supervised and single-image learning strategies that eliminate the need for paired or clean training data. – AI software architecture for large-scale 4D tomography reconstruction (BMBF Grant 05D23WE1); coordination of 14 international partners on milestones, deliverables, and evaluation protocols. – Supervised 10 M.Sc. thesis students on CT artifact reduction, diffusion models, dataset distillation, and medical AI.	since 07/2023
Researcher — Fraunhofer EZRT, Fürth – Deep learning methods for artifact compensation in industrial and scientific tomography (synchrotron, neutron, X-ray). – Robust training and inference pipelines for high-throughput systems across diverse scanners and protocols.	since 07/2023
Research Assistant — FAU Erlangen-Nürnberg – Literature synthesis on artificial intelligence and antitrust law; reinforcement learning market pricing simulation.	02/2023 – 06/2023
Master's Thesis & Research Intern — Anki Lab, FAU Erlangen-Nürnberg – Genetic-algorithm-based neural architecture search and hardware-aware model design for Google Edge TPUs. – Quantization and compilation workflows for deployable inference on resource-constrained devices. – Compact convolutional Transformer benchmarking on Edge TPUs for real-time medical image processing.	06/2022 – 05/2023

SELECTED PUBLICATIONS

Journal Articles

- [1] Mei, S., Thies, M., Xia, Y., **Sun, Y.**, Wu, F., Fan, F., Gu, M., Ye, C., Huang, Y., Christlein, V., Maier, A. (2026). Vision transformer Hook for dense predictions. *Pattern Recognition*, 113818. [📄](#)
- [2] **Sun, Y.**, Schneider, L.-S., Mei, S., Wang, J., Hu, G., Gu, M., Ye, C., Wagner, F., Song, L., Bayer, S., Maier, A. (2026). Filter2Noise: a framework for interpretable and zero-shot low-dose CT image denoising. *J. Med. Imag.*, 13(2), 024004. [📄](#)

- [3] **Sun, Y.**, Huang, Y., Yang, Z., Schneider, L.-S., Thies, M., Gu, M., Mei, S., Bayer, S., Zöllner, F. G., Maier, A. (2025). EAGLE: An Edge-Aware Gradient Localization Enhanced Loss for CT Image Reconstruction. *Journal of Medical Imaging*, 12(1), 014001. [📄](#)
- [4] Ye, C., Schneider, L.-S., **Sun, Y.**, Mei, S., Kist, A. M., Maier, A. (2025). DRACO: Data-Driven Reconstruction Algorithm for Cone-Beam CT. *Physics in Medicine & Biology*, 70(14), 145003. [📄](#)
- [5] Yang, Z., Chen, Z., **Sun, Y.**, Strittmatter, A., Raj, A., Allababidi, A., Rink, J. S., Maier, A. (2025). seg2med: A Bridge from Artificial Anatomy to Multimodal Medical Images. *Physics in Medicine & Biology*, 70(24), 245015. [📄](#)

