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 monkey connectome.

EDUCATION:

National University of Singapore — Singapore
Ph.D. student in Medicine — *Aug. 2023 – Present*
Neuroscience track and Biostatistics, Bioinformatics & Epidemiology track

Zhejiang University — Hangzhou, China
B.S. in Bioinformatics — *Sep. 2019 – Jun. 2023*

The University of Edinburgh — Edinburgh, UK
B.S. (Hons) in Biomedical Informatics — *Sep. 2019 – May. 2023*

GRANTS & AWARDS:

NUS Research Scholarship
National University of Singapore — *Aug. 2023 – Present*

Outstanding Graduate of Zhejiang University
Zhejiang University — *May. 2023*

Zhejiang University Scholarship
Zhejiang University — *Dec. 2022*

Academic Scholarship (¥40,000)
ZJU-UoE Institute — *Dec. 2022*

2021 Student Research Training Program Funding (¥1,200)
Zhejiang University — *Mar. 2021 – May. 2022*

RESEARCH EXPERIENCE:

The N.1 Institute for Health, National University of Singapore — Singapore
Graduate Researcher; — *Sep. 2023 – Present*
Advisors: Andrew Tan, Camilo Libedinsky, Shih-Cheng Yen

Computational models of biologically plausible synaptic plasticity in neural networks

- Implemented spatial learning models based on spike response model and temporal difference error-modulated STDP rule.
- Developed a representation learning model with Hebbian learning in the entorhinal cortex-to-dentate gyrus pathway, replicating pattern separation behavior.

Centre for Discovery Brain Sciences, The University of Edinburgh Edinburgh, UK

Rotation Student; 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 decoding capabilities 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

Rotation Student; 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

Rotation Student; 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:

Annual Biomedical Research Congress, NUS
Session Manager *Feb. 2025*

National University of Singapore
Graduate Teaching Assistant

- Beginning Artificial Intelligence Through Neuroscience *Fall 2024*
- LSM4213 Systems Neurobiology *Fall 2024*

Edinburgh University Students' Association (EUSA)
Programme Representative (Biomedical Informatics) *2021 – 2022*

ASSOCIATIONS:

- 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 reinforcement learning model for the causal relationship between hippocampal Hebbian plasticity and pattern separation in memory. C1-20. 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 50^{th} 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.