Rushil Srirambhatla

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Education

- **Johns Hopkins University** — Baltimore, MD
  B.S. Applied Mathematics & Statistics, Cognitive Science; GPA: 3.83/4.00 — Aug 2023 – Dec 2026
  - **Relevant Coursework**: Deep Learning, Computer Vision, Artificial Intelligence, Data Structures & Algorithms; Linear Algebra, Probability, Mathematical Statistics, Data Science, Optimization

Research Experience

- **Stanford University – AIDE Lab** — Stanford, CA
  Machine Learning Research Intern — Mentors: Akshay Chaudhari, David Larson — Jun 2026 – Present
  - Built a scalable 3D CT preprocessing pipeline for **25,489 Merlin studies**, generating 23,935 VAE embeddings and segmentations using TotalSegmentator; implemented SLURM workflows for distributed GPU processing.
  - Fine-tuned three **text-conditioned 3D diffusion U-Nets** using MAISI, frozen ClinicalT5 embeddings, and cross-attention; compared impression-only, full-report, and MedGemma-27B-structured report conditioning on matched training and validation cohorts.
  - Improved medical text-image alignment by **42%** (BiomedCLIP: 14.95 to 21.19) using structured reports; identified systematic 512-token truncation and redesigned prompts to preserve clinical impressions in **99.8%** of training cases.
  - Developed a multidimensional evaluation framework combining FID, BiomedCLIP, Merlin-based clinical assessment, and 3D anatomical measurements; conducted **74-patient fixed-noise counterfactual experiments**, identifying limitations in disease-specific anatomical control.

- **BIOS Clinical Trials Coordinating Center** — Remote
  Machine Learning Researcher — Mentor: John Muschelli — May 2024 – Present
  - Led a large-scale benchmark of seven CT brain-extraction algorithms across **5,062 scans** from 499 patients at 78 sites, developing task-specific evaluation criteria for registration, volumetric analysis, and deep-learning workflows.
  - Developed and validated **Robust-CTBET**, integrating CT intensity windowing, template-guided neck removal, and spatial registration; achieved a **0.30% scan-level failure rate** and Dice ≈ 0.98, outperforming six competing methods.
  - Built reproducible Python/R pipelines for large-scale 3D CT preprocessing and quality control; evaluated methods using Dice, HD95, MSD, ICV error, and rim-HU contamination, with bootstrap confidence intervals and scanner-stratified statistical analyses.

- **University of Pittsburgh Medical Center** — Pittsburgh, PA
  Deep Learning Researcher — Mentor: Helmet T. Karim — May 2021 – Present
  - Developed scalable 3D MRI preprocessing and brain-age prediction pipelines across 40,841 scans from 46 datasets, using ANTs registration, intensity normalization, and 3D CNNs in PyTorch Lightning; achieved **3.14-year test MAE** and investigated disease-specific brain aging.
  - Developed a **skip-connection-free 3D autoencoder** with a 512 dimensional latent bottleneck and 3D pixel-shuffle decoder for whole-brain MRI reconstruction; reduced **GPU memory by 19.6%**, runtime by 10.4%, and parameters by 13.4%, evaluating fidelity using MAE and SSIM.
  - Developed a **WMH microstructure analysis pipeline** for 576 participants, integrating 3D U-Net (LST-AI), ANTs, and T1w/T2w-FLAIR imaging with multiple imputation and mediation analysis.
  - Developed an explainable CNN for COVID-19 CT classification using MATLAB, HU-windowed lung isolation, and class activation mapping (CAM), achieving a **12.34% improvement** in accuracy over reference models.

- **Massachusetts General Hospital / Harvard Medical School** — Remote
  Neuroimaging Researcher — Mentor: David H. Salat — Mar 2025 – Present
  - Developed a reproducible Python/R neuroimaging analysis pipeline integrating cognitive assessments and FreeSurfer-derived cortical thickness across **68 brain regions** in the ADNI cohort.
  - Applied age-stratified multivariable regression, ANCOVA, and FDR correction to examine cortical structure and cognitive performance in cognitively healthy older adults.
  - Identified stronger associations between **executive function and cortical thickness** in adults aged **80+**, with widespread FDR-significant regional associations across temporal, parietal, frontal, and occipital cortices.

- **Washington University School of Medicine** — St. Louis, MO
  Computational Cancer Genomics Researcher — Mentor: Kelly Bolton — May 2025 – Dec 2025
  - Developed machine-learning screening models for IDH1/2-mutant clonal hematopoiesis using **457,698 UK Biobank participants**, combining FDR-controlled feature selection with elastic net, random forest, and XGBoost classifiers.
  - Achieved **56.9-fold enrichment** in mutation-carrier prevalence among the top 0.1% of predicted-risk participants on held-out data, supporting targeted genetic screening.