Conference Proceedings

- [6] **Sun, Y.**, Schneider, L.-S., Schwarz, A., Gu, M., Mei, S., Ye, C., Bayer, S., Maier, A. (2025). LSTT: Latent Spatio-Temporal Transformer for Non-rigid Motion Compensation in CBCT. In *Reconstruction and Imaging Motion Estimation (RIME), MICCAI Workshop*. [📄](#)
- [7] **Sun, Y.**, Schneider, L.-S., Gu, M., Mei, S., Bayer, S., Maier, A. (2025). Learning Wavelet-Sparse FDK for 3D Cone-Beam CT Reconstruction. In *International Conference on Fully Three-Dimensional Image Reconstruction (Fully3D)*. [📄](#)
- [8] **Sun, Y.**, Schneider, L.-S., Gu, M., Mei, S., Bayer, S., Maier, A. (2025). Compensating CBCT Motion Artifacts with Any 2D Generative Model. In *14th Conference on Industrial Computed Tomography (iCT)*. [📄](#)
- [9] **Sun, Y.**, Schneider, L.-S., Fan, F., Thies, M., Gu, M., Mei, S., Zhou, Y., Bayer, S., Maier, A. (2024). Data-Driven Filter Design in FBP: Transforming CT Reconstruction with Trainable Fourier Series. In *International Conference on Image Formation in X-Ray CT (CT Meeting)*. [📄](#)
- [10] **Sun, Y.**, Kist, A. M. (2023). Compact Convolutional Transformers on Edge TPUs. In *Bildverarbeitung für die Medizin (BVM)*, pp. 141–146. [📄](#)
- [11] Schneider, L.-S., Waldyra, A., **Sun, Y.**, Maier, A. (2025). Differentiable Few-view CT-Reconstruction for Arbitrary CT-Trajectories. In *14th Conference on Industrial Computed Tomography (iCT)*. [📄](#)
- [12] Ye, C., Schneider, L.-S., **Sun, Y.**, Thies, M., Maier, A. (2025). Learned Shift-variant CBCT Reconstruction Weights for Non-continuous Trajectories. In *Bildverarbeitung für die Medizin (BVM)*, pp. 292–297. [📄](#)
- [13] Ye, C., Schneider, L.-S., **Sun, Y.**, Thies, M., Maier, A. (2025). Compressibility Analysis for the Differentiable Shift-variant FBP Model. In *SPIE Medical Imaging*, 13405, pp. 539–544. [📄](#)
- [14] Gu, M., Thies, M., Mei, S., Wagner, F., Fan, M., **Sun, Y.**, Pan, Z., Vesal, S., Kosti, R., Maier, A. (2024). Unsupervised Domain Adaptation Using Soft-Labeled Contrastive Learning for Cardiac Image Segmentation. In *MICCAI 2024*. [📄](#)

Preprints

- [15] **Sun, Y.**, Kist, A. M. (2022). Deep Learning on Edge TPUs: A Review. *arXiv preprint*, arXiv:2108.13732. [📄](#)

MANUSCRIPTS IN PREPARATION

- *Learning Mean Denoising Flows from a Single Noisy Image* (target: MICCAI 2026).
- *Blind Motion Compensation in Single-Scan CBCT via Test-Time Physics-Constrained Manifold Prior* (target: MICCAI 2026).

PRESENTATIONS

- **Oral:** LSTT: Latent Spatio-Temporal Transformer for CBCT Motion Compensation. *MICCAI Workshop (RIME)*, 2025.
- **Oral:** (Upcoming) *BVM 2026*, Germany, Mar. 2026.
- **Poster:** Compensating CBCT Motion Artifacts with Any 2D Generative Model. *iCT 2025*, Wels, Austria.
- **Poster:** Learning Wavelet-Sparse FDK for 3D Cone-Beam CT Reconstruction. *Fully3D 2025*.
- **Poster:** Data-Driven Filter Design in FBP. *CT Meeting 2024*, Bamberg, Germany.
- **Poster:** Compact Convolutional Transformers on Edge TPUs. *BVM 2023*, Braunschweig, Germany.

SOFTWARE

- **diffct** [📄](#) — CUDA-accelerated differentiable CT operator library (Numba) for end-to-end reconstruction research.
- **Filter2Noise** [📄](#) — Self-supervised single-image denoising for low-dose CT with interpretable attention-guided bilateral filtering.
- **Eagle Loss** [📄](#) — Edge-aware gradient localization enhanced loss for CT image reconstruction.
- **Diagnostic Devil's Advocate** [📄](#) — Multi-agent medical image reasoning system (MedGemma Impact Challenge).
- **ConvNeXt Perceptual Loss** [📄](#) — Modern perceptual loss package for PyTorch.
- **AutoCitation** [📄](#) — Multi-agent tool for academic citation insertion in L^AT_EX workflows.

ACADEMIC SERVICE

- **Journal Reviewer:** SPIE Journal of Medical Imaging; Machine Learning for Biomedical Imaging; Frontiers in Molecular Biosciences.

TECHNICAL SKILLS

- **Programming:** Python (NumPy, SciPy, Numba), C/C++, CUDA, MATLAB
- **ML/DL:** PyTorch, TensorFlow, self-supervised learning, generative models, inverse problems
- **Tools:** Git, Docker, HPC/SLURM, Linux
- **Languages:** Mandarin Chinese (Native), English (C1), German (B2)