

Hengjie Liu

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EDUCATION & EXPERIENCE

University of California, San Francisco	Postdoctoral Scholar, Radiation Oncology	Aug 2025–Present
University of California, Los Angeles	Ph.D. in Physics & Biology in Medicine	Sep 2018–Jun 2025
Tsinghua University	B.S. in Engineering Physics	Aug 2014–Jul 2018

RESEARCH HIGHLIGHTS

Deformable Image Registration (2021–Present):

- Develop **learning- and optimization-based deformable image registration** methods emphasizing **registration-specific inductive biases, anatomical plausibility, and clinical translation**, with applications to CT/MR registration, longitudinal image alignment, contour propagation, and dose accumulation.
- Developed **multimodal and domain-generalizable medical image registration** methods across heterogeneous imaging modalities, including a **1st-place solution in the MICCAI Learn2Reg LUMIR Challenge**.
- Developed **MUSA**, an anatomy-aware registration framework that incorporates **anatomical priors** to **improve deformation plausibility and robustness** for head-and-neck CT registration.

MRI Physics, Acquisition & Reconstruction (2017–2021):

- Developed **cardiac MRI acquisition and reconstruction** methods, including **4D MRI** and **4D flow MRI**, with experience in **pulse-sequence development, low-rank and sparsity-based reconstruction, and quantitative cardiovascular imaging**.
- Developed hardware and software for a **low-field tabletop MRI scanner**, including **on-the-fly pulse-sequence programming and image reconstruction** capabilities; the system was used in an MRI teaching laboratory at MIT.

TECHNICAL SKILLS

Machine Learning & Optimization: Deep learning, multimodal learning, domain generalization, numerical optimization, sparse and low-rank modeling

Medical Imaging: Deformable image registration (monomodal and multimodal), CT/MRI physics & reconstruction, MRI pulse-sequence programming, cardiac and abdominal MR, motion management, 4D flow MRI, radiotherapy treatment planning & dose calculation

Programming & Tools: Python, PyTorch, MATLAB, C++, Linux, Git, Docker, Siemens IDEA

SELECTED PUBLICATIONS

- [1] **H Liu**, E McKenzie, D Xu, Q Xu, RK Chin, D Ruan, K Sheng. MUsculo-Skeleton-Aware (MUSA) deep learning for anatomically guided head-and-neck CT deformable registration. *Medical Image Analysis*, 2025.
- [2] **H Liu**, C Shen, D Ruan, K Sheng. The Right Prior for the Right Deformation: Rethinking Continuous Deformable Image Registration. *Off-Grid: 1st Workshop on Continuous Representations and Grid-Free Methods in Medical Imaging, MICCAI 2026. (Workshop Oral)*
- [3] **H Liu**, Y Dou, D Xu, X Fu, D Ruan, K Sheng. Zero-Shot Multi-Contrast Brain MRI Registration by Intensity Randomizing T1-Weighted MRI. *Learn2Reg Challenge, MICCAI 2025. (1st Place)*
- [4] **H Liu**, D Ruan, K Sheng. Unsupervised Deformable Image Registration Revisited: Enhancing Performance with Registration-Specific Designs. *MIDL*, 2025. *(Short Paper/Poster)*
- [5] C Shen, **H Liu**, D Ruan, D Li. Population-Prior-Assisted Implicit Neural Representations for Instance-Specific Unsupervised Accelerated MRI Reconstruction. *ISBI*, 2026.
- [6] D Xu, **H Liu**, X Miao, et al. Accelerated Patient-specific Non-Cartesian MRI Reconstruction using Implicit Neural Representations. *Int J Radiat Oncol Biol Phys*, 2025.

HONORS & AWARDS

1st Place Oral Presentation, Stanford/UCSF Joint Medical Physics Retreat	2026
1st Place, MICCAI Learn2Reg Challenge (LUMIR)	2025
Dean's Scholar Award, UCLA Physics and Biology in Medicine Graduate Program	2018