

Curriculum Vitae

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Education:

1995 Doctor of Engineering in Electrical Engineering, Sophia University, Japan

1988 Dual M.S. in Electrical Engineering and Mechanical Engineering, University of Michigan (Ann Arbor), U.S.A.

1981 B.A. in Mechanical Engineering, Waseda University, Japan

Professional Career:

2019 Dec - Visiting Professor, The Technical University of Munich

2017 Sep - Full Professor, Okinawa Institute of Science and Technology Graduate University (OIST)

2017-2017Aug Adjunct Professor, Okinawa Institute of Science and Technology Graduate University (OIST)

2014-2017 Visiting Professor, Faculty of Science and Engineering, Waseda University

2012-2017 Full Professor, Dept. of Electrical Engineering, Korea Advanced Institute of Science and Technology (KAIST)

2001-2012 Team Leader, Lab. for Behavior and Dynamic Cognition, RIKEN Brain Science Institute, Japan

2008-2011 Visiting Professor, Dept. of Brain Science and Technology, Kyushu Inst. of Tech., Japan

1997-2002 Visiting Associate Professor, Graduate School of Arts and Sciences, University of Tokyo, Japan

1993-2001 Senior Researcher, Sony Computer Science Laboratories Inc., Japan

1990-1993 Researcher, Sony Corporation, Japan

1981-1990 Engineer, Chiyoda Chemical Engineering and Construction Corporation, Japan

Award:

- The best paper award, Japanese Neural Network Society, 2000.
- The best paper award, 5th International Conference on Simulation of Adaptive Behavior, 1998.

Editorial Board Member:

- Connection Science, Associate Editor, 2014 ~ 2022
- IEEE Transactions on Autonomous Mental Development, Associate Editor, 2008 ~ 2015
- Frontiers in Neurorobotics, Associate Editor, 2007 ~
- Adaptive Behavior, Associate Editor, 2006 ~

Publication List of Jun Tani

Books

1. Tani, J. (2016). Exploring Robotic Minds: Actions, Symbols, and Consciousness as Self-Organizing Dynamic Phenomena. *Oxford University Press*.

