JEA (JAY) KWON

RESEARCH INTERESTS

- Brain-inspired machine intelligence, deep learning for pose estimation and action recognition
- Neural decoding, computational neuroscience, memory-driven learning
- Privacy and security in AI systems, human-AI alignment

EDUCATION

- Korea University, Seoul, South Korea • Ph.D. in Nano-Bio-Information-Technology • 2014 - 2022
  Advisor: C. Justin Lee, Director of IBS
- Saitama University, Saitama, Japan • B.E. in Electrical and Electronic System • 2008 - 2012

PROFESSIONAL EXPERIENCE

- Max Planck Institute for Security and Privacy (MPI-SP), Bochum, Germany • Postdoctoral Researcher • 2024 - Present
  Advisor: Meeyoung Cha, Director of MPI-SP
- Center for Cognition and Sociality, Institute for Basic Science (IBS), Daejeon, South Korea • Postdoctoral Researcher • 2022 - 2024
- Center for Cognition and Sociality, Institute for Basic Science (IBS), Daejeon, South Korea • Researcher • 2018 - 2020
- Korea Institute of Science and Technology (KIST), Seoul, South Korea • Student Researcher • 2014 - 2018

ACHIEVEMENTS

- Korean Artificial Intelligence Association (JKAIA) • Excellent Paper Award • 2023
  Brain-inspired Lp-Convolution benefits large kernels and aligns better with visual cortex
- Application Number: 10-2023-0027219 • Patent Application & Technology Transfer • 2023
  Device and Method for Classification of Human and Animal Behavior, Patent Contribution=35%
  Finalized a technology transfer with ACTNOVA Inc.
- Korean Society for Brain and Neural Sciences (KSBNS) • Best Presentation Award • 2022
  ABCD-analysis: Mapping animal behavior and differential analysis of kinematic features without selection bias
- Korean Society for Molecular and Cellular Biology (KSMCB) • Young Investigator Award • 2022
  Retina-attached slice recording reveals light-triggered tonic GABA signaling in suprachiasmatic nucleus

- Center for Cognition and Sociality (CCS) Workshop • Best Poster Award • 2021
  Mapping Behavior with DECLARE: Deep Embedded Clustering of Action REpresentation
- Korea University - Korea Institute of Science and Technology (KU-KIST) Graduate School • Full-Ride Scholarship for Doctoral Studies • 2014 - 2022
- Korea-Japan Governments Joint Scholarship Program for Science and Engineering Students • Full-Ride Scholarship for Bachelor's Studies • 2007 - 2012

INVITED TALKS

- Spark(l)ing Science - Max Planck Institute for Security and Privacy • AI Engram: In Search of Memory Traces in Artificial Neural Networks • 2026
- KAIST BK21 IBS Symposium - Integrated Neuroscience and Physiology • How neuroscience can benefit AI • 2025
- KSBNS Symposium • Transformer as a Hippocampal Memory Consolidation Model based on NMDAR-inspired Nonlinearity • 2025
- Netzwerk Junge Generation Deutschland-Korea • Sovereign AI: K-AI as an opportunity • 2025
- Institute for Basic Science (IBS) • Brain-inspired AI • 2025
- Korea Brain Research Institute (KBRI) • Brain-inspired AI • 2025
- Gwangju Institute of Science and Technology (GIST) • Brain-inspired AI • 2025
- MLAI group, Yonsei University • Neuroscience for Artificial Intelligence • 2025
- Kyungpook National University (KNU) • Brain-inspired AI • 2024
- Korea Institute of Ocean Science & Technology (KIOST) • SUBTLE: An Unsupervised Platform with Temporal Link Embedding that Maps Animal Behavior • 2024
- Korea Brain Research Institute (KBRI) • SUBTLE: An Unsupervised Platform with Temporal Link Embedding that Maps Animal Behavior • 2024
- IBS-CCS Symposium • Transformer as a hippocampal memory consolidation model based on NMDAR-inspired nonlinearity • 2023
- IBS Science in the Cinema Roof • Memory editing in the brain - Eternal Sunshine of the Spotless Mind • 2023
- Reading Festival at Jeonil High School • From human mind to artificial intelligence - Is ChatGPT a bridge • 2023
- IBS Data Science Group seminar • Resolving clustering bias during animal behavior mapping and kinematic profiling • 2022
- IBS 2021 2nd Workshop • Age-dependent motor coordination analysis by 3D pose-estimation using AVATAR • 2021
- KAIST-NeuroAI Journal Club • Backpropagation and the Brain • 2020
- IBS 2019 Year-End Workshop • Deep learning with NMDA receptor inspired activation function • 2020
- Korean Society for Molecular and Cellular Biology (KSMCB) • Development of a Low-cost, Comprehensive Recording System for Circadian Rhythm Behavior • 2019

PUBLICATIONS

31. **J. Kwon***, S. Kim*, J. Woo, K. Tanaka-Yamamoto, O. James, E. De Schutter, S. Hong, C. J. Lee.
Cerebellar Tonic Inhibition Orchestrates the Maturation of Information Processing and Motor Coordination.
Experimental & Molecular Medicine, 2026.

