

YAMIN LI

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Education

Vanderbilt University

Ph.D. student in Computer Science

GPA: 4.0/4.0 · Sidney P. Colowick Graduate Student Scholarship · Harold Stirling Scholar · Russell G. Hamilton Scholar

Aug 2022 – Present

(Expected Dec 2026)

Shanghai Jiao Tong University

M.Sc. in Biomedical Engineering

Legend Medical Excellence Scholarship (top 2%) · Outstanding Graduate

Sept 2019 – Mar 2022

Xi'an Jiaotong University

B.E. in Biomedical Engineering

National Scholarship (top 0.2% nationwide) · Outstanding Graduate

Sept 2015 – Jun 2019

Research Interests

My research interests include, but are not limited to, multimodal foundation modeling across vision, language, and time series; large-scale time-series modeling; vision-language(-action) learning; AI for health and sensing; Neuro AI and brain decoding; cross-modal reasoning and transfer for human-centered AI.

Professional Experience

Research Scientist Intern (extended as Part-time Student Researcher)

Meta, Reality Lab Research

Burlingame, CA

May 2025 – Nov 2025

- Focus area: Multimodal hand foundation model; Wearable-based multimodal learning focusing on generative modeling of fingertip force, egocentric representation learning, and vision-language(-action) learning.
- Built the first wearable-based multimodal dataset with EMG, hand pose, egocentric video, force and stiffness labels to support representation learning of human hand interactions.

Selected Research Experience

Neurdylab, Vanderbilt University

Advisor: Prof. Catie Chang

Sept 2022 – Present

Multimodal Learning for Neural Representation, Physiological Time Series, and Beyond (Ongoing)

- Developed a scalable, context-aware unified framework for cross-modality translation in neuroimaging, leveraging **large-scale self-supervised masked modeling** and **context-conditioned prompt learning** to generate whole-brain time series from limited sensors, achieving efficient and generalizable zero-shot transfer across tasks and subjects. (*submitted to ICLR'26*)
- Leading the development of a **unified benchmark and library for deep time-series foundation models and LLMs in neuroimaging and physiological data**, systematically evaluating state-of-the-art pre-trained architectures under out-of-the-box and few-shot settings across forecasting, imputation, and classification task to guide model selection and improve reproducibility. (*in progress*)
- Developed NeuroBOLT, a **multi-scale, multi-dimensional biosignal transformer** for EEG-to-fMRI translation, capturing spectral, temporal, and spatial dependencies in neural dynamics; supports flexible input sensor configurations and variable-length sequence generation, achieving zero-shot generalization across unseen participants, experimental conditions, and imaging systems. (*NeurIPS'24*).
- Co-developed a **VQ-VAE based framework for interpretable physiological signal generation**, learning discrete latent representations of fMRI dynamics to model respiration and heart-rate fluctuations (*NeurIPS'25, BrainBodyFM*)
- Co-developed a **contrastive learning-based cross-modal foundation framework** that aligns multi-modal neural embeddings for vigilance detection, integrating pretrained **foundation models** for both modalities and benchmarking their transferability and adaptation performance. (*MICCAI'25, OHBM'25*)

Agentic AI in Healthcare (*Ongoing*)

SAM3-based Multi-Agent Framework for Zero-Shot Surgical Scene Segmentation (*preprint in preparation*)

- Fine-tuned SAM3 on medical imaging datasets to better capture medical-domain visual concepts, including surgical instruments and anatomy.
- Proposed a multi-agent refinement framework that iteratively performs error analysis, VLM-guided localization, and mask refinement, enabling progressive segmentation improvement.
- Implemented a modular agent-based system to support extensible refinement workflows and task specialization.

Efficient 4D Neural Radiance Field and Gaussian Splatting

- Contributed to the development of direction-aware representation designed to capture scene dynamics from six distinct directions, enhancing NeRF and GS's abilities to reconstruct both static and dynamic scenes. (*CVPR'24*, *preprint submitted to TPAMI*)

Neural Engineering Lab, Shanghai Jiao Tong University

Sept 2019 – Mar 2022

Advisor: Prof. Shangbao Tong, Prof. Xiaoli Guo

EEG-based Multi-User Neural Interaction Modeling

- Led an end-to-end dual-EEG hyperscanning project modeling inter-brain dynamics during mother-child cooperation, covering experimental design, large-scale sensor data acquisition, preprocessing, and algorithm development. Coordinated cross-institution collaborations with hospitals, kindergarten to build a high-quality, time-synchronized multi-subject EEG dataset (**108 participants**) for social interaction modeling.
- Modeled inter-brain relationships as dynamic graph representations using phase-locking and causal metrics, revealing interpretable neural signatures of human cooperation. (*IEEE JBHI'25, HBM'24*)