Journal Papers

1. Matsumoto, T., Vijayaraghavan, P., & Tani, J. (2026). Goal-Directed Latent Variable Inference: A Unified Active Inference Framework for Embodied Intelligence in Continuous Spatiotemporal Domains, in press in *Topics in Cognitive Science*.
2. Tinker, T. J., Doya, K., & Tani, J. (2026). Curiosity-Driven Development of Action and Language in Robots Through Self-Exploration, accepted in *Science Advances*. [LINK](#)
3. Queißer, J. F., & Tani, J. (2025). Working Memory and Self-Directed Inner Speech Enhance Multitask Generalization in Active Inference. *Neural Computation*, 38, 28–70 (2026). [LINK](#)
4. Matsumoto, T., Fujii, K., Murata, S., & Tani, J. (2025). Active Inference with Dynamic Planning and Information Gain in Continuous Space by Inferring Low-Dimensional Latent States. *Entropy*, 27(8), 846. [LINK](#)
5. Queißer, J. F., Oyama, H., & Tani, J. (2025). How deep will you go? Hierarchy in predictive coding and transformers. *Cognitive Neuroscience*, 1–3. [LINK](#)
6. Oyama, H., Matsumoto, T., & Tani, J. (2025). Modeling autonomous shifts between focus state and mind-wandering using a predictive-coding-inspired variational recurrent neural network. *Frontiers in Computational Neuroscience*, 19, 1578135. [LINK](#)
7. Idei, H., Tani, J., Ogata, T., & Yamashita, Y. (2025). Future shapes present: autonomous goal-directed and sensory-focused mode switching in a Bayesian allostatic network model. *NPJ Complexity*, 2:23. [LINK](#)
8. Ohata, W., & Tani, J. (2025). Characterizing the sense of agency in human–robot interaction based on the free energy principle. *NPJ Complexity*, 2:12. [LINK](#)
9. Queißer, J. F., Tani, J., & Steil, J. J. (2025). The Epistemic Uncertainty Gradient in Spaces of Random Projections. *Entropy*, 27(2), 144.
10. Vijayaraghavan, P., Queißer, J. F., Verduzco-Flores, S., & Tani, J. (2025). Development of compositionality through interactive learning of language and action of robots. *Science Robotics*, 10, eadp0751.
11. Takahashi, Y., Idei, H., Komatsu, M., Tani, J., Tomita, H., & Yamashita, Y. (2025). Digital Twin Brain Simulator for Real-Time Consciousness Monitoring and Virtual Intervention Using Primate Electroencephalogram Data. *npj Digital Medicine*, in press.
12. Sawada, H., Ohata, W., & Tani, J. (2025). Human–Robot Kinaesthetic Interactions Based on the Free-Energy Principle. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*. 55 (1), 366-379.
13. Ohata, W., & Tani, J. (2024). Characterizing the sense of agency in human–robot interaction based on the free energy principle. Accepted in *NPJ Complexity*.
14. Han, D., Doya, K., Li, D., & Tani, J. (2024). Synergizing habits and goals with variational Bayes. *Nature Communication*, 15:4461.
15. Tinker, T., Doya, K., & Tani, J. (2024). Intrinsic Rewards for Exploration Without Harm From Observational Noise: A Simulation Study Based on the Free Energy Principle. *Neural Computation*, 36 (9), 1854–1885.
16. Matsumoto, T., Ohata, W., & Tani, J. (2023). Incremental Learning of Goal-Directed Actions in a Dynamic Environment by a Robot using Active Inference. *Entropy*, 25(11), 1506.
17. Tani, J. (2023). 自由エネルギー原理に基づく認知脳型ロボット研究 Studies of Cognitive Neurorobotics Based on the Free Energy Principle. *日本ロボット学会誌*, 41(7), 609-615.

