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President 회장 Korean Society for Computational Neuroscience 한국계산뇌과학회

Associate Editor 부편집장 Science Advances, AAAS

RESEARCH INTERESTS

Theoretical and Computational Neuroscience

Neuro-AI Algorithm, Human-AI Interaction, Visual Perception, Learning and Memory

EDUCATION

2005 - 2009	**Ph.D.**	Physics, University of California at Berkeley (Advisor: Donald A Glaser)	Berkeley, USA
1998 - 2000	**M.S.**	Physics, Seoul National University (Advisor: Sook-Il Kwun)	Seoul, Korea
1994 - 1998	**B.S.**	Nuclear Engineering and Physics, Seoul National University	Seoul, Korea

PROFESSIONAL EXPERIENCE

2026 - Present	**Endowed Chair Professor**, KAIST	Daejeon, Korea
2025 - Present	**Affiliated Faculty**, New York University	New York, USA
2021 - Present	**Singularity Professor**, KAIST	Daejeon, Korea
2022 - Present	**Associate and Full Professor**, Department of Brain and Cognitive Sciences, KAIST	
2013 - 2022	**Assistant and Associate Professor**, Department of Bio and Brain Engineering, KAIST	
2009 - 2013	**Postdoctoral Researcher**, University of California at Los Angeles	
	Department of Neurobiology, David Geffen School of Medicine (Advisor: Dario L Ringach)	
2003 - 2005	**Research Assistant**, Northwestern University, Department of Physics (Advisor: Donald E Ellis)	
2000 - 2003	**Officer Faculty**, Korea Air Force Academy, Department of Physics	

ACADEMIC ACTIVITIES

2025 - Present	**Associate Editor**	Science Advances (AAAS)
2024 - Present	**President**	Korean Society for Computational Neuroscience (CBRAIN)
2024 - Present	**Research Fellow**	Institute for Basic Science
2021 - Present	**Associate Editor, Review Editor**	Frontiers in Neuroscience, Frontiers in Systems Neuroscience
2019 - Present	**Editorial Board**	Scientific Reports (Springer-Nature)
2014 - 2024	**Board of Director**	Society for Computational Neuroscience (CBRAIN)
2018 - 2023	**Board of Director**	Brain Engineering Society (BESK)
2016 - 2018	**Research Planner**	National Research Foundation (NRF)
2013	**Young Faculty Science Fellow**	POSCO Cheong-Am Foundation

PUBLICATIONS

52. Jeonghwan Cheon, Jaehyuk Bae, **Se-Bum Paik,** One-Time Soft Alignment Enables Resilient Learning without Weight Transport, *Advances in Neural Information Processing Systems (NeurIPS)* (2026)

51. Jeonghwan Cheon, **Se-Bum Paik**, Brain-Inspired Warm-Up Training with Random Noise for Uncertainty Calibration, *Nature Machine Intelligence* 8, 602–613 (2026)

50. Minju Jeong, Seungdae Baek, Qingdi Wang, Li Yao, Eun Ji Lee, Arturo Marroquin Rivera, Joann Jocelynn Lee, Hyeonseok Jang, Dhananjay Bambah-Mukku, Christine Hyun-Seung Mun, Tyler Boesen, Sumit Nanda, Cheol Ryong Ku, Hong-wei Dong, Benoit Labonté, Se-Bum Paik*, Byung Kook Lim*, Distinct interneuronal dynamics selectively gate target-specific cortical projections in drug seeking, *Neuron* 114, 1-18 (2026) (*co-corresponding)

49. Minjun Kang, Seungdae Baek, **Se-Bum Paik**, Prewired static visual receptive fields for environment-agnostic perception, *Patterns* 7(2), 101475 (2026)

48. Muwon Kang, Seoyeong Kim, Wangyong Shin, Kyungdeok Kim, Yewon Jung, Woochul Choi, **Se-Bum Paik**, Eunjoon Kim, Grin2b-mutant mice exhibit heightened remote fear via suppressed extinction and chronic amygdalar synaptic and neuronal dysfunction, *Science Advances* 11, eadr7691 (2025)

47. Suhee Cho, Hyeonsu Lee, Seungdae Baek, **Se-Bum Paik**, Neuromimetic metaplasticity for adaptive continual learning without catastrophic forgetting, *Neural Networks* 190, 107762 (2025)

46. Se-Bum Paik, Split-Second Insights from the Brain's Dual-Stream Visual System, *Neuron* 112(24), 3991-3993 (2024)

45. Min Song, Eun Ju Shin, Hyojung Seo, Alireza Soltani, Daeyeol Lee, Min Whan Jung, & **Se-Bum Paik**, Hierarchical gradients of multiple timescales in the mammalian forebrain, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)* 121(51), e2415695121 (2024)

