

Xinhe Zhang

Harvard University
Cambridge, MA

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Education

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|----------------------------|-------|-------------------------------------|---------------|
| Harvard University | Ph.D. | Electrical Engineering | Expected 2027 |
| Harvard University | M.Sc. | Electrical Engineering | 2024 |
| Carnegie Mellon University | M.Sc. | Electrical and Computer Engineering | 2020 |
| Carnegie Mellon University | B.Sc. | Electrical and Computer Engineering | 2018 |

Main Research Interests

My research focuses on the development of **multimodal AI systems for biomedical sciences**. I develop computational methods that integrate heterogeneous biomedical data—such as imaging, genomics, physiological signals, and clinical records—into unified models for biologically meaningful inference. Through rigorous model design and evaluation, I aim to advance AI methodologies that improve disease characterization, mechanistic understanding, and predictive modeling in complex biological systems.

Awards and Distinctions

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| 2025 | Poster Presentation Third Place | The Eric and Wendy Schmidt Center Symposium: Biomedical Science and AI |
| 2024 | Poster Competition Runner-Up | The NIH BRAIN Initiative NeuroAI Workshop |
| 2024 | Early-Career Scholar Honoree | The NIH BRAIN Initiative NeuroAI Workshop |
| 2019 | ECE GHC Scholarship | Carnegie Mellon University |
| 2018 | University Honors | Carnegie Mellon University |
| 2018 | CIT Research Honors | Carnegie Mellon University |
| 2018 | Dean's List | Carnegie Mellon University |
| 2016 | Elected Member | IEEE-Eta Kappa Nu (HKN) |

Talks and Presentations

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| 2025 | Poster | Harvard University Center for Brain Science Retreat |
| 2025 | Poster | The Eric and Wendy Schmidt Center Symposium: Biomedical Science and AI |
| 2025 | Poster | The NSF Workshop on Reinforcement Learning |
| 2024 | Poster | The NIH BRAIN Initiative NeuroAI Workshop |
| 2024 | Lecture | Harvard University BE131 Neuroengineering |
| 2024 | Lecture | Harvard University BE129 Introduction to Bioelectronics |

Workshop and Conference Organization

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|-----------|-------------------|--|
| 2025 | Student Volunteer | The NSF Workshop on Reinforcement Learning |
| 2017-2018 | Co-President | CMU Summit on US-China Innovation and Entrepreneurship |

Teaching

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|--|-------------|--|
| Teaching Fellow | Fall 2025 | AM226 Theory of Neural Computation |
| Harvard University | Fall 2025 | BE129 Neuroengineering |
| | Fall 2024 | BE129 Neuroengineering |
| | Fall 2022 | AC207 Systems Development for CS |
| Teaching Assistant | Fall 2020 | 10-707 Deep Reinforcement Learning |
| Carnegie Mellon University | Spring 2020 | 18-290 Signals and Systems |
| | Fall 2019 | 18-290 Signals and Systems |
| | Spring 2018 | 18-290 Signals and Systems |
| | Spring 2017 | 15-112 Fundamentals of Programming |
| | Fall 2016 | 18-290 Signals and Systems |
| | Spring 2016 | 15-112 Fundamentals of Programming |
| | Fall 2015 | 15-112 Fundamentals of Programming |
| | Summer 2015 | 15-110 Principles of Computing |
| CRLA Certified Level II: Advanced Tutor | 2015-2020 | 15-110 Principles of Computing |
| Carnegie Mellon University | | 15-112 Fundamentals of Programming |
| | | 15-122 Principles of Imperative Computing |
| | | 15-150 Functional Programming |
| | | 15-213 Computer Systems |
| | | 18-100 Introduction to ECE |
| | | 18-290 Signals and Systems |
| | | 21-127 Concept of Math |
| | | 21-141 Matrices and Linear Transformations |
| | | 33-141 Physics for Engineering |

Mentorship

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| First-Year Advisor | 2022-2024 | Harvard University |
| Academic Peer Advisor | 2020 | Carnegie Mellon University |

Community Services

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|------------------------|-----------|--------------------------------------|
| Student Representative | 2026 | Harvard Student Wellbeing Council |
| Peer Staffer & Mentor | 2025-2026 | Harvard InTouch Peer Support Network |

Preprints

11. **Xinhe Zhang**, Yuyang Zhang, Pengfei Jin, Arnau Marin-Llobet, Na Li and Quanzheng Li, *LiFT: Lifted Inter-slice Feature Trajectories for 3D Image Generation from 2D Generators*. arXiv, 2026.
10. Ariel J. Lee[†], Hao Sheng[†], Arnau Marin-Llobet, Zheliang Wang, Jaeyong Lee, Ren Liu, **Xinhe Zhang**, Emma Hsiao, Jongmin Baek, Almir Aljovic, Ding Liu, Yichun He, Nanshu Lu, Jia Liu[✉], *Growth-adaptive spring electronics for long-term, same-neuron mapping in the developing rat brain*. bioRxiv, 2026.