18. Soda, T., Ahmadreza, A., Tani, J., Honda, M., Hanakawa, T., & Yamashita, Y. (2023). Simulating Developmental Diversity: Impact of Neural Stochasticity on Atypical Flexibility and Hierarchy. *Frontiers in Psychiatry, section Psychopathology*. Volume 14 - 2023.
19. Wirkuttis, N., Ohata, W., & Tani, J. (2023). Turn-Taking Mechanisms in Imitative Interaction: Robotic Social Interaction Based on the Free Energy Principle. *Entropy*, 25(2), 263.
20. Nikulin, V., & Tani, J. (2022). Initialization of Latent Space Coordinates via Random Linear Projections for Learning Robotic Sensory-Motor Sequences. Accepted in *Frontiers in Neurorobotics*.
21. Idei, H., Ohata, W., Yamashita, Y., Ogata, T., & Tani, J. (2022). Emergence of sensory attenuation mechanism by the free-energy principle. *Scientific Report*, 12:14542, DOI: 10.1038/s41598-022-18207-7
22. Matsumoto, T., Ohata, W., Benureau, F. C., & Tani, J. (2022). Goal-directed Planning and Goal Understanding by Extended Active Inference: Evaluation Through Simulated and Physical Robot Experiments. *Entropy*, 24(4), 469.
23. Benureau, F. C., & Tani, J. (2020). Morphological Development at the Evolutionary Timescale: Robotic Developmental Evolution. *Alife*, 00: 1–19.
24. 谷淳 (2021). 池上「生命理論としての認知科学：減算と縮約の哲学をめぐって」へのコメント. *認知科学*. 28(2) 222-230.
25. Wirkuttis, N., & Tani, J. (2021). Leading or Following? Dyadic Robot Imitative Interaction Using the Active Inference Framework. *IEEE Robotics and Automation Letters*, 6(3) 6024-6031.
26. Queißer, J. F., Jung, M., Matsumoto, T., & Tani, J. (2021). Emergence of Content-Agnostic Information Processing by a Robot Using Active Inference, Visual Attention, Working Memory, and Planning. *Neural Computation*, 33(9), 2353–2407.
27. Chame H. F., Ahmadi A., & Tani, J. (2020). A Hybrid Human-Neurorobotics Approach to Primary Intersubjectivity via Active Inference. *Frontiers in Psychology*, 11, 584869.
28. Tani, J., & White, J. (2020). Cognitive neurorobotics and self in the shared world, a focused review of ongoing research. *Adaptive Behavior*, 1–20.
29. Ohata, W., & Tani, J. (2020). Investigation of the Sense of Agency in Social Cognition, based on frameworks of Predictive Coding and Active Inference: A simulation study on multimodal imitative interaction. *Frontiers in Neurorobotics*, 14, 61.
30. Han, D., Doya, K., & Tani, J. (2020). Self-Organization of Action Hierarchy and Compositionality by Reinforcement Learning with Recurrent Neural Networks. *Neural Networks*, 129, 149-162.
31. Matsumoto, T., & Tani, J. (2020). Goal-Directed Planning for Habituated Agents by Active Inference Using a Variational Recurrent Neural Network. *Entropy*, 22(5), 564.
32. Hwang, J., Kim, J., Ahmadi, A., Choi, M., & Tani, J. (2020). Dealing With Large-Scale Spatio-Temporal Patterns in Imitative Interaction Between a Robot and a Human by Using the Predictive Coding Framework. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 50(5), 1918-1931.
33. Cappuccio, M. L., Kirchhoff, M. D., Alnajjar, F., & Tani, J. (2020). Unfulfilled Prophecies in Sport Performance: Active Inference and the Choking Effect. *Journal of Consciousness Study*. 27(3-4), 152-184.
34. Ahmadi, A., & Tani, J. (2019). A Novel Predictive-Coding-Inspired Variational RNN Model for Online Prediction and Recognition. *Neural Computation*, 31, 2025–2074.
35. Zhong, J., Peniak, M., Tani, J., Ogata, T., & Cangelosi, A. (2019). Sensorimotor input as a language generalisation tool: A neurorobotics model for generation and generalisation of noun-verb combinations with sensorimotor inputs. *Autonomous Robots*, 43(5), 1271-1290.
36. Parisi, I. G., Tani, J., Weber, C., and Wermter, S. (2018). Lifelong Learning of Spatiotemporal Representations with Dual-Memory Recurrent Self-Organization. *Frontiers in Neurorobotics*, 12:78.
37. Idei, H., Murata, S., Chen, Y., Yamashita, Y., Tani, J., and Ogata, T. (2018). A Neurorobotics Simulation of Autistic Behavior Induced by Unusual Sensory Precision. *Computational Psychiatry*, 2, 164-182.