Publications

- **Srirambhatla, R.**; Walborn, N.; Hanley, D.; Muschelli, J. *Benchmarking Automated CT Brain Extraction Methods Across 5,000 Scans.* BMC Medical Imaging, pending acceptance.
- **Srirambhatla, R.**; Karim, H. T.; Campion, J.-Y. *Memory-Efficient Skip-Connection-Free 3D Autoencoder for Whole-Brain MRI Reconstruction.* ECCV 2026 AI4M3D Workshop, accepted.
- Jain, R.; **Srirambhatla, R.**; Kessler, J.; Goel, R. *The Black Box Dilemma: Challenges in Human-AI Collaboration in ML-CDSS. The American Journal of Bioethics*, 24(9), 108–110, 2024. Published commentary. doi:10.1080/15265161.2024.2377105.
- **Srirambhatla, R.**; Campion, J.-Y.; Desmidt, T.; Pan, Y.; Andreescu, C.; *et al. Altered T1w/T2w-FLAIR Ratio in White Matter Hyperintensities as an Indicator of Structural Integrity Loss: Association with Alzheimer's Disease and Vascular Dementia.* medRxiv preprint, 2026; under revision. doi:10.64898/2026.07.28.26359139.
- Campion, J.-Y.*; **Srirambhatla, R.***; Andreescu, C.; *et al. Deep Learning-Derived Brain Age from 40,000+ MRI Scans Reveals Disease-Specific Aging Trajectories.* Submitted. *Equal contribution (co-first authors).
- **Srirambhatla, R.**; Hong, Y.; Zhang, Y.; Salat, D. H. *Cortical Thickness Signatures of High vs. Low Cognitive Performers in the ADNI Dataset.* medRxiv preprint, 2026.
- **Srirambhatla, R.**; Karim, H. T. *Prediction of COVID-19 Diagnosis from Healthy and Pneumonia CT Scans Using Convolutional Neural Networks.* medRxiv preprint, 2022. doi:10.1101/2022.10.20.22281334.

Conference Presentations & Abstracts

- **Srirambhatla, R.**, Walborn, N., Hanley, D., & Muschelli, J. *Comparison of Automated Brain Extraction Methods in Over 5,000 Computed Tomography Scans.* International Stroke Conference, 2026. *Stroke*, 57(Suppl. 1), WP305. doi:10.1161/str.57.suppl_1.WP305.
- **Srirambhatla, R.**, *et al. Altered T1w/T2w Ratio in White Matter Hyperintensities as an Indicator of Structural Integrity Loss.* Alzheimer's Association International Conference (AAIC) and Society of Biological Psychiatry (SOBP), 2026.
- Campion, J.-Y., **Srirambhatla, R.**, Andreescu, C., Desmidt, T., & Karim, H. T. *Deep Learning-Derived Brain Age from 40,000+ MRI Reveals Disease-Specific Aging Trajectories.* Alzheimer's Association International Conference (AAIC) and Society of Biological Psychiatry (SOBP), 2026.
- **Srirambhatla, R.**, Mustion, G., Tran, D., Chatterjee, N., & Bolton, K. *Machine Learning–Driven Screening for Individuals at High Risk of IDH1/2-Mutant Clonal Hematopoiesis.* 15th International Workshop on Molecular Aspects of Myeloid Stem Cell Development & Leukemia, 2026.
- **Srirambhatla, R.**, Hong, Y., Zhang, Y., & Salat, D. H. *Cortical Thickness Signatures of High vs. Low Cognitive Performers in the ADNI Dataset.* Poster presentation, Mass General Brigham Neuroscience Day, 2025.
- **Srirambhatla, R.** & Karim, H. T. *A Task-Specific Curriculum Learning Approach to Predict the Onset of Alzheimer's Disease.* Johns Hopkins DREAMS, 2024.
- **Srirambhatla, R.**; Muschelli, J.; Siddharthan, T.; Blair, P. *UltraNet: Differentiating A-Line and B-Line Lung Ultrasound Using Deep Learning.* Point-of-Care Ultrasound Research Seminar, 2023.
- Bagga, A.; Bharti, S.; Polamraju, A.; Shah, M.; Edupadanti, H.; **Srirambhatla, R.**; *et al. Persistent Insurance Coverage Gaps Among Working-Age United States Stroke Survivors: No Improvement From 1999 Through 2023.* International Stroke Conference, 2027. Oral presentation accepted.

Honors, Awards & Fellowships

- **Stanford Radiological Sciences Laboratory (RSL) REU** – $8,000 (2026)
- **WashU Computational Cancer Genomics Summer Research Program** – $7,000 (2025)
- **JHU Bloomberg Distinguished Professors Summer Program** – $6,000
- **Best Delegate** – UNC Model UN Conference (2024)
- **Dean's List** – 2024, 2025, 2026
- **Northwest Science Expo** – $9,000/year renewable OSU scholarship
- **Biomedical Hackathon** – 1st Place (Med-O-Vate)

Leadership, Community Service & Clinical Experience

- **Research Mentor, University of Pittsburgh** – Mentoring a high school student on a neuroimaging research project examining white matter hyperintensity burden in cognitive impairment (2026–Present).
- **Founder, Welfare Support Organization** – Donated 1,000+ lbs of clothing to 120+ homeless individuals (100+ hours).
- **Clinical Volunteering & Physician Shadowing** – Supported patient care at MedStar Health, provided companionship through Alzheimer's Buddies, and shadowed pediatric neurosurgeries (100+ hours combined).

Technical Skills

- **Programming & Systems** – Python, R, MATLAB, Bash, Java, Swift; Git, Docker, Slurm/HPC, LaTeX.
- **Machine Learning & AI** – PyTorch, PyTorch Lightning, Keras, TensorFlow, OpenCV, scikit-learn, TensorBoard, Matplotlib.