30. **J. Kwon***, L. F. Vecchietti, S. Park, M. Cha.
Dropouts in Confidence: Moral Uncertainty in Human-LLM Alignment.
AAAI Conference on Artificial Intelligence, 2026.

29. D. Kim, M. Kim, **J. Kwon**, N. Yang, M. Cha.
Bilinear Relational Structure Fixes Reversal Curse and Enables Consistent Model Editing.
International Conference on Learning Representations, 2026.

28. N. Yang, D. Kim, **J. Kwon**, M. Kim, K. Jung, M. Cha.
Erase or Hide? Suppressing Spurious Unlearning Neurons for Robust Unlearning.
International Conference on Learning Representations, 2026.

27. B. Hyeon, J. Shin, J. Lee, W. Kim, **J. Kwon**, H. Lee, D. Kim, C. Kim, S. Choi, J. Jeong, K. Kim, C. J. Lee, D. Kim, W. D. Heo.
Integrating Artificial Intelligence and Optogenetics for Parkinson's Disease Diagnosis and Therapeutics in Male Mice.
Nature Communications, 2025.

26. J. Kim*, **J. Kwon***, L. F. Vecchietti*, A. Oh, M. Cha.
Exploring Persona-dependent LLM Alignment for the Moral Machine Experiment.
ICLR 2025 Workshop in Bi-Align, 2025.

25. **J. Kwon***, S. Lim, K. Song, C. J. Lee.
Brain-inspired Lp-Convolution Benefits Large Kernels and Aligns Better with Visual Cortex.
International Conference on Learning Representations, 2025.

24. **J. Kwon***, M. Sa, H. Kim, Y. Seong, C. J. Lee.
Egocentric 3D Skeleton Learning in Identity-Aware Deep LSTM Network Encodes Obese-Like Motion Representations.
ICLR TS4H Workshop, 2024.

23. **J. Kwon***, S. Lim, K. Song, C. J. Lee.
Brain-inspired Lp-Convolution Benefits Large Kernels and Aligns Better with Visual Cortex.
ICLR Re-Align Workshop, 2024.

22. **J. Kwon***, S. Kim, D. Kim, J. Joo, S. Kim, M. Cha, C. J. Lee.
SUBTLE: An Unsupervised Platform with Temporal Link Embedding that Maps Animal Behavior.
International Journal of Computer Vision, 2024.

21. **J. Kwon***, M. Sa, H. Kim, Y. Seong, C. J. Lee.
Egocentric 3D Skeleton Learning in a Deep Neural Network Encodes Obese-like Motion Representations.
Experimental Neurobiology, 2024.

20. H. Kang, A. Han, A. Zhang, H. Jeong, W. Koh, J. M. Lee, H. Lee, H. Y. Jo, M. A. Maria-Solano, M. Bhalla, **J. Kwon**, et al..
GolpHCat (TMEM87A), a Unique Voltage-Dependent Cation Channel in Golgi Apparatus, Contributes to Golgi-pH Maintenance and Hippocampus-Dependent Memory.
Nature Communications, 2024.

19. D. Kim*, **J. Kwon***, M. Cha, C. J. Lee.
Transformer as a Hippocampal Memory Consolidation Model Based on NMDAR-Inspired Nonlinearity.
Advances in Neural Information Processing Systems, 2023.

18. M. Sa, E. Yoo, W. Koh, M. G. Park, H. Jang, Y. R. Yang, M. Bhalla, J. Lee, J. Lim, W. Won, **J. Kwon**, et al..
Hypothalamic GABRA5-Positive Neurons Control Obesity via Astrocytic GABA.
Nature Metabolism, 2023.

17. **J. Kwon***, S. Kim, D. Kim, J. Joo, S. Kim, M. Cha, C. J. Lee.
SUBTLE: An Unsupervised Platform with Temporal Link Embedding that Maps Animal Behavior.
CVPR CV4Animals Workshop, 2023.

16. M. Nam, H. Y. Ko, D. Kim, S. Lee, Y. M. Park, S. J. Hyeon, W. Won, J. Chung, S. Y. Kim, H. H. Jo, K. T. Oh, Y. Han, G. Lee, Y. H. Ju, H. Lee, H. Kim, J. Heo, M. Bhalla, K. J. Kim, **J. Kwon**, et al..
Visualizing Reactive Astrocyte-Neuron Interaction in Alzheimer's Disease Using 11C-Acetate and 18F-FDG.
Brain, 2023.