38. Jung, M., Lee, H., & Tani J. (2018). Adaptive Detrending to Accelerate Convolutional Gated Recurrent Unit Training for Contextual Video Recognition. *Neural Networks*, 105, 356-370.
39. Choi, M., & Tani, J. (2018). Predictive Coding for Dynamic Visual Processing: Development of Functional Hierarchy in a Multiple Spatio-Temporal Scales RNN Model. *Neural Computation*, 30, 237-270.
40. Tatsch, C., Ahmadi, A., Bottega, F., Tani, J., & da Silva Guerra, R. (2018). Dimitri: An Open-Source Humanoid Robot with Compliant Joints. *Journal of Intelligent & Robotic Systems*, (91), 291-300.
41. White, J., & Tani, J. (2017). From Biological to Synthetic Neurorobotics Approaches to Understanding the Structure Essential to Consciousness (Part 3). *American Philosophy Association Newsletter, Philosophy and Computers*, 17(1), 11-22.
42. Lee, H., Jung, M., & Tani, J. (2017). Recognition of Visually Perceived Compositional Human Actions by Multiple Spatio-Temporal Scales Recurrent Neural Networks. *IEEE Transactions on Cognitive and Developmental Systems*, (99), 1-1.
43. Parisi, G. I., Tani, J., Weber, C., & Wermter, S. (2017). Lifelong learning of human actions with deep neural network self-organization. *Neural Networks*, 96, 137-149.
44. Hwang, J., & Tani, J. (2017). Seamless Integration and Coordination of Cognitive Skills in Humanoid Robots: A Deep Learning Approach. *IEEE Transactions on Cognitive and Developmental Systems*, 10(2), 345-358.
45. Tani, J., & White, J. (2017). From Biological to Synthetic Neurorobotics Approaches to Understanding the Structure Essential to Consciousness (Part 2). *American Philosophy Association Newsletter, Philosophy and Computers*, 16(2), 29-41.
46. Ahmadi, A., & Tani, J. (2017). How can a recurrent neurodynamic predictive coding model cope with fluctuation in temporal patterns? Robotic experiments on imitative interaction. *Neural Networks*. 92, 3-16, DOI:10.1016/j.neunet.2017.02.015
47. Parisi, G. I., Tani, J., Weber, C., & Wermter, S. (2017). Emergence of multimodal action representations from neural network self-organization. *Cognitive Systems Research*, 43, 208-221.
48. Lyon, C. et al. (2016). Embodied language learning and cognitive bootstrapping: Methods and design principles. *International Journal of Advanced Robotics Systems*, 13:105, DOI:10.5772/63462
49. White, J., & Tani, J. (2016). From biological to synthetic neurorobotics approaches to understanding the structure essential to consciousness. (Part 1). *American Philosopher Association Newsletter, Philosophy and Computers*, 16(1), 13-23.
50. Murata, S., Yamashita, Y., Arie, H., Ogata, T., Sugano, S., & Tani, J. (2015). Learning to perceive the world as probabilistic or deterministic via interaction with others: a neuro-robotics experiment. *IEEE Transactions on Neural Networks and Learning Systems*, (4), 830-848. DOI: 10.1109/TNNLS.2015.2492140
51. Park, G., & Tani, J. (2015). Development of compositional and contextual communicable congruence in robots by using dynamic neural network models. *Neural Networks*, 72, 109-122.
52. Jung, M., Hwang, J., & Tani, J. (2015). Self-organization of spatio-temporal hierarchy via learning of dynamic visual image patterns on action sequences. *PLoS One*, 10(7): e0131214, DOI:10.1371/journal.pone.0131214
53. Murata, S., Arie, H., Ogata, T., Sugano, S., & Tani, J. (2014). Learning to generate proactive and reactive behavior using a dynamic neural network model with time-varying variance prediction mechanism. *Advanced Robotics*, 28(17), 1189-1203, DOI: 10.1080/01691864.2014.916628
54. Komatsu, M., Namikawa, J., Chao, Z. C., Nagasaka, Y., Fujii, N., Nakamura, K., & Tani, J. (2014). An artificial network model for estimating the network structure underlying partially observed neuronal signals. *Neuroscience Research*, 81-82, 69-77, DOI: 10.1016/j.neures.2014.02.005
55. Tani, J., Froston, K., & Haykin, S. (2014). Self-Organization and Compositionality in Cognitive Brains [Further Thoughts]. *Proceedings of the IEEE, Special Issue on Cognitive Dynamic Systems*, 102(4), 606-607.
56. Tani, J. (2014). Self-Organization and Compositionality in Cognitive Brains: A Neuro-Robotics Study. *Proceedings of the IEEE, Special Issue on Cognitive Dynamic Systems*, 102(4), 586-605.
57. Murata, S., Namikawa, J., Arie, H., Sugano, S., & Tani, J. (2013). Learning to reproduce fluctuating time series by inferring their time-dependent stochastic properties: Application in robot learning via

