

RESEARCH FOCUS

Safe and reliable vision and multi-modal models for medical imaging and beyond. Experienced in conventional machine learning, large-scale data curation, self-supervised pretraining, and efficient fine-tuning for deployment.

EDUCATION

Rochester Institute of Technology, Ph.D. Imaging Science 2015–2022

Thesis: Learning representations in the hyperspectral domain in aerial imagery

Rochester Institute of Technology, M.S. Electrical Engineering 2013–2015

EXPERIENCE

Memorial Sloan Kettering Cancer Center, *Research Fellow* August 2022 – Present

- Developed and deployed vision models for multi-hospital clinical workflows, collaborating with radiation oncologists and medical physicists to translate research into real-world impact at scale.
- Built robust computer vision systems across multimodal medical imaging (CT/MRI/PET) with focus on out-of-distribution detection, ensuring reliable model behavior in safety-critical applications.
- Designed parameter-efficient fine-tuning approaches (with LoRA/DoRA) for pretrained encoders, achieving 30% reduction in compute requirements and 90% parameter savings while improving generalization on unseen data distributions.
- Pretrained vision and multi-modal foundation models on curated research and clinical datasets; developed evaluation frameworks for assessing model robustness and failure modes in high-stakes deployment environments.
- Students mentored: [Jorge T Gomez](#), [Nishant Nadkarni](#), [Shiqin Tan](#)
- Oct 2022 - Oct 2023: Medical leave for accident recovery

Rochester Institute of Technology, *Graduate Research Assistant* May 2016 - August 2022

- Designed self-supervised learning frameworks for multi-modal remote sensing, developing pretraining strategies that achieved >10% performance gains over supervised baselines with limited labeled data.
- Developed scalable data processing pipelines for hyperspectral video analysis, creating one of the largest research datasets (4TB+) with efficient storage and streaming infrastructure.
- Published research on semi-supervised segmentation and representation learning for high-dimensional spectral imagery, with focus on resource-constrained deployments.
- Students mentored: [Henry Ye](#), [Varun Mondaiyka](#), [Parikshit Shembekar](#)

SRI International, *Research Intern* Summer 2018

- Designed continual self-supervised approaches for object counting in aerial imagery with efficient data labeling.
- Adapted Faster R-CNN for occlusion-aware infrared object detection under low-data regimes.

Conduent Labs, *Software Research Intern* Summer 2017

- Developed GAN-based data augmentation for vehicle occupancy estimation at toll booths.

SELECTED PUBLICATIONS

1. **A Rangnekar**, H Veeraraghavan. Random forest-based out-of-distribution detection for robust lung cancer segmentation. *SPIE Conference on Medical Imaging*, 2026. [\[Link\]](#)
2. M Kayser, M Gridnev, W Wang, M Bain, **A Rangnekar**, A Chatterjee, A Petrov, H Veeraraghavan, N Swinburne. brat: Aligned multi-view embeddings for brain MRI analysis. [\[Link\]](#)
Winter Conference on Applications of Computer Vision (WACV), 2026.
3. J Jiang, **A Rangnekar**, H Veeraraghavan. Co-distilled attention guided masked image modeling with noisy teacher for self-supervised learning on medical images. [\[Link\]](#)
International Conference on Medical Imaging with Deep Learning (MIDL), 2025.

4. **A Rangnekar**, N Nadkarni, J Jiang, H Veeraraghavan. Quantifying uncertainty in lung cancer segmentation with foundation models applied to mixed-domain datasets. *SPIE Conference on Medical Imaging*, 2025. [\[Link\]](#)
5. JT Gomez, **A Rangnekar**, H Williams, H Thompson, J Garcia-Aguilar, J Smith, H Veeraraghavan. Swin Transformers are robust to distribution and concept drift in endoscopy-based longitudinal rectal cancer assessment. *SPIE Conference on Medical Imaging*, 2025. [\[Link\]](#)
6. J Jiang, **A Rangnekar**, H Veeraraghavan. Self-supervised learning improves robustness of deep learning lung tumor segmentation models to CT imaging differences. *Journal of Medical Physics*, 2025. [\[Link\]](#)
7. J Jiang, **A Rangnekar**, H Veeraraghavan. Self-distilled masked attention guided masked image modeling with noise regularized teacher (SMART) for medical image analysis. *arXiv*, 2025. [\[Link\]](#)
8. FCJ Reinders, M Savenije, M Ridder, M Maspero, P Doornaert, C Terhaard, C Raaijmakers, K Zakeri, N Lee, E Aliotta, **A Rangnekar**, H Veeraraghavan, M Philippens. Automatic segmentation for magnetic resonance imaging guided individual elective lymph node irradiation in head and neck cancer patients. *Journal of Physics and Imaging in Radiation Oncology*, 2024. [\[Link\]](#)
9. **A Rangnekar**, C Kanan, M Hoffman. Semantic segmentation with active semi-supervised learning. *Winter Conference on Applications of Computer Vision (WACV)*, 2023. [\[Link\]](#)
10. **A Rangnekar**, C Kanan, M Hoffman. Semantic segmentation with active semi-supervised representation learning. *British Machine Vision Conference (BMVC)*, 2022. [\[Link\]](#)
11. **A Rangnekar**, N Mokashi, E Ientilucci, C Kanan, M Hoffman. AeroRIT: A new scene for hyperspectral image analysis. *IEEE Transactions on Geoscience and Remote Sensing*, 2020. [\[Link\]](#)
12. B Uzkent, **A Rangnekar**, M Hoffman. Tracking in aerial hyperspectral videos using deep kernelized correlation filters. *IEEE Transactions on Geoscience and Remote Sensing*, 2018. [\[Link\]](#)