44. Jeonghwan Cheon, Sang Wan Lee & **Se-Bum Paik**, Pretraining with random noise for fast and robust learning without weight transport, *Advances in Neural Information Processing Systems (NeurIPS)* (2024)

43. Geurim Son, Yongwoo Na, Yongsung Kim, Ji-Hoon Son, Gregory D. Clemenson, Simon T. Schafer, Jong-Yeon Yoo, Sarah L. Parylak, Apua Paquola, Hyunsu Do, Dayeon Kim, Insook Ahn, Mingyu Ju, Chanhee S. Kang, Younghee Ju, Eunji Jung, Aidan H. McDonald, Youngjin Park, Gilhyun Kim, **Se-Bum Paik**, Junho Hur, Joon Kim, Yong-Mahn Han, Seung-Hee Lee, Fred H. Gage, Jong-Seo Kim & Jinju Han, miR-124 coordinates metabolic regulators acting at early stages of human neurogenesis, *Communications Biology* 7(1), 1393 (2024)

42. Seungdae Baek, Youngjin Park & **Se-Bum Paik**, Species-specific wiring of cortical circuits for small-world networks in the primary visual cortex, *PLOS Computational Biology* 19(8), e1011343 (2023)

41. Hyeonsu Lee, Woochul Choi, Dongil Lee, **Se-Bum Paik**, Comparison of visual quantities in untrained deep neural networks, *Cell Reports* 42(8), 112900 (2023)

40. BumJin Ko, Jong-Yeon Yoo, Taesik Yoo, Woochul Choi, Rumeysa Dogan, Kibong Sung, Dahun Um, Su Been Lee, Hyun Jin Kim, Sangjun Lee, Seung Tae Beak, Sang Ki Park, **Se-Bum Paik**, Tae-Kyung Kim, Joung-Hun Kim, Npas4-mediated dopaminergic regulation of safety memory consolidation *Cell Reports* 42(7), 112678 (2023)

39. Hyoseon Oh, Suho Lee, Yusang Oh, Seongbin Kim, Young Seo Kim, Yeji Yang, Woochul Choi, Ye-Eun Yoo, Heejin Cho, Seungjoon Lee, Esther Yang, Wuhyun Koh, Woojin Won, Ryunhee Kim, C. Justin Lee, Hyun Kim, Hyojin Kang,

Jin Young Kim, Taeyun Ku, **Se-Bum Paik** & Eunjoon Kim, Kv7/KCNQ potassium channels in cortical hyperexcitability and juvenile seizure-related death in Ank2-mutant mice *Nature Communications* 14, 3547 (2023)

38. Jeonghwan Cheon, Seungdae Baek & **Se-Bum Paik**, Invariance of object detection in untrained deep neural networks *Frontiers in Computational Neuroscience* 16, 1030707 (2022)

37. Woohyun Kim, Jae Jin Shin, Yu Jin Jeong, Kyungdeok Kim, Jung Won Bae, Young Woo Noh, Seungjoon Lee, Woochul Choi, **Se-Bum Paik**, Min Whan Jung, Eunee Lee, Eunjoon Kim, Suppressed prefrontal neuronal firing variability and impaired social representation in IRSp53-mutant mice *eLife* 11, e74998 (2022)

36. Seungdae Baek, Min Song, Jaeson Jang, Gwangsu Kim & **Se-Bum Paik**, Face detection in untrained deep neural networks *Nature Communications* 12, 7328 (2021)

35. Eunee Lee, Seungjoon Lee, Jae Jin Shin, Woochul Choi, Changuk Chung, Suho Lee, Jihye Kim, Seungmin Ha, Ryunhee Kim, Taesun Yoo, Ye-Eun Yoo, Jisoo Kim, Young Woo Noh, Issac Rhim, Soo Yeon Lee, Woohyun Kim, Taekyung Lee, Hyogeun Shin, Il-Joo Cho, Karl Deisseroth, Sang Jeong Kim, Joo Min Park*, Min Whan Jung*, **Se-Bum Paik*** & Eunjoon Kim***,** Excitatory synapses and gap junctions cooperate to improve Pv neuronal burst firing and cortical social cognition in Shank2-mutant mice *Nature Communications* 12, 5116 (2021) (*co-corresponding)

34. Minju Jeong, Hyeonsu Lee, Youngsoo Kim, Eric Hou-Jen Wang, **Se-Bum Paik***, Byung Kook Lim* & Daesoo Kim*, Interhemispheric Cortico-Cortical Pathway for Sequential Bimanual Movements in Mice *eNeuro* 8(4), 200-221 (2021) (*co-corresponding)