- tutoring. *IEEE Transactions on Autonomous Mental Development*, 5(4), 298-310, DOI: 10.1109/TAMD.2013.2258019
58. Jeong, S., Park, Y., Mallipeddia, P., Tani, J., & Lee, M. (2013). Goal-oriented Behavior Sequence Generation based on Semantic Commands using Multiple Timescales Recurrent Neural Network with Initial State Correction. *Neurocomputing*, 129, 67-77.
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 63. Arie, H., Arakaki, T., Sugano, S., & Tani, J. (2011). Imitating others by composition of primitive actions: a neuro-dynamic model. *Robotics and Autonomous Systems*, 60, 729-741.
 64. Tobari, Y., Okumura, T., Tani, J., & Okanoya, K. (2011). A direct neuronal connection between the telencephalic nucleus robustus arcopallialis and the nucleus nervi hypoglossi, pars tracheosyringalis in Bengalese finches (*Lonchura striata* var. domestica). *Neuroscience Research*, 71(4), 361-368.
 65. Namikawa, J., Nishimoto, R., & Tani, J. (2011). A neurodynamic account of spontaneous behaviour”, *PLoS Computational Biology*, Vol. 7, Issue 10, e1002221.
 66. Rohlfing, K.J., & Tani, J. (2011). Grounding language in action. *IEEE Transactions on Autonomous Mental Development*, 3(2), 109-112.
 67. Jeong, S., Arie, H., Lee, M., & Tani, J. (2011). Neuro-robotics study on integrative learning of proactive visual attention and motor behaviors. *Cognitive Neurodynamics*, 6, 43-59.
 68. Sugita, Y., Tani, J., & Butz, M.V. (2011). Simultaneously emerging braitenberg codes and compositionality. *Adaptive Behavior*, 19(5), 295-316.
 69. Yamashita, Y., Okumura, T., Okanoya, K., & Tani, J. (2011). Cooperation of deterministic dynamics and random noise in production of complex syntactical avian song sequences: a neural network model. *Frontiers in Computational Neuroscience*, 5(18), 1-12.
 70. Nishide, S., Tani, J., Okuno, H.G. & Ogata, T. (2011). Towards written text recognition based on handwriting experiences using recurrent neural network. *Advanced Robotics*, 25(17), 2173-2187.
 71. Hinoshita, W., Arie, H., Tani, J., Okuno, H. & Ogata, T. (2011). Emergence of hierarchical structure mirroring linguistic composition in a recurrent neural network. *Neural Networks*, 24, 311-320.
 72. Cangelosi, A., Metta, G., Sagerer, G., Nolfi, S., Nehaniv, C.L., Fischer, K., Tani, J., Belpaeme, B., Sandini, G., Fadiga, L., Wrede, B., Rohlfing, K., Tuci, E., Dautenhahn, K., Saunders, J. & Zeschel, A. (2010). Integration of action and language knowledge: A roadmap for developmental robotics. *IEEE Transactions on Autonomous Mental Development*, 2(3), 167-195.
 73. Tani, J. (2010). Studies of symbols from ‘Robot Science’. *Journal of the Robotics Society of Japan*, 28(4), 522-531.
 74. Namikawa, J. & Tani, J. (2010). Learning to imitate stochastic time series in a compositional way by chaos. *Neural Networks*, 23, 625-638.
 75. Maniadakis, M., Trahanias, P., & Tani, J. (2009). Explorations on artificial time perception. *Neural Networks*, 22, 509-517.
 76. Tani, J. (2009). Autonomy of ‘Self’ at criticality: The perspective from synthetic neuro-robotics. *Adaptive Behavior*, 17(5), 421-443.
 77. Nishide, S., Ogata, T., Tani, J., Komatani, K., & Okuno, H.G. (2009). Self-organization of dynamic object features based on bidirectional training. *Advanced Robotics*, 23, 2035-2057.
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 79. Nishimoto, R., & Tani, J. (2009). Development of hierarchical structures for actions and motor imagery: a constructivist view from synthetic neuro-robotics study. *Psychological Research*, 73,