15. D. Kim, **J. Kwon**, M. Cha, C. J. Lee.
Transformer Needs NMDA Receptor Nonlinearity for Long-Term Memory.
NeurIPS Memory in Artificial and Real Intelligence Workshop, 2022.

14. D. Kim, J. Kim, W. Jung, J. Park, M. Kim, A. Shin, Y. Jeong, S. Park, G. Shin, Y. W. Lee, **J. Kwon**, D. Kim.
AVATAR: AI Vision Analysis for Three-Dimensional Action in Real-Time.
CVPR CV4Animals Workshop, 2022.

13. S. Kim, **J. Kwon**, M. G. Park, C. J. Lee.
Dopamine-Induced Astrocytic Ca2+ Signaling in mPFC is Mediated by MAO-B in Young Mice, but by Dopamine Receptors in Adult Mice.
Molecular Brain, 2022.

12. Y. H. Ju, M. Bhalla, S. J. Hyeon, J. E. Oh, S. Yoo, U. Chae, **J. Kwon**, W. Koh, J. Lim, Y. M. Park, et al..
Astrocytic Urea Cycle Detoxifies Aβ-Derived Ammonia While Impairing Memory in Alzheimer's Disease.
Cell Metabolism, 2022.

11. J. M. Lee, M. Sa, H. An, J. M. J. Kim, **J. Kwon**, B. Yoon, C. J. Lee.
Generation of Astrocyte-Specific MAOB Conditional Knockout Mouse with Minimal Tonic GABA Inhibition.
Experimental Neurobiology, 2022.

10. **J. Kwon***, M. W. Jang, C. J. Lee.
Retina-Attached Slice Recording Reveals Light-Triggered Tonic GABA Signaling in Suprachiasmatic Nucleus.
Molecular Brain, 2021.

9. M. W. Jang, T. Y. Kim, K. Sharma, **J. Kwon**, E. Yi, C. J. Lee.
A Deafness Associated Protein TMEM43 Interacts with KCNK3 (TASK-1) Two-Pore Domain K+ (K2P) Channel in the Cochlea.
Experimental Neurobiology, 2021.

8. J. Won, H. H. Kazan, **J. Kwon**, M. Park, M. A. Ergun, S. Ozcan, B. Y. Choi, W. D. Heo, C. J. Lee.
Ultimate COVID-19 Detection Protocol Based on Saliva Sampling and qRT-PCR with Risk Probability Assessment.
Experimental Neurobiology, 2021.

7. K. Han, M. Lee, H. Lim, M. W. Jang, **J. Kwon**, C. J. Lee, S. Kim, M. Suh.
Excitation-Inhibition Imbalance Leads to Alteration of Neuronal Coherence and Neurovascular Coupling Under Acute Stress.
Journal of Neuroscience, 2020.

6. S. Oh, J. M. Lee, H. Kim, J. Lee, S. Han, J. Y. Bae, G. Hong, W. Koh, **J. Kwon**, E. Hwang, et al..
Ultrasonic Neuromodulation via Astrocytic TRPA1.
Current Biology, 2019.

5. Y. Han, **J. Kwon**, J. Won, H. An, M. W. Jang, J. Woo, J. S. Lee, M. G. Park, B. Yoon, S. E. Lee, et al..
Tweety-Homolog (Ttyh) Family Encodes the Pore-Forming Subunits of the Swelling-Dependent Volume-Regulated Anion Channel (VRACswell) in the Brain.
Experimental Neurobiology, 2019.

4. J. Woo, J. O. Min, D. Kang, Y. S. Kim, G. H. Jung, H. J. Park, S. Kim, H. An, **J. Kwon**, J. Kim, et al..
Control of Motor Coordination by Astrocytic Tonic GABA Release Through Modulation of Excitation/Inhibition Balance in Cerebellum.
Proceedings of the National Academy of Sciences, 2018.

3. **J. Kwon***, M. G. Park, S. E. Lee, C. J. Lee.
Development of a Low-Cost, Comprehensive Recording System for Circadian Rhythm Behavior.
Experimental Neurobiology, 2018.

2. **J. Kwon***, H. An, M. Sa, J. Won, J. I. Shin, C. J. Lee.
Orai1 and Orai3 in Combination with Stim1 Mediate the Majority of Store-Operated Calcium Entry in Astrocytes.
Experimental Neurobiology, 2017.

1. G. E. Ha, J. Lee, H. Kwak, K. Song, **J. Kwon**, S. Jung, J. Hong, G. Chang, E. M. Hwang, H. Shin, et al..
The Ca2+-Activated Chloride Channel Anoctamin-2 Mediates Spike-Frequency Adaptation and Regulates Sensory Transmission in Thalamocortical Neurons.
Nature Communications, 2016.