Chenyu Gao

444 Elmington Ave, Apt 716, Nashville, TN 37205

📞 +1 (667) 910-5300 | ✉ chenyu.gao@vanderbilt.edu | 🌐 chenyugoal.github.io

PROFESSIONAL SKILLS

- Areas of expertise: computer vision, generative models, deep learning, machine learning, medical image analysis
- Programming languages: Python, Bash, R, MATLAB
- Software tools: PyTorch, pandas, TensorFlow, multiprocessing, Singularity

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

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 and organized demographic and diagnostic 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 July 2022 – May 2026 (expected)
Doctor of Philosophy in Electrical & Computer Engineering *Nashville, TN*

Johns Hopkins University Aug 2020 – May 2022
Master of Science in Biomedical Engineering *Baltimore, MD*

Sun Yat-sen University Aug 2016 – June 2020
Bachelor of Science in Biomedical Engineering *Guangzhou, China*

Refereed Journal Articles

J1. **Chenyu Gao**, et al. "Brain age identification from diffusion MRI synergistically predicts neurodegenerative disease." *Imaging Neuroscience.* 2025.

J2. **Chenyu Gao**, et al. "Field-of-view extension for brain diffusion MRI via deep generative models." *Journal of Medical Imaging.* 2024.

J3. **Chenyu Gao**, et al. "Characterizing patterns of diffusion tensor imaging variance in aging brains." *Journal of Medical Imaging.* 2024.

J4. **Chenyu Gao**, Bennett A. Landman, Jerry L. Prince, Aaron Carass. "Reproducibility evaluation of the effects of MRI defacing on brain segmentation." *Journal of Medical Imaging.* 2023.

J5. Adam M. Saunders, Michael E. Kim, **Chenyu Gao**, et al. "Comparison and calibration of MP2RAGE quantitative T1 values to multi-TI inversion recovery T1 values." *Magnetic Resonance Imaging.* 2025

J6. Amalia Peterson, Aditi Sathe, Dimitrios Zaras, Yisu Yang, Alaina Durant, Kacie D Deters, Niranjana Shashikumar, Kimberly R Pechman, Michael E Kim, **Chenyu 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.

J7. Praitayini Kanakaraj, Tianyuan Yao, Leon Y Cai, Ho Hin Lee, Nancy R Newlin, Michael E Kim, **Chenyu Gao**, et al. "DeepN4: Learning N4ITK Bias Field Correction for T1-weighted Images." *Neuroinformatics.* 2024.

J8. Michael E Kim, **Chenyu Gao**, et al. "Empirical assessment of the assumptions of ComBat with diffusion tensor imaging." *Journal of Medical Imaging.* 2024.

J9. Kurt G Schilling, Karthik Ramadass, Viljami Sairanen, Michael E Kim, Francois Rheault, Nancy Newlin, Tin Nguyen, Laura Barquero, Micah D'archangel, **Chenyu 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.

Refereed Conference Publications

C1. **Chenyu Gao**, et al. "Predicting age from white matter diffusivity with residual learning." *Medical Imaging 2024: Image Processing.* International Society for Optics and Photonics (SPIE). 2024.

C2. **Chenyu Gao**, Linghao Jin, Jerry L Prince, Aaron Carass. "Effects of defacing whole head MRI on neuroanalysis." *Medical Imaging 2022: Image Processing.* International Society for Optics and Photonics (SPIE). 2022.

C3. Ema Topolnjak*, **Chenyu Gao***, et al. "Assessment of subject head motion in diffusion MRI." *Medical Imaging 2024: Image Processing.* International Society for Optics and Photonics (SPIE). 2024.

C4. Aravind R Krishnan, Kaiwen Xu, Thomas Li, **Chenyu Gao**, et al. "Inter-vendor harmonization of CT reconstruction kernels using unpaired image translation." *Medical Imaging 2024: Image Processing.* International Society for Optics and Photonics (SPIE). 2024.

C5. Tian Yu, Yunhe Li, Michael E Kim, **Chenyu Gao**, et al. "Tractography with T1-weighted MRI and associated anatomical constraints on clinical quality diffusion MRI." *Medical Imaging 2024: Image Processing.* International Society for Optics and Photonics (SPIE). 2024.

C6. Hanliang Xu, Nancy R Newlin, Michael E Kim, **Chenyu Gao**, et al. "Evaluation of mean shift, ComBat, and CycleGAN for harmonizing brain connectivity matrices across sites." *Medical Imaging 2024: Image Processing.* International Society for Optics and Photonics (SPIE). 2024.

C7. Michael E Kim, Ho Hin Lee, Karthik Ramadass, **Chenyu Gao**, et al. "Characterizing low-cost registration for photographic images to computed tomography." *Medical Imaging 2024: Clinical and Biomedical Imaging.* International Society for Optics and Photonics (SPIE). 2024.

Manuscripts Under Review

P1. **Chenyu Gao***, Kaiwen Xu*, et al. "Pitfalls of defacing whole-head MRI: re-identification risk with diffusion models and compromised research potential." (submitted) [arXiv]

P2. Zhiyuan Li, Tianyuan Yao, Praitayini Kanakaraj, **Chenyu Gao**, et al. "Multi-Modality Conditioned Variational U-Net for Field-of-View Extension in Brain Diffusion MRI." (submitted) [arXiv]

P3. Michael E. Kim, **Chenyu Gao**, et al. "Scalable quality control on processing of large diffusion-weighted and structural magnetic resonance imaging datasets." (submitted) [arXiv]

P4. Michael E Kim, Karthik Ramadass, **Chenyu Gao**, et al. "Scalable, reproducible, and cost-effective processing of large-scale medical imaging datasets." (submitted) [arXiv]

P5. Joshua T. Vogelstein, Jayanta Dey, Hayden S. Helm, Will LeVine, Ronak D. Mehta, Tyler M. Tomita, Haoyin Xu, Ali Geisa, Qingyang Wang, Gido M. van de Ven, **Chenyu Gao**, et al. "A Simple Lifelong Learning Approach." (submitted) [arXiv]