

# Chenyu Gao

444 Elmington Ave, Apt 716, Nashville, TN 37205

☎ +1 (667) 910-5300 | ✉ [chenyu.gao@vanderbilt.edu](mailto:chenyu.gao@vanderbilt.edu) | 🌐 [chenyugoal.github.io](https://chenyugoal.github.io)

## PROFESSIONAL SKILLS

---

- Areas of Expertise: Computer Vision, Generative Models, Natural Language Processing, Medical Image Analysis
- Languages: Python, Bash
- Frameworks & Libraries: PyTorch, TensorFlow, pandas/polars, multiprocessing
- Developer Tools: Singularity, Git, HPC/Slurm

## 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

June 2025 – August 2025

*insitro*

*South San Francisco, CA*

- Designed a framework for multimodal self-supervised representation learning to enable the discovery of novel gene targets. First-authored a technical paper (pending internal review).

### Multi-Modality Representation Learning and Uncertainty Inference

July 2022 – Present

*Vanderbilt University (advisor: Bennett A. Landman), Research Assistant*

*Nashville, TN*

- 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

July 2022 – Present

*Vanderbilt University (advisor: Bennett A. Landman), Research Assistant*

*Nashville, TN*

- Coordinated the collection and processing of 20+ MRI datasets, encompassing 28,000+ participants.
- Cleaned, organized, and harmonized tabular data from 48,000+ sessions 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

Dec 2020 – May 2022

*Johns Hopkins University (advisor: Jerry L. Prince), Research Assistant*

*Baltimore, MD*

- 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

Aug 2020 – May 2021

*Johns Hopkins University (advisor: Joshua T. Vogelstein), Research Assistant*

*Baltimore, MD*

- Extended the application of a lifelong learning algorithm (ProgLearn) from vision to speech. Validated and benchmarked the backward and forward knowledge transfer against transfer learning. [GitHub]

## EDUCATION

---

### Vanderbilt University

*Doctor of Philosophy in Electrical & Computer Engineering*

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

July 2022 – Present

*Nashville, TN*

### Johns Hopkins University

*Master of Science in Biomedical Engineering*

Aug 2020 – May 2022

*Baltimore, MD*

### Sun Yat-sen University

*Bachelor of Science in Biomedical Engineering*

Aug 2016 – June 2020

*Guangzhou, China*

## JOURNAL ARTICLES

---

- J1. **C Gao**, et al. “Brain age identification from diffusion MRI synergistically predicts neurodegenerative disease.” *Imaging Neuroscience*. 2025.
- J2. **C Gao**, et al. “Field-of-view extension for brain diffusion MRI via deep generative models.” *Journal of Medical Imaging*. 2024.
- J3. **C Gao**, et al. “Characterizing patterns of diffusion tensor imaging variance in aging brains.” *Journal of Medical Imaging*. 2024.
- J4. **C Gao**, BA Landman, JL Prince, A Carass. “Reproducibility evaluation of the effects of MRI defacing on brain segmentation.” *Journal of Medical Imaging*. 2023.
- J5. JT Vogelstein, J Dey, . . . , **C Gao**, et al. “Simple Lifelong Learning Machines.” *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 2025.
- J6. ME Kim, **C Gao**, et al. “Scalable quality control on processing of large diffusion-weighted and structural magnetic resonance imaging datasets.” *PLoS One*. 2025.
- J7. C Peter, . . . , **C Gao** (ADSP-PHC Analyst Team), et al. “White Matter Abnormalities and Cognition in Aging and Alzheimer Disease.” *JAMA neurology*. 2025.
- J8. 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.
- J9. A Lorenz, . . . , **C Gao**, et al. “The effect of Alzheimer’s disease genetic factors on limbic white matter microstructure.” *Alzheimer’s & Dementia*. 2025.
- J10. 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.
- J11. R Zhang, . . . , **C Gao**, et al. “Enhancing Clinical Data Management through Barcode Integration and REDCap: Innovations in Scalability and Adaptability.” *JMIR Formative Research*. 2025.
- J12. A Peterson, . . . , **C Gao**, et al. “Sex and APOE- $\epsilon$ 4 allele differences in longitudinal white matter microstructure in multiple cohorts of aging and Alzheimer’s disease.” *Alzheimer’s & dementia*. 2024.
- J13. P Kanakaraj, . . . , **C Gao**, et al. “Deepn4: learning N4ITK bias field correction for T1-weighted images.” *Neuroinformatics*. 2024.
- J14. 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.

#### MANUSCRIPTS UNDER REVIEW

---

- P1. **C Gao\***, K Xu\*, et al. “Pitfalls of defacing whole-head MRI: re-identification risk with diffusion models and compromised research potential.” [arXiv]