College of BME & Instrument Science, Zhejiang University

Aug 2021 – Oct 2021

Advisor: Prof. Dan Wu

- Applied deep learning-based super-resolution reconstruction for fetal brain MRI, achieving a 5dB PSNR improvement over traditional optimization methods. Designed learning-based reconstruction pipelines combining model-driven and data-driven priors for efficient medical image synthesis. (*IEEE TMI'22, NI'21*)

Department of BME, Xi'an Jiaotong University

Oct 2018 – Jan 2020

Advisor: Prof. Gang Wang

- Modeled neural state transitions during anesthesia using machine learning on EEG microstate dynamics; integrated Hilbert–Huang spectral features with unsupervised clustering to build interpretable representations, improved model accuracy for consciousness-state classification by 10% over conventional EEG markers. (*IEEE JBHI'20, IJNS'20, NI'21*)

Selected Publications

**These authors contributed equally to this work.*

Conference Papers

[C.16] Ange Lou, **Yamin Li**, Qi Chang, Tianyu Luan, “VLM-Guided Iterative Refinement for Medical Image Segmentation with Foundation Models”, *in prep for* International Conference on Machine Learning, (**ICML**), 2026

[C.15] **Yamin Li**, Ting Zhang, Ariel Feldman, Purnima Padmanabhan, Ali Nabi, Guan Li, Hrvoje Benko, “ForceFlow: Generative Fingertip Force Estimation via Multimodal Flow Matching”, *in prep for*, International Conference on Machine Learning, (**ICML**), 2026

[C.14] **Yamin Li**, Shiyu Wang, Chang Li, Ange Lou, Dario J. Englot, Daniel Moyer, Roza G. Bayrak, Catie Chang, “Towards Unified, Context-Aware EEG-to-fMRI Synthesis”, *under review*, International Conference on Learning Representations (**ICLR**), 2026

[C.13] **Yamin Li**, Ange Lou, Chang Li, Ziyuan Xu, Shengchao Zhang, Shiyu Wang, Dario J. Englot, Soheil Kolouri, Daniel Moyer, Roza G. Bayrak, Catie Chang, “A Scalable EEG-to-fMRI Translation Framework for Whole-Brain Inference and Functional Connectivity Reconstruction”, *under review*, Medical Imaging with Deep Learning (**MIDL**), 2026

[C.12] Shiyu Wang, **Yamin Li**, Ziyuan Xu, Haatef Pourmotabbed, Chang Li, Roza G. Bayrak, Catie Chang, “A VQ-VAE Framework for Modeling Physiological Information in fMRI”, Accepted by **NeurIPS 2025** workshop on Foundation Model for the Brain and Body

[C.11] Chang Li, Shiyu Wang, **Yamin Li**, Haatef Pourmotabbed, Jeffery M. Harding, Alexander Douma, Derek J. Doss, Anas Reda, Shengchao Zhang, Jorge A. Salas, Sarah E. Goodale, Shumit Saha, Dario J. Englot, Roza G. Bayrak, Catie Chang “EEG-to-fMRI Knowledge Distillation Empowers Few-shot Resting-state fMRI Vigilance Detection”, Accepted by Medical Imaging 2026: Image Processing, **SPIE**

[C.10] Chang Li, **Yamin Li**, Haatef Pourmotabbed, Shengchao Zhang, Jorge A Salas, Sarah E Goodale, Roza G Bayrak, Catie Chang, “CBrain: Cross-Modal Learning for Brain Vigilance Detection in Resting-State fMRI”, International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**), 2025

[C.9] J. Mason Harding, Haatef Pourmotabbed, **Yamin Li**, Kimberly Rogge-Obando, Kate Wang, Sarah E. Goodale, Shiyu Wang, Camden Bibro, Bergen Allee, Caroline Martin, Victoria L. Morgan, Dario J. Englot, Catie Chang, “Joint-Source Decomposition Analysis of Resting-State fMRI and EEG in Epilepsy and Control Subjects”, IEEE International Symposium on Biomedical Imaging (**ISBI**), 2025