- 545-558.
80. Arie, H., Endo, T., Arakaki, T., Sugano, S., & Tani, J. (2009). Creating novel goal-directed actions at criticality: a neuro-robotic experiment. *New Mathematics and Natural Computation*, 5(1), 307-334.
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 83. Tani, J. (2008). Objectifying the subjective self: An account from a synthetic robotics approach. *Constructivist Foundations*, 4(1), 28-30.
 84. Namikawa, J., & Tani, J. (2008). Building recurrent neural networks to implement multiple attractor dynamics using the gradient descent method. *Advances in Artificial Neural Systems*, Vol. 2009, Article ID 846040.
 85. Yamashita, Y., & Tani, J. (2008). Emergence of functional hierarchy in a multiple timescale neural network model: a humanoid robot experiment. *PLoS Computational Biology*, Vol.4, Issue.11, e1000220.
 86. Namikawa, J., & Tani, J. (2008). A model for learning to segment temporal sequences, utilizing a mixture of RNN experts together with adaptive variance. *Neural Networks*, 21, 1466-1475.
 87. Yamashita, Y., Takahashi, M., Okumura, T., Ikebuchi, M., Yamada, H., Suzuki, M., Okanoya, K., & Tani, J. (2008). Developmental learning of complex syntactical song in the Bengalese finch: A neural network model. *Neural Networks*, 21, 1224-1231.
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 92. Tani, J. (2007). On the interactions between top-down anticipation and bottom-up regression. *Frontiers in Neurorobotics*, Vol. 1, Article 2.
 93. Okumura, T., Okanoya, K., & Tani, J. (2007). Application of light-cured dental adhesive resin for mounting electrodes or microdialysis probes in chronic experiments. *Journal of Visualized Experiments*, 6, 249-1~249-10.
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- systems. *Adaptive Behavior*, 13(3), 211-225.
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 104. Tani, J. (2004). The dynamical systems accounts for phenomenology of immanent time: an interpretation by revisiting a robotics synthetic study. *Journal of Consciousness Studies*, 11(9), 5-24.
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 113. Nolfi, S., & Tani, J. (1999). Extracting regularities in space and time through a cascade of prediction of prediction networks: The case of a mobile robot navigating in a structured environment. *Connection Science*, 11(2), 125-148.
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International Conference Proceedings, Technical Papers, and Book Chapters

1. Benureau, F. C., & Tani, J. (2022). Morphological Wobbling Can Help Robots Learn. *2022 IEEE International Conference on Development and Learning (ICDL)*. 257-264.
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- robot experiments to phenomenology. *Proc. 7th Int. Conf. on Simulation of Adaptive Behavior (SAB'02)*, pp. 171-180, Edinburgh, UK, August, edited by Hallam B., Floreano D., Hayes G., Meyer J., and Hallam J., The MIT Press.
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 120. Tani, J. (1995). Essential dynamical structure in learnable autonomous robots. *Proc. 3rd European Conf. on Artificial Life (ECAL95)*, pp. 721-732, Granada, Spain, June, Springer-Verlag.
 121. Tani, J. (1995). Embedding symbolic process into deterministic chaos. *Proc. Biologically Inspired Evolutionary Systems (BIES95)*, pp. 156-162, Tokyo, Japan.
 122. Tani, J. (1995). Dynamical systems approach in learnable autonomous robots. *Proc. Information Integration Workshop, Beyond Divide and Conquer Strategy (IIW95)*, pp. 241-249.
 123. Tani, J. (1994). Experiment of Learning and Chaotic Planning of a Mobile Robot. *Proc. 2nd Int. Conf. on Fuzzy Logic, Neural Nets and Soft Computing*, Iizuka, Japan.
 124. Tani, J., & Fukumura, N. (1994). Embedding task-based behavior into internal sensory-based attractor dynamics in navigation of a mobile robot. *Proc. 1994 IEEE/RSJ/GI Int. Conf. on*