33. Jung Won Bae, Huijeong Jeong, Chanmee Bae, Hyeonsu Lee, **Se-Bum Paik** & Min Whan Jung, Parallel processing of working memory and temporal information by distinct types of cortical projection neurons *Nature Communications* 12, 4352 (2021)

32. Hyun Yong Koh, Jaeson Jang, Sang Hyeon Ju, Ryunhee Kim, Gyu-Bon Cho, Dong Seok Kim, Jong-Woo Sohn, **Se-Bum Paik*** & Jeong Ho Lee*, Non–Cell Autonomous Epileptogenesis in Focal Cortical Dysplasia *Annals of Neurology* 0, 1-15 (2021) (*co-corresponding)

31. Gwangsu Kim, Jaeson Jang, & **Se-Bum Paik**, Periodic clustering of simple and complex cells in visual cortex *Neural Networks* 143, 148-160 (2021)

30. Seungdae Baek, Youngjin Park, Woochul Choi & **Se-Bum Paik**, A brain-inspired network architecture for cost-efficient object recognition in shallow hierarchical neural networks, *Neural Networks* 134, 76-85 (2021)

29. Min Song, Jaeson Jang, Gwangsu Kim & **Se-Bum Paik**, Projection of orthogonal tiling from the retina to the visual cortex, *Cell Reports* 34(1), 108581 (2021)

28. Gwangsu Kim, Jaeson Jang, Seungdae Baek, Min Song & **Se-Bum Paik**, Visual number sense in untrained deep neural networks, *Science Advances* 7(1), eabd6127 (2021)

27. Jung Hwan Shin, Min Song, **Se-Bum Paik** & Min Whan Jung, Spatial organization of functional clusters representing reward and movement information in the striatal direct and indirect pathways, *Proceedings of the National Academy of Sciences (PNAS)* 117 (43), 27004-27015 (2020)

26. Jinwoo Kim, Min Song, Jaeson Jang & **Se-Bum Paik**, Spontaneous retinal waves can generate long-range horizontal connectivity in visual cortex, *Journal of Neuroscience* 40(43), 6584-6599 (2020) (Cover Article)

25. Jun Ho Song, Woochul Choi, You-Hyang Song, Jae-Hyun Kim, Daun Jeong, Seung-Hee Lee & **Se-Bum Paik**, Precise Mapping of Single Neurons by Calibrated 3D Reconstruction of Brain Slices Reveals Topographic Projection in Mouse Visual Cortex, *Cell Reports* 31(8), 107682 (2020)

24. Huijeong Jeong, Dohoung Kim, Min Song, **Se-Bum Paik &** Min Whan Jung, Distinct roles of parvalbumin- and somatostatin-expressing neurons in flexible representation of task variables in the prefrontal cortex, *Progress in Neurobiology* 187, 101773 (2020)

23. Jaeson Jang, Min Song, & **Se-Bum Paik**, Retino-cortical mapping ratio predicts columnar and salt-and-pepper organization in mammalian visual cortex, *Cell Reports* 30(10), 3270-3279 (2020)

22. Danqian Liu, Weifu Li, Chenyan Ma, Weitong Zheng, Yuanyuan Yao, Chak Foon Tso, Peng Zhong, Xi Chen, Jun Ho Song, Woochul Choi, **Se-Bum Paik**, Hua Han & Yang Dan, A common hub for sleep and motor control in the substantia nigra, *Science* 367(6476), 440-445 (2020)

21. Hyunsu Lee, Woochul Choi, Youngjin Park & **Se-Bum Paik**, Distinct role of flexible and stable encoding in sequential working memory, *Neural Networks*, 121, 419-429 (2020)

20. Woochul Choi & **Se-Bum Paik**, Intrinsic timescales of sensory integration for motion perception, *Scientific Reports* 9(1), 3993 (2019)

19. Hyun Yong Koh, Se Hoon Kim, Jaeson Jang, Hyungguk Kim, Sungwook Han, Jae Seok Lim, Geurim Son, Junjeong Choi, Byung Ouk Park, Won Do Heo, Jinju Han, Hyunjoo Lee, Daeyoup Lee, Hoon-Chul Kang, Minho Shong, **Se-Bum Paik**, Dong Seok Kim & Jeong Ho Lee, BRAF somatic mutation contributes to intrinsic epileptogenicity in pediatric brain tumors, *Nature Medicine*, 24, 1662-1668 (2018)