[C.8] Ange Lou*, **Yamin Li***, Yike Zhang*, Robert F. Labadie, Jack Noble, “Zero-Shot Surgical Tool Segmentation in Monocular Video Using Segment Anything Model 2”, Medical Imaging 2025: Image Processing, **SPIE**, 2025

[C.7] Ange Lou, **Yamin Li**, Yike Zhang, Jack Noble, “Surgical Depth Anything: Depth Estimation for Surgical Scenes using Foundation Models”, Medical Imaging 2025: Image-Guided Procedures, Robotic Interventions, and Modeling, **SPIE**, 2025, (**Oral**)

[C.6] Shiyu Wang, Ziyuan Xu, Laurent M. Lochard, **Yamin Li**, Jiawen Fan, Jingyuan E. Chen, Yuankai Huo, Mara Mather, Roza G. Bayrak, Catie Chang, “Reconstructing Physiological Signals from fMRI across the Adult Lifespan”, Medical Imaging 2025: Image Processing, **SPIE**, 2025, (**Oral**).

[C.5] **Yamin Li**, Ange Lou, Ziyuan Xu, Shengchao Zhang, Shiyu Wang, Dario J. Englot, Soheil Kolouri, Daniel Moyer, Roza G. Bayrak, Catie Chang, “NeuroBOLT: Resting-state EEG-to-fMRI Synthesis with Multi-dimensional Feature Mapping”, the Conference on Neural Information Processing Systems (**NeurIPS**), 2024

[C.4] Ange Lou, Benjamin Planche, Zhongpai Gao, **Yamin Li**, Tianyu Luan, Hao Ding, Terrence Chen, Jack Noble, Ziyuan Wu, “Darenerf: Direction-aware Representation for Dynamic Scenes”, IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**), 2024

[C.3] **Yamin Li**, Ange Lou, Ziyuan Xu, Shiyu Wang, Catie Chang, “Leveraging Sinusoidal Representation Networks to Predict fMRI Signals from EEG”, Medical Imaging 2024: Image Processing, **SPIE**, 2024

[C.2] Ange Lou, **Yamin Li**, Xing Yao, Yike Zhang, Jack Noble, “SAMSNeRF: Segment Anything Model (SAM) Guides Dynamic Surgical Scene Reconstruction by Neural Radiance Field (NeRF)”, Medical Imaging 2024: Image-Guided Procedures, Robotic Interventions, and Modeling, **SPIE**, 2024

[C.1] **Yamin Li**, Saishuang Wu, Wen Shi, Shanbao Tong, Yunting Zhang, Xiaoli Guo, “Enhanced inter-brain connectivity between children and adults during cooperation: a dual EEG study”, 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (**EMBC**), 2021

Journal Papers

[J.9] Ruxin Su, Jiayang Xu, **Yamin Li**, Saishuang Wu, Haiwa Wang, Zihan Yang, Yuqi Liu, Jieqiong Liu, Shanbao Tong, Yuting Zhang, Xiaoli Guo, Fan Jiang, “Who Is in Mind Matters: Attachment Representations Synchronize Interacting Brains in Early Childhood”, *Preprint, under review*, (**Nature Human Behavior**)

[J.8] Ange Lou, Benjamin Planche, Zhongpai Gao, **Yamin Li**, Tianyu Luan, Hao Ding, Meng Zheng, Terrence Chen, Ziyuan Wu, Jack Noble, “DaRePlane: Direction-aware Representations for Dynamic Scene Reconstruction”, *Preprint, under review*, IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**)

[J.7] Jiayang Xu, **Yamin Li**, Ruxin Su, Saishuang Wu, Chengcheng Wu, Haiwa Wang, Qi Zhu, Yue Fang, Fan Jiang, Shanbao Tong, Yunting Zhang, Xiaoli Guo, “Dynamic theta-alpha inter-brain model during mother-preschooler cooperation”, IEEE Journal of Biomedical and Health Informatics (**IEEE JBHI**), 2025

[J.6] **Yamin Li**, Saishuang Wu, Jiayang Xu, Haiwa Wang, Qi Zhu, Wen Shi, Yue Fang, Fan Jiang, Shanbao Tong, Yunting Zhang, Xiaoli Guo, “Interbrain substrates of role switching during mother-child interaction”, Human Brain Mapping (**HBM**), 2024

[J.5] Wen Shi, Haoan Xu, Cong Sun, Jiwei Sun, **Yamin Li**, Xinyi Xu, Tianshu Zheng, Yi Zhang, Guangbin Wang, Dan Wu, “AFFIRM: affinity fusion-based framework for iteratively random motion correction of multi-slice fetal brain MRI”, IEEE Transactions on Medical Imaging (**IEEE TMI**), 2022