9. Jaeyong Lee[†], Zuwan Lin[†], Wenbo Wang[†], Jongmin Baek[†], Ariel J. Lee, Almir Aljović, Arnau Marin-Llobet, **Xinhe Zhang**, Ren Liu, Na Li and Jia Liu[✉], *DeviceAgent: An autonomous multimodal AI agent for flexible bioelectronics*. bioRxiv, 2025.
8. Arnau Marin-Llobet[†], Zuwan Lin[†], Jongmin Baek[†], Almir Aljovic, **Xinhe Zhang**, Ariel J. Lee, Wenbo Wang, Jaeyong Lee, Hao Shen, Yichun He, Na Li and Jia Liu[✉], *An AI Agent for cell-type specific brain computer interfaces*. bioRxiv, 2025.
7. Almir Aljović^{†‡}, Zuwan Lin^{†‡}, Wenbo Wang, **Xinhe Zhang**, Arnau Marin-Llobet, Ningyue Liang, Bradley Canales, Jaeyong Lee, Jongmin Baek, Ren Liu, Catherine Li, Na Li, Jia Liu[✉], *An autonomous AI agent for universal behavior analysis*. bioRxiv, 2025
6. Xinyi Lin, **Xinhe Zhang**, Zheliang Wang, Juntao Chen, Jaeyong Lee, Ariel J. Lee, Hang Yang, Antoine Remy, Hao Shen, Yichun He, Hao Zhao, Xuyue Zhang, Wenbo Wang, Almir Aljović, Joost J. Vlassak, Nanshu Lu and Jia Liu[✉], *Plastic-elastomer heterostructure for robust flexible brain-computer interfaces*. bioRxiv, 2025.
5. Zuwan Lin[†], Wenbo Wang[†], Arnau Marin-Llobet, Qiang Li, Samuel D. Pollock, Xin Sui, Almir Aljovic, Jaeyong Lee, Jongmin Baek, Ningyue Liang, **Xinhe Zhang**, Connie Kangni Wang, Jiahao Huang, Mai Liu, Zihan Gao, Hao Sheng, Jin Du, Stephen J. Lee, Brandon Wang, Yichun He, Jie Ding, Xiao Wang, Juan R. Alvarez-Dominguez[✉] and Jia Liu[✉], *Spatial transcriptomics AI agent charts hPSC-pancreas maturation in vivo*. bioRxiv, 2025.
4. Zuwan Lin[†], Arnau Marin-Llobet[†], Jongmin Baek, Yichun He, Jaeyong Lee, Wenbo Wang, **Xinhe Zhang**, Ariel J. Lee, Ningyue Liang, Jin Du, Jie Ding, Na Li, Jia Liu[✉], *Spike sorting AI agent*. bioRxiv, 2025.
3. Ren Liu[†], Zhaolin Ren[†], **Xinhe Zhang**[†], Qiang Li, Wenbo Wang, Zuwan Lin, Richard T. Lee, Jie Ding, Na Li[✉] and Jia Liu[✉], *An AI-Cyborg System for Adaptive Intelligent Modulation of Organoid Maturation*. bioRxiv, 2024.
2. Siyuan Zhao[†], Hao Shen[†], Shanshan Qin, Shouhao Jiang, Xin Tang, Madeleine Lee, **Xinhe Zhang**, Jaeyong Lee, Juntao Chen and Jia Liu[✉] *Realigning representational drift in mouse visual cortex by flexible brain-computer interfaces*. bioRxiv, 2024.
1. Jin Du, **Xinhe Zhang**, Hao Shen, Xun Xian, Ganghua Wang, Jiawei Zhang, Yuhong Yang, Na Li, Jia Liu[✉] and Jie Ding[✉], *Drift to remember*. arXiv, 2024.

