

# CHENYU GAO

+1 (667) 910-5300 | [chenyu.gao@vanderbilt.edu](mailto:chenyu.gao@vanderbilt.edu) | [chenyugoal.github.io](https://github.com/chenyugoal) | [LinkedIn](#) | [Google Scholar](#)

## TECHNICAL SKILLS

<b>Areas of Expertise</b>	Multimodal Representation Learning, Generative Models, Medical Image Analysis
<b>Languages</b>	Python, Bash
<b>Frameworks</b>	PyTorch, TensorFlow, Scikit-learn, Hugging Face, Pandas, NumPy, Polars
<b>DevOps &amp; Cloud</b>	Git, Docker, Singularity, HPC/Slurm, AWS (S3, EC2), Weights & Biases

## INTELLECTUAL PROPERTY

IP1. **Chenyu Gao**, Bennett A. Landman, Michael E. Kim. 2024. System and Method of Brain Age Identification for Predicting Neuro-Degenerative Disease. U.S. Patent 63/701,861, filed Oct 1, 2024. Provisional patent.

## EXPERIENCE

### Data Science and Machine Learning Intern

South San Francisco, CA

*insitro*

June 2025 – Aug 2025

- Designed and implemented a framework for multimodal self-supervised representation learning to enable the discovery of novel gene targets. First-authored a technical paper, currently pending internal review for publication.

### Multi-Modality Representation Learning and Uncertainty Inference

Nashville, TN

*Vanderbilt University, Research Assistant*

July 2022 – Present

- Designed a brain age estimation system which enables early detection of neurodegenerative diseases. [GitHub]
- Developed conditional generative adversarial network (cGAN) for field-of-view extension of diffusion MRI.
- Designed a red team model to simulate privacy attacks on defaced MRI images: reconstructing 3D high-resolution MRI images with high-fidelity human faces with cascaded diffusion models. [Blog]
- Characterized the heteroscedasticity of uncertainty in diffusion tensor imaging (DTI) of aging brains.

### Building the World's Largest Diffusion and Structural MRI Database

Nashville, TN

*Vanderbilt University, Research Assistant*

July 2022 – Present

- Coordinated the collection and processing of 40+ MRI datasets, encompassing 30,000+ participants.
- Cleaned, organized, and harmonized tabular data from 100,000+ scans using pandas.
- Implemented containerization of pipelines with Singularity to ensure reproducibility and scalability.
- Utilized local and high-performance computing (HPC) resources for high-throughput parallel processing.
- Developed strategies for quality assurance of over 1M of image samples in real-time collaboration.

### Medical Image Analysis and MRI Defacing

Baltimore, MD

*Johns Hopkins University, Research Assistant*

Dec 2020 – May 2022

- Implemented classical image processing algorithms and deep learning-based methods for registration, segmentation, and synthesis of MR images.
- Evaluated the effects of defacing whole-head MRI on segmentation reproducibility.

### ProgLearn: Omnidirectional Transfer for Quasilinear Lifelong Learning

Baltimore, MD

*Johns Hopkins University, Research Assistant*

Aug 2020 – May 2021

- Extended the application of a lifelong learning algorithm (ProgLearn) from vision to speech. Validated and benchmarked the backward and forward knowledge transfer against other continual/transfer learning methods, contributing to a publication in the top-tier journal *IEEE TPAMI*. [GitHub]

## EDUCATION

---

### Vanderbilt University

Doctor of Philosophy in Electrical & Computer Engineering

- Honors: Graduate School Travel Grant (2023), ECE Day best poster (2025)

Nashville, TN

July 2022 – Nov 2026 (expected)