- Intelligent Robots and Systems (IROS'94)*, 2, 886-893, Munich, Germany.
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 128. Tani, J. (1992). The role of chaos in processing language. *IEEE Proc. Int. Joint Conf. on Neural Networks (IJCNN'92)*, 3, 444-449, Baltimore, USA.
 129. Tani, J., Hirobe, T., Niida, K., Koshijima, I., & Murakami, H. (1989). New learning algorithm for rule extraction by neural network and its application. *Proceedings of the 4th Knowledge Acquisition for Knowledge-Based Systems Workshop*, 35.1-35.16, Banff, Alberta, October 1-6.
 130. Tani, J., & Yang, W.J. (1989). Numerical Simulation of Pipeline Control System. *Proceeding of the 2nd ICFP*, pp. 836-840, Zhejiang University, China.

Recent Talks and Seminars (since 2006):

1. Keynote speech, Tani, J. Human-in-the-Loop Learning under the Free Energy Principle: A Developmental Robotics Perspective. *The Augmented Humans (AHs) International Conference 2026*, OIST, Okinawa, Japan, March 16-19, 2026.
2. Invited talk, Tani, J. Exploring robotic minds by extending the idea of predictive coding and active inference. *International Symposium on the Unified Theory of Prediction and Action 2026*, Tokyo, Japan, March 13-14, 2026.
3. Keynote speech, Tani, J. Development of Higher Cognitive Mechanisms Through Iterative Sensorimotor Interactions With the World: Insights From Neurorobotics. *32nd International Conference on Neural Information Processing (ICONIP2025)*, OIST, Okinawa, Japan, November 20-24, 2025.
4. Keynote speech, Tani, J. Cognitive Neurorobotics Studies Extending the Free Energy Principle. *6th International Workshop on Active Inference (IWAI2025)*, Montreal, October 15-17, 2025.
5. Invited talk, Tani, J. How can higher cognitive mechanisms develop through iterative sensorimotor interactions with the world? Insights From Neurorobotics. *2025 Asia-Pacific Computational and Cognitive Neuroscience Conference (AP-CCN2025)*, Saitama, Japan, July 22, 2025.
6. Invited talk, Tani, J. Development of Compositionality through Interactive Learning of Language and Action of Robots Using Free Energy Principle. Colloquium Talk, Department of Informatics, University of Hamburg, March 24, 2025.
7. Invited talk, Tani, J. Development of Compositionality through Interactive Learning of Language and Action of Robots Using Free Energy Principle. Italian Institute of Technology, Genova, March 18, 2025.
8. Invited talk, Synergizing Habits and Goals with Variational Bayes. Oct. 9th, 2024, International Research Center for Neurointelligence, The University of Tokyo
9. Invited talk, Cognitive Neurorobotics Studies Extending the Free Energy Principle. *Simulation of Adaptive Behavior (SAB2024)*, Sept. 10, 2024, Irvine, California, The USA
10. Keynote speech, Tani, J. Toward Understanding Structural Basis for Autonomy of Consciousness: A Synthetic Neurorobotics Study. *Association for the Scientific Study of Consciousness 27 (ASSC-27)*, Tokyo, July 2, 2024.
11. Invited lecture, Tani, J. Cognitive Neurorobotics Studies Using the Free Energy Principle. Department of Mechano-Informatics. Graduate School of Information Science and Technology, University of Tokyo, April 24, 2024.
12. Keynote address, Tani, J. Exploring robotic minds using the free energy principle. *AWARE-AI NSF Research Traineeship Program*, January 16th, 2024, Online.

