Kaiwen Bian

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Education

2022 – 2026   **University of California, San Diego**, La Jolla, CA

B.S. in Data Science, Major-GPA 3.891/4.0

B.S. in Cognitive Behavioral Neuroscience, Major-GPA 3.875/4.0

Research Focus: Embodied Agent, Interactive Learning, Representation Learning, Graph Generation, Computational Neuroscience

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Research Experience

2025 – 2026   **University of California, San Diego**, *Student Researcher*, La Jolla, CA.

Halıcıoğlu Data Science Institute

Advisor: Yusu Wang

- Designing a motif-preserve graph tokenization scheme, allowing sequence transformers to model long-range graph topology more effectively and generate biological graphs (i.e. molecules, proteins, brain networks) more accurately.
- Developed topological clustering method using neuromechanical embodied agent and discrete Morse graphs for revealing animal *"behavioral-basis"* and segmenting stereotypical animal behaviors.

2025 – 2026   **Stanford University**, *Visiting Research Scholar*, Palo Alto, CA.

Statistics Department & Wu Tsai Neurosciences Institute

Advisor: Scott W Linderman

- Developed generative state space models capable of performing low-dimensional neuromechanical control and showed that such low-dimensional space has meaningful segmentation of natural behaviors.

2024 – 2026   **Salk Institute for Biological Studies**, *Research Intern*, La Jolla, CA.

Crick-Jacobs Center for Theoretical and Computational Biology

Advisor: Talmo D Pereira

- Developed computationally efficient deep reinforcement imitation systems (MIMIC-MJX) to control a bio-mechanically realistic agent and mimic realistic animal behaviors.

2023 – 2024   **University of California, San Diego**, *FMP Scholar*, La Jolla, CA.

Cognitive Science Department & Undergraduate Research Hub

Advisor: Sean Trott

- Developed tools using linguistic techniques (i.e. affordance) for probing the embodied simulation in large multi-modal models to improve the interpretability of these models.

Conference Manuscript & Journal Publication

Nature Methods 2026
Zhang, C.Y., Yang, Y., Sirbu, A., Leonardis, E.J., Abe, E., Warnberg, E., Aldarondo, D.E., Lee, A., Prasad, A., Foat, J., **Bian, K.**, Park, J., Bhatt, R., Saunders, H., Nagamori, A., Thanawalla, A.R., Huang, K.W., Plum, F., Beck, H., Flavell, S.W., Labonte, D., Richards, B.A., Brunton, B.W., Azim, E., Ölveczky, B.P., & Pereira, T.D. (2026). MIMIC-MJX: Neuromechanical Emulation of Animal Behavior. Manuscript submitted to *Nature Methods*.

NeurIPS 2026
Bian, K., Leonardis, E. J., Yang, Y., Zhang, C., Azim, E., Ölveczky, B. P., Wang, Y., & Pereira, T. D. (2026). Topological Clustering of Neuromechanical Agent's Naturalistic Behavior. *Manuscript in preparation to submit.*

Conference Poster

UCSD/HDSI 2026
Bian, K., Yang, A. H., Mishne, G., & Wang, Y. (2026). Motif-preserving Graph Tokenization for Biological Structure Generation using Sequence Transformer. *Poster will be presenting at Halıcıoğlu Data Science Institute, UC San Diego Senior Capstone Showcase, La Jolla, CA.*

COSYNE 2026
Bian, K., Jha, A., Buchanan, K., Zhang, C., Yang, Y., Leonardis, E., Pereira, T. D., & Linderman, S. W. (2026). Linking Segmentation and Generation of Behavior with Neuromechanical Embodied Control. *Submitted to the Computational and Systems Neuroscience (COSYNE) Conference, Lisbon, Portugal.*

Stanford/SURP 2025
Bian, K., Jha, A., Buchanan, K., & Linderman, S. W. (2025). Deep State Space Controls For Biomechanically Realistic Artificial Agents. *Poster presented at Stanford Undergraduate Research Program (SURP-Stats) Symposium, Palo Alto, CA.*

SfN 2025
Bian, K., Leonardis, E. J., Yang, Y., Zhang, C., Azim, E., Ölveczky, B. P., Wang, Y., & Pereira, T. D. (2025). Topology-driven Insights into Naturalistic Behavior from Neuromechanical Agent Modeling. *Poster presented at the Society for Neuroscience (SfN) Annual Meeting, San Diego, CA.*

SfN 2025
Yang, Y., Zhang, C., Leonardis, E. J., Sirbu, A., **Bian, K.**, Azim, E., Ölveczky, B. P., & Pereira, T. D. (2025). VNL-playground: Fast and Biologically Realistic Virtual Environment for Simulating Animal Behavior. *Poster presented at the Society for Neuroscience (SfN) Annual Meeting, San Diego, CA.*

COSYNE 2025
Zhang, C., Yang, S., **Bian, K.**, Abe, E., Wärnberg, E., Foat, J., Aldarondo, D., Brunton, B. W., Ölveczky, B. P., & Pereira, T. D. (2025). Track-MJX: A GPU-Accelerated Pipeline for Imitating Animal Motor Control. *Poster presented at the Computational and Systems Neuroscience (COSYNE) Conference, Montreal, Canada.*

UCSD/URH **Bian, K.**, Li, A., Jones, C., & Trott, S. (2023). Embodied Simulation in Multimodal
2023 Models Using Affordance Stimulus: A Probing Study. *Poster presented at the UC San Diego Undergraduate Research Faculty Mentorship Program (FMP) Symposium, La Jolla, CA.*

Skills

Programing Python, SQL, Java, Java Script, Web Dev.

Python Jax, Flax, Ray, MuJoCo/MJX, Gym, Dm-Control, Brax, PyTorch (Torch, TorchRL,
Packages and PyG), TensorFlow, Ripser, SkLearn, Panda, Dask, and Spark.

Mathematic Probability & Statistics (State Space Models, Probabilistic Inference, Stochastic Processes, and Computational Stochastic), Reinforcement Learning, Convex Optimization, Dynamical System, Linear Algebra, Linear Control Theory, Graph Theory, and Computational Topology.

Neuroscience System & Cognitive Neuroscience, Neuro-anatomy, Motivational & Developmen-
& Biology tal Neurobiology, Behavioral Endocrinology, Exercise Physiology, Kinesiology, and Human Nutrition.

Language Mandarin Chinese and English