[J.4] Kexu Zhang, Wen Shi, Chang Wang, **Yamin Li**, Zhian Liu, Tun Liu, Jing Li, Xiangguo Yan, Qiang Wang, Zehong Cao, Gang Wang, “Reliability of EEG microstate analysis at different electrode densities during propofol-induced transitions of brain states”, **NeuroImage**, 2021

[J.3] Wen Shi, Guohui Yan, **Yamin Li**, Haotian Li, Tingting Liu, Cong Sun, Guangbin Wang, Yi Zhang, Yu Zou, Dan Wu, “Fetal brain age estimation and anomaly detection using attention-based deep ensembles with uncertainty”, **NeuroImage**, 2020

[J.2] **Yamin Li**, Wen Shi, Zhian Liu, Jing Li, Qiang Wang, Xiangguo Yan, Zehong Cao, Gang Wang, “Effective brain state estimation during propofol-induced sedation using advanced EEG microstate spectral analysis”, **IEEE journal of biomedical and health informatics (IEEE JBHI)**, 2020

[J.1] Wen Shi, **Yamin Li**, Zhian Liu, Jing Li, Qiang Wang, Xiangguo Yan, Gang Wang, “Non-canonical microstate becomes salient in high density EEG during propofol-induced altered states of consciousness”, **International Journal of Neural Systems (IJNS)**, 2020

Selected Awards and Honors

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| Sidney P. Colowick Graduate Student Scholarship (\$5000, sole recipient for the year, awarded for outstanding academic and research excellence), Vanderbilt University | 2025 |
| Harold Stirling Vanderbilt Scholarship (\$5000/year), Vanderbilt University | 2025 |
| Institutional Nominee (one of three university-wide) for the 2025 Google PhD fellowship | 2025 |
| 1st Place Runner-Up, AI Showcase, Vanderbilt University | 2025 |
| Top Reviewer, NeurIPS 2024 | 2024 |
| Best Poster Award, ECE Day, Vanderbilt University | 2024 |
| Student Conference Travel Grant, Vanderbilt University | 2023, 2024 |
| SPIE Student Travel Award, SPIE Medical Imaging 2024 | 2024 |
| Russell G. Hamilton Scholar (\$5000/year), Vanderbilt University | 2022 |
| Engineering Graduate Fellowship, Vanderbilt University | 2022 |
| Outstanding Graduate (Top 6%), SJTU | 2021 |
| Legend Medical Excellence Scholarship (Top 2%), SJTU | 2021 |
| Graduate Academic Scholarship, SJTU | 2019–2021 |
| Outstanding Graduate, XJTU | 2019 |
| National Scholarship (Top 0.2%, highest undergraduate scholarship nationally) | 2018 |
| POSTECH Open-lab Scholarship, Pohang University of Science and Technology, South Korea | 2018 |
| University-level Outstanding Student, XJTU | 2016–2018 |
| Siyuan Scholarship, XJTU | 2016–2017 |

Academic and Professional Service

Reviewing: Provided review services for multiple top-notched conference and journals in ML&AI and healthcare, including **CVPR(2026)**, **NeurIPS(2024, 2025)**, **ICLR(2025, 2026)**, **ICML(2025)**, **MICCAI(2023, 2024, 2025)**, **AISTATS(2026)**, **TMLR**, **IEEE TMI**.

Teaching: Teaching Assistant, Foundation of Machine Learning (VU CS4262/5262, Fall 2022) by Prof. Catie Chang, Prof. Soheil Kolouri.

Mentoring:

- Ziyuan Xu, B.S. in Computer Science, Vanderbilt University (now M.S. at Harvard University)
- Edward S. Tong, High school student researcher, Shanghai Jiao Tong University (now B.S. at UC San Diego)

Talks

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| Invited talk: Getting Started With Latest ML Approaches @ BrainHackVU | Jan 2025 |
| Invited panelist: Open Science x Neuroscience Career Panel @ BrainHackVU | Jan 2025 |
| Invited presenter @ Vanderbilt Lab for Immersive AI Translation Grand Opening | Mar 2025 |
| Guest lecturer @ Foundation of Machine Learning (CS4262/5262), Spring 2025 | Mar 2025 |

Additional Information

Programming skills: Python, Pytorch, scikit-learn, Matlab

Language: English (Proficient), Mandarin (Native)