18. Hwajin Jung, Haram Park, Yeonsoo Choi, Hyojin Kang, Eunee Lee, Hanseul Kweon, Junyeop Daniel Roh, Jacob Ellegood, Woochul Choi, Jaeseung Kang, Issac Rhim, Su-Yeon Choi, Mihyun Bae, Sun Gyun Kim, Jiseok Lee, Changuk Chung, Taesun Yoo, Hanwool Park, Yangsik Kim, Seungmin Ha, Seung Min Um, Seojung Mo, Yonghan Kwon, Won Mah, Hyun Kim, Yong Chul Bae, Jason Lerch, **Se-Bum Paik** & Eunjoon Kim, Sexually dimorphic behavior, neuronal activity, and gene expression in Chd8-mutant mice, *Nature Neuroscience*, 21, 1218-1228 (2018)

17. Min Song, Minseok Kang, Hyeonsu Lee, Yong Jeong & **Se-Bum Paik**, Classification of Spatiotemporal Neural Activity Patterns in Brain Imaging Data, *Scientific reports*, 8 (1), 8231 (2018)

16. Jaeson Jang & **Se-Bum Paik**, Interlayer repulsion of retinal ganglion cell mosaics regulates spatial organization of functional maps in the visual cortex, *Journal of Neuroscience*, 37(50), 12141-12152 (2017) (Featured Article)

15. Pachaya Sailamul, Jaeson Jang, **Se-Bum Paik**, Synaptic Convergence Regulates Synchronization -Dependent Spike Transfer in Feedforward Neural Networks, *Journal of Computational Neuroscience*, 43(3), 189-202 (2017)

14. Jeongjin Kim, Youngsoo Kim, Ryuichi Nakajima, Anna Shin, Minju Jeong, Ah Hyung Park, Yongcheol Jeong, Seonmi Jo, Seungkyoung Yang, Hosung Park, Sung-Hwan Cho, Kwang-Hyun Cho, Insop Shim, Jae Hoon Chung, **Se-Bum Paik**, George J. Augustine, and Daesoo Kim, Inhibitory basal ganglia inputs induce excitatory motor signals in the thalamus, *Neuron*, 95, 1181-1196 (2017)

13. Youngjin Park, Woochul Choi, **Se-Bum Paik**, Symmetry of learning rate in synaptic plasticity modulates formation of flexible and stable memories, *Scientific Reports*, 7, 5671 (2017)

12. Ah Hyung Park, Seung Hyun Lee, Changju Lee, Jeongjin Kim, Han Eol Lee, **Se-Bum Paik**, Keon Jae Lee, and Daesoo

Kim, Optogenetic Mapping of Functional Connectivity in Freely Moving Mice via Insertable Wrapping Electrode Array Beneath the Skull, *ACS Nano*, 10, 2791-2802 (2016)

11. Soyoung An, Woochul Choi, **Se-Bum Paik**, Development of a Computational Model on the Neural Activity Patterns of Visual Working Memory in a Hierarchical Feedforward Network, *Journal of Korean Physical Society*, 67, 1713-1718 (2015)

10. Se-Bum Paik, Developmental models of functional maps in cortex, *Biomedical Engineering Letters* 3(4), 223-225 (2013)

9. Se-Bum Paik & Dario L Ringach, Link between the orientation and retinotopic maps in primary visual cortex, *Proceedings of the National Academy of Sciences (PNAS)* 109, 7091-7096 (2012)

8. Se-Bum Paik & Dario L Ringach, Retinal origin of orientation maps in visual cortex, *Nature Neuroscience* 14, 919-925 (2011) (Cover Article)

7. Se-Bum Paik* & Donald A Glaser, Synaptic plasticity controls sensory responses through frequency-dependent gamma oscillation resonance, *PLoS Computational Biology* 6(9) e1000927 (2010) (*corresponding)

6. Se-Bum Paik*, Tribhawan Kumar & Donald A Glaser, Spontaneous local gamma oscillation selectively enhances neural network responsiveness, *PLoS Computational Biology* 5(3) e1000342 (2009) (*corresponding)

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3. Moon SE, **Back SB**, Kwun SI, Lee YS, Noh TW, Song TK & Yoon JG, Orientational dependence of electro-optic properties of $SrBi_2Ta_2O_9$ ferroelectric thin films, *Japanese Journal of Applied Physics* 39, 5916-5917 (2000)

2. Moon SE, Song TK, **Back SB** & Kwun SI, Controlled growth of a-/b- and c-axis oriented epitaxial $SrBi_2Ta_2O_9$ ferroelectric thin films, *Applied Physics Letters* 75, 2827-2829 (1999)

1. Moon SE, **Back SB** & Kwun SI, Controlled growth of $SrBi_2Ta_2O_9$ thin films by the rf magnetron sputtering deposition, *Journal of the Korean Physical Society* 35, s1206-s1209 (1999)