### Johns Hopkins University

Master of Science in Biomedical Engineering

Baltimore, MD

Aug 2020 – May 2022

### Sun Yat-sen University

Bachelor of Science in Biomedical Engineering

Guangzhou, China

Aug 2016 – June 2020

## JOURNAL ARTICLES

---

- J1. **C Gao\***, K Xu\*, et al. "Pitfalls of defacing whole-head MRI: re-identification risk with diffusion models and compromised research potential." *Computers in Biology and Medicine*. 2025.
- J2. **C Gao**, et al. "Brain age identification from diffusion MRI synergistically predicts neurodegenerative disease." *Imaging Neuroscience*. 2025.
- J3. **C Gao**, et al. "Field-of-view extension for brain diffusion MRI via deep generative models." *Journal of Medical Imaging*. 2024.
- J4. **C Gao**, et al. "Characterizing patterns of diffusion tensor imaging variance in aging brains." *Journal of Medical Imaging*. 2024.
- J5. **C Gao**, BA Landman, JL Prince, A Carass. "Reproducibility evaluation of the effects of MRI defacing on brain segmentation." *Journal of Medical Imaging*. 2023.
- J6. JT Vogelstein, J Dey, ..., **C Gao**, et al. "Simple Lifelong Learning Machines." *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 2025.
- J7. ME Kim, **C Gao**, et al. "Scalable quality control on processing of large diffusion-weighted and structural magnetic resonance imaging datasets." *PLoS One*. 2025.
- J8. C Peter, ..., **C Gao** (ADSP-PHC Analyst Team), et al. "White Matter Abnormalities and Cognition in Aging and Alzheimer Disease." *JAMA neurology*. 2025.
- J9. AM Saunders, ME Kim, **C Gao**, et al. "Comparison and calibration of MP2RAGE quantitative T1 values to multi-T1 inversion recovery T1 values." *Magnetic Resonance Imaging*. 2025.
- J10. A Lorenz, ..., **C Gao**, et al. "The effect of Alzheimer's disease genetic factors on limbic white matter microstructure." *Alzheimer's & Dementia*. 2025.
- J11. KG Schilling, ..., **C Gao**, et al. "Head Motion in Diffusion Magnetic Resonance Imaging: Quantification, Mitigation, and Structural Associations in Large, Cross-Sectional Datasets Across the Lifespan." *Human Brain Mapping*. 2025.
- J12. R Zhang, ..., **C Gao**, et al. "Enhancing Clinical Data Management through Barcode Integration and REDCap: Innovations in Scalability and Adaptability." *JMIR Formative Research*. 2025.
- J13. A Peterson, ..., **C Gao**, et al. "Sex and APOE-ε4 allele differences in longitudinal white matter microstructure in multiple cohorts of aging and Alzheimer's disease." *Alzheimer's & dementia*. 2024.
- J14. P Kanakaraj, ..., **C Gao**, et al. "Deepn4: learning N4ITK bias field correction for T1-weighted images." *Neuroinformatics*. 2024.
- J15. ME Kim, **C Gao**, et al. "Empirical assessment of the assumptions of ComBat with diffusion tensor imaging." *Journal of Medical Imaging*. 2024.

## CONFERENCE PUBLICATIONS

---

- C1. **C Gao**, et al. "Predicting age from white matter diffusivity with residual learning." *Medical Imaging 2024: Image Processing*. 2024.
- C2. **C Gao**, L Jin, JL Prince, A Carass. "Effects of defacing whole head MRI on neuroanalysis." *Medical Imaging 2022: Image Processing*. 2022.
- C3. E Topolnjak\*, **C Gao\***, et al. "Assessment of subject head motion in diffusion MRI." *Medical Imaging 2024: Image Processing*. 2024.
- C4. E McMaster, L Puglisi, **C Gao**, et al. "A technical assessment of latent diffusion for Alzheimer's disease progression." *Medical Imaging 2025: Image Processing*. 2025.
- C5. ME Kim, K Ramadass, **C Gao**, et al. "Scalable, reproducible, and cost-effective processing of large-scale medical imaging datasets." *Medical Imaging 2025: Imaging Informatics*. 2025.

- C6. Y Chang, L Xu, **C Gao**, et al. "Bundle-wise functional connectivity density and fractional amplitude of low-frequency fluctuations decrease in white matter in preclinical Alzheimer's disease and are associated with  $A\beta$  levels and cognition." *Medical Imaging 2025: Clinical and Biomedical Imaging*. 2025.
- C7. K Ramadass, Y Liu, ME Kim, **C Gao**, et al. "Investigating effects of air quality and weather on human brain volumes." *Medical Imaging 2025: Clinical and Biomedical Imaging*. 2025.
- C8. Z Li, ..., **C Gao**, et al. "Approximate diffusion tractography from FLAIR MRI and anatomical context using recurrent neural networks." *Medical Imaging 2025: Image Processing*. 2025.
- C9. S Bao, ..., **C Gao**, et al. "Quantitative analysis of colonic epithelial cell aging in a cell-cycle-like model: changes in nucleus and cytoplasm along the crypt axis." *Medical Imaging 2025: Digital and Computational Pathology*. 2025.
- C10. AR Krishnan, K Xu, T Li, **C Gao**, et al. "Inter-vendor harmonization of CT reconstruction kernels using unpaired image translation." *Medical Imaging 2024: Image Processing*. 2024.
- C11. T Yu, Y Li, ME Kim, **C Gao**, et al. "Tractography with T1-weighted MRI and associated anatomical constraints on clinical quality diffusion MRI." *Medical Imaging 2024: Image Processing*. 2024.
- C12. H Xu, NR Newlin, ME Kim, **C Gao**, et al. "Evaluation of mean shift, ComBat, and CycleGAN for harmonizing brain connectivity matrices across sites." *Medical Imaging 2024: Image Processing*. 2024.
- C13. ME Kim, HH Lee, K Ramadass, **C Gao**, et al. "Characterizing low-cost registration for photographic images to computed tomography." *Medical Imaging 2024: Clinical and Biomedical Imaging*. 2024.