Journal Publications

5. Hao Zhao[✉], **Xinhe Zhang**[✉], Arnau Marin-Llobet, Xinyi Lin and Jia Liu, *Benchmarking spike source localization algorithms in high density probes*. PLOS Computational Biology 22(3): e1014059.
4. Qiang Li[†], Ren Liu[†], Zuwan Lin[†], **Xinhe Zhang**[†], Wenbo Wang[†], Israeli Galicia Silva, Mai Liu, Zihan Gao, Samuel D. Pollock, Juan R. Alvarez-Dominguez[✉] and Jia Liu[✉], *Implanted flexible electronics reveal principles of human islet cell electrical maturation*. Science, 391(6787), p.eab3295.
3. Junya Aoyama[†], Ren Liu[†], **Xinhe Zhang**[†], Anthony Y. Zhu, Pichayathida Luanpaisanon, Nivedhitha Velayutham, Jessica C. Garbern, Fang Cao, Irving Barrera, Hannah Fandl, Morgan

Sokol, Satvik Dasariraju, Eun Seok Gil, Elton Aleksy, Toshi Amanuma, Jeffrey J. Saucerman, Fei Chen, Jia Liu[✉] and Richard T. Lee[✉], *Flexible nanoelectronics reveal arrhythmogenesis in transplanted human cardiomyocytes*. Science, 390(6774), p.eadw4612.

2. Arnau Marin-Llobet[✉], Sergio Sánchez-Manso, Arnau Manasanch, Lluc Tresserras, **Xinhe Zhang**, Yining Hua, Hao Zhao, Melody Torao-Angosto, Maria V Sanchez-Vives[✉] and Leonardo Dalla Porta[✉], *Riemannian geometry for the classification of brain states with intracortical brain recordings*. Advanced Intelligent Systems, p.e202500480.
1. Xin Tang[†], Jiawei Zhang[†], Yichun He[†], **Xinhe Zhang**, Zuwan Lin, Sebastian Partarrieu, Emma Bou Hanna, Zhaolin Ren, Hao Shen, Yuhong Yang, Xiao Wang, Na Li, Jie Ding[✉] and Jia Liu[✉], *Explainable multi-task learning for multi-modality biological data analysis*. Nature Communications, 14(1), p.2546.

Conference Proceedings

3. Yuyang Zhang, **Xinhe Zhang**, Jia Liu and Na Li, *Error-in-variables methods for efficient system identification with finite-sample guarantees*. In 2025 IEEE 64th Conference on Decision and Control (CDC) (pp. 438-443). IEEE.
2. Ren Liu, **Xinhe Zhang**, Hao Sheng and Jia Liu, *In vivo neural stimulation and recording using flexible bioelectronics*. In 2024 IEEE International Electron Devices Meeting (IEDM) (pp. 1-4). IEEE.
1. Tom Bu[†], **Xinhe Zhang**[†], Christoph Mertz and John M.Dolan, *CARLA simulated data for rare road object detection*. In 2021 IEEE International Intelligent Transportation Systems Conference (ITSC) (pp. 2794-2801). IEEE.

† : Contributed equally.

✉ : Corresponding author(s).

Academic Services

Journals reviewing: *Nature Communications; Heliyon; International Journal of Microbiology; Discover Oncology; Frontiers in Neurology; Briefings in Functional Genomics; PLOS One; PeerJ Computer Science; International Journal of Clinical Practice; Open Life Sciences; Biochemical Genetics; Computational and Mathematical Methods; Gene Reports*

Workshops reviewing: ICML Workshop on Geometry-grounded Representation Learning and Generative Modeling; COLM Workshop on Socially Responsible Language Modelling Research; NeurIPS Workshop on Symmetry and Geometry in Neural Representations; NeurIPS Workshop on Structured Probabilistic Inference and Generative Modeling; Topology, Algebra, and Geometry in Data Science (TAG-DS)

Industry

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|--------------------------|-------------|---------------------------------|
| Software Engineer | 2021 | JPMorgan Chase & Co |
| Tech Intern | Summer 2019 | Guangdong Sanjiu Brain Hospital |
| Software Engineer | 2018-2019 | Duolingo |
| Engineer Intern | Fall 2018 | Expaii |
| Software Engineer Intern | Summer 2018 | Facebook (Meta) |
| Software Engineer Intern | Summer 2017 | Google |
| Engineering Intern | Summer 2016 | Google |