

Jiachuan Wang

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SUMMARY:

I have broad interests in computational and cognitive neuroscience, focusing on the neurocomputational mechanisms underlying memory and decision-making processes. Currently, I am pursuing a Ph.D. at the National University of Singapore, developing biologically plausible models of spatial learning and associative memory. During my undergraduate studies at Zhejiang University and the University of Edinburgh, I contributed to fMRI research on human cognition and the primate connectome.

EDUCATION:

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| National University of Singapore <i>Ph.D. student in Medicine</i> <i>Neuroscience track and Biostatistics, Bioinformatics & Epidemiology track</i> | Singapore Aug. 2023 – Present |
| Zhejiang University <i>B.S. in Bioinformatics</i> | Hangzhou, China Sep. 2019 – Jun. 2023 |
| The University of Edinburgh <i>B.S. (Hons) in Biomedical Informatics</i> | Edinburgh, UK Sep. 2019 – May. 2023 |

GRANTS & AWARDS:

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| NUS Research Scholarship <i>National University of Singapore</i> | Aug. 2023 – Present |
| Outstanding Graduate of Zhejiang University <i>Zhejiang University</i> | May. 2023 |
| Zhejiang University Scholarship <i>Zhejiang University</i> | Dec. 2022 |
| Academic Scholarship (¥40,000) <i>ZJU-UoE Institute</i> | Dec. 2022 |
| 2021 Student Research Training Program Funding (¥1,200) <i>Zhejiang University</i> | Mar. 2021 – May. 2022 |

RESEARCH EXPERIENCE:

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| The N.1 Institute for Health, National University of Singapore <i>Graduate Researcher;</i> <i>Advisors: Andrew Tan, Camilo Libedinsky, Shih-Cheng Yen</i> <i>Computational models of biologically plausible synaptic plasticity in neural networks</i> | Singapore Sep. 2023 – Present |
| <ul style="list-style-type: none">• Implemented spatial learning models based on spike response model and temporal difference error-modulated STDP rule.• Developed a representation learning model incorporating Hebbian learning and neurogenesis in the hippocampal circuit, replicating pattern separation. | |

Centre for Discovery Brain Sciences, The University of Edinburgh

Edinburgh, UK

Research Intern; Advisor: Gediminas Lukšys

Mar. 2022 – Aug. 2023

Multi-voxel pattern analysis of human emotion and memory guided by Neurosynth (Final year project)

- Conducted brain mapping of emotional dimensions and memory retrieval performance in a picture task.
- Compared the decoding performance of machine learning models using brain region information from real fMRI data and a meta-analysis database.

Computational model-based analysis of spatial navigation strategies under stress and uncertainty using place and border cells

- Conducted behavioral analysis, performance assessment, and parameter estimation of a spatial navigation reinforcement learning model in the Morris Water Maze.

School of Brain Science and Brain Medicine, Zhejiang University

Hangzhou, China

Research Intern; Advisor: Zhiping Wang

Jan. 2022 – Sep. 2022

Jun. 2020 – Aug. 2020

The role of protein quality control regulator UBE4B on the neurodevelopment of mammalian hippocampus

- Interpreted label-free quantification data and performed enrichment analysis. One publication.

Interdisciplinary Institute of Neuroscience and Technology, Zhejiang University

Hangzhou, China

Research Intern; Advisor: Anna Wang Roe

Apr. 2021 – Oct. 2021

Visualization software development of functional magnetic resonance data analysis results

- Developed a web-based fMRI data viewer hosted on Zhejiang University's public server.
- Assisted in animal preparations and recorded five infrared neural stimulation-fMRI experiments on the amygdala of juvenile monkeys.

SERVICE:

Reviewing

- Journal: *Scientific Reports*.
- Conference: Cognitive Computational Neuroscience.

Teaching

National University of Singapore

Graduate Teaching Assistant

- Beginning Artificial Intelligence Through Neuroscience Fall 2024
- LSM4213 Systems Neurobiology Fall 2024
- LSM4232 Advanced Cell Biology Fall 2024

University Service

Edinburgh University Students' Association

Programme Representative (Biomedical Informatics)

2021 – 2022

ASSOCIATIONS:

- Society for Neuroscience, Singapore Chapter • ALBA Network

TALKS & POSTERS:

- **Wang, J.**, Shetru Jagadeesh, V., Kumar, M. G., Libedinsky, C., Yen, S.-C., Tan, A. Y.-Y. and Polepalli, J. S. A biologically plausible computational model of hippocampal neurogenesis and pattern separation in memory. Poster presentation delivered at the **Neuroscience & Artificial Intelligence Symposium**, Singapore, April, 2025.
- **Wang, J.**, Shetru Jagadeesh, V., Kumar, M. G., Libedinsky, C., Yen, S.-C., Tan, A. Y.-Y. and Polepalli, J. S. A biologically plausible reinforcement learning model for the causal relationship between hippocampal Hebbian plasticity and pattern separation in memory. Poster presentation delivered at the **NeuroFrontiers: Bridging Molecules, Minds, and AI Systems Symposium**, Singapore, January, 2025.
- Qiu, Y., Wang, S., **Wang, J.**, Zhu, W., Cheng, Y., Aydemir, B., Gerstner, W., Sandi, C. and Luksys, G. Computational model-based analysis of spatial navigation strategies under stress and uncertainty using place, distance and border cells. PS03-27AM-195. Poster presentation delivered at the **Federation of European Neuroscience Societies Forum 2024**, Vienna, Austria, June, 2024.
- Wang, S., **Wang, J.**, Zhu, W., Cheng, Y., Aydemir, B., Qiu, Y., Gerstner, W., Sandi, C. and Luksys, G. Computational model-based analysis of spatial navigation strategies under stress and uncertainty using place, distance and border cells. Program No. 235.23. 2023 Neuroscience Meeting Planner. Poster presentation delivered at the **Society for Neuroscience** meeting, Washington, D.C., November, 2023.
- Wang, S., Qiu, Y., Cheng, Y., **Wang, J.**, Zhu, W., Aydemir, B., Gerstner, W., Sandi, C. and Luksys, G. Computational model-based analysis of spatial navigation strategies under stress and uncertainty using place, distance and border cells. P3.7. Poster presentation delivered at the 50th Meeting of the **European Brain and Behaviour Society**, Amsterdam, Netherlands, August, 2023.

PUBLICATIONS:

- Kong, X., Shu, X., **Wang, J.**, Liu, D., Ni, Y., Zhao, W., Wang, L., Gao, Z., Chen, J., Yang, B., Guo, X. and Wang, Z. (2022) Fine-tuning of mTOR signaling by the UBE4B-KLHL22 E3 ubiquitin ligase cascade in brain development. *Development*. doi: 10.1242/dev.201286.
- Zhang, L., Ma, X., Wu, Z., Liu, J., Gu, C., Zhu, Z., **Wang, J.**, Shu, W., Li, K., Hu, J. and Lv, X. (2022) Prevalence of ground glass nodules in preschool children: a cross-sectional study. *Translational Pediatrics*. doi: 10.21037/tp-22-465.

SKILLS:

- **Languages:** Mandarin (native), English (fluent).
- **Programming Languages:** Python, R, PostgreSQL, Bash. Basics of: C/C++, Java.
- **Applications:** ITK-SNAP, COPASI, IGV, PyMOL, Git, \LaTeX .