Abstracts and Posters at Medical Conferences

13. **A Rangnekar**, N Mankuzhy, M Thor, A Wu, A Rimner, H Veeraraghavan. Foundation models with balanced data sampling enhance auto-segmentation for cardiac substructures. *AAPM Annual Meeting*, 2025. [\[Link\]](#)
14. C Choi, J Jiang, **A Rangnekar**, N Mankuzhy, Y Cho, J Kim, A Rimner, M Thor, J Deasy, A Wu, H Veeraraghavan. Multimodal framework for predicting radiation-induced severe acute esophagitis in esophageal cancer. *AAPM Annual Meeting*, 2025. [\[Link\]](#)
15. S Tan, J Jiang, **A Rangnekar**, H Veeraraghavan. Integrating multiple modalities with pretrained Swin foundation model for head and neck tumor segmentation. *AAPM Annual Meeting*, 2025. [\[Link\]](#)
16. **A Rangnekar**, N Nadkarni, J Jiang, H Veeraraghavan. Robustness of pretrained transformers on lung cancer segmentation with computed tomography scans. *AAPM Annual Meeting*, 2024. [\[Link\]](#)
17. **A Rangnekar**, J Jiang, H Veeraraghavan. Enhancing Swin Transformer with semantic attention for explainable prediction: a case study with lung cancer CT images. *AAPM Annual Meeting*, 2024. [\[Link\]](#)
18. J Jiang, **A Rangnekar**, S Elguindi, L Cervino, J Moran, J Deasy, H Veeraraghavan. Organs at risk segmentations Using foundational models. *AAPM Annual Meeting*, 2023. [\[Link\]](#)

Preprints

19. **A Rangnekar**, H Veeraraghavan. Tumor-anchored deep feature random forests for out-of-distribution detection in lung cancer segmentation. [Under review] [\[Link\]](#)
20. JT Gomez, D Kanata, **A Rangnekar**, C Lee, J Garcia-Aguilar, J Smith, H Veeraraghavan. Dual cross-attention siamese transformer for rectal tumor regrowth assessment in watch-and-wait endoscopy. [Under review] [\[Link\]](#)
21. **A Rangnekar**, N Mankuzhy, J Willmann, C Choi, A Wu, M Thor, A Rimner, H Veeraraghavan. Generalizable cardiac substructures segmentation from contrast and non-contrast CTs using pretrained transformers. [Under review] [\[Link\]](#)

22. **A Rangnekar**, K Boehm, E Aherne, I Nikolovski, N Gangai, Y Liu, D Zamarin, K Roche, S Shah, Y Lakhman, H Veeraraghavan. Improving ovarian cancer segmentation accuracy with transformers through AI-guided labeling. [Under review] [\[Link\]](#)
23. **A Rangnekar**, A Apte, E LoCastro, P Romessor, J Smith, J Garcia-Aguilar, J Deasy, H Veeraraghavan. Anisotropic resolution training improves transformer-based rectal tumor segmentation in oblique 3D MRI scans. [Under legal review]
24. C Choi, **A Rangnekar**, J Jiang, H Veeraraghavan. Topological data analysis visualization for interpretable assessment of AI contouring quality. [Under legal review]

TEACHING EXPERIENCE

Guest lectures: Reinforcement learning (2016–2020), Transformers for vision (2020–2021), Semantic segmentation (2021). Mentored MS/PhD students at MSK and RIT.

REVIEWER

- Medical Physics, IEE Transactions on Image Processing, and IEEE Transactions on Geoscience and Remote Sensing
- Computer Vision and Pattern Recognition (CVPR), International Conference on Computer Vision (ICCV), European Conference on Computer Vision (ECCV), Winter Conference on Applications of Computer Vision (WACV), and International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)
- Tackling Climate Change with Machine Learning

TECHNICAL SKILLS

- Languages: Python, C++, MATLAB
- Frameworks: PyTorch, JAX, HuggingFace, MONAI, OpenCV
- Infrastructure: Git, Weights & Biases, Docker, Slurm, TensorBoard