13. Keynote speech, Tani, J. Cognitive Neurorobotics Studies Utilizing the Free Energy Principle: Towards an Ontological Understanding of the Mind. *ALIFE 2023*, Sapporo, July 24, 2023.
14. Invited talk, Tani, J. Exploring robotic minds using the free energy principle. *Brain & Neuroscience Workshop 2023* (Online) - Microsoft Research, June 20, 2023.
15. Invited talk, Tani, J. Cognitive Science Colloquium, Univ. of Tübingen, May 25, 2023.
16. Invited talk, Tani, J. Doctoral Seminar Talk at Technical University of Munich 2023 May 22, 2023.
17. Invited talk, Tani, J. Exploring robotic minds by extending the framework of predictive coding and active inference. The Center for Robotics and Neural Systems (CRNS) (Online), University of Plymouth, UK, February 15, 2023.
18. 招待講演, 谷淳, 製造科学技術センター、異分野技術シーズ「意見交換会」自由エネルギー原理で作動する認知脳ロボット (Online), January 17, 2023
19. Invited talk, Tani, J. Goal-directed Planning and Goal Understanding of Robots by Extended Active Inference. *RoboTac 2022*, The IROS 2022 workshop, Kyoto, October 23, 2022.
20. Invited talk, Tani, J. Lifelong Learning of High-level Cognitive and Reasoning Skills. *IROS 2022 workshop*, Kyoto, October 23, 2022.
21. Invited talk, Tani, J. Cognitive Neurorobotics Studies Using the Frameworks of Predictive Coding and Active Inference. *International Symposium on Artificial Intelligence and Brain Science 2022*, Okinawa Institute of Science and Technology Graduate University, Okinawa, Japan, July 5, 2022.
22. Invited talk, Tani, J. Neurorobotics experiments on goal-directed planning based on active inference. *The Fifth International Workshop on Intrinsically Motivated Open-ended Learning IMOL 2022* (Online), Max Planck Institute for Intelligent Systems, Tübingen, Germany, April 4-6, 2022.
23. Invited talk, Tani, J. Predictive coding and active inference framework for cognitive neurorobotics. *ECoGs seminar organized by Tom Froese* (Online), February 28, 2022.
24. Plenary talk, Tani, J. Cognitive Neurorobotics Study Using the Free Energy Principle. *FEP workshop* (Online), December 14, 2021.
25. Invited talk, Tani, J. Robotic Minds from Predictive Coding and Active Inference. *Graduate School, University of Tokyo, Graduate Course: Brain Information Processing Systems*, (Online), December 10, 2021.
26. Tani, J. Studies on cognitive neurorobotics using the framework of predictive coding and active inference. *RIKEN-OIST Joint Symposium, Series 2, Neurosciences and AI/Data science, Kinds of Minds - What is thinking?* (Online), October 6, 2021.
27. Invited talk, Tani, J. Cognitive neurorobotic self in the shared world. *International Conference on Philosophy of Information ICPI 2021* (Online), September 18, 2021.
28. Keynote talk, Tani, J. Exploring robotic minds using the concepts of predictive coding and active inference. *IEEE ICDL 2021, Beijing, China* (Online), August 28, 2021.
29. Invited talk, Tani, J. An analysis of meta-level cognitive processes of a variational recurrent neural network model when acting with the environment. *ICDL Workshop StEPP'21* (Online), August 22, 2021.
30. Invited talk, Tani, J. Exploring robotic minds using predictive coding and active inference frameworks. *Cognitive Informatics at Université du Québec à Montréal* (Online), April 1, 2021.
31. Invited talk, Tani, J. Understanding Embodied Cognition through Free Energy Minimization. *2021 International Workshop on Embodied Intelligence* (Online), March 24, 2021.
32. Invited talk, Tani, J. Cognitive Neurorobotics Study Using Predictive Coding and Active Inference. *Neuroengineering Symposium* (Online), The Technical University of Munich, Germany, March 11, 2021.
33. Invited talk, Tani, J. Exploring minds using predictive coding and active inference frameworks. *1st SMILES workshop 2020* (Online), November 2, 2020.
34. Invited talk, Tani, J. Cognitive Neurorobotics Study and Its Possible Applications to Rehabilitation. *The 2nd RENEW Workshop: Integrating Sensor Information for Optimal Rehabilitation* (Online), October 20, 2020.
35. Invited talk, Tani, J. An account of the development of cognitive minds using predictive coding and

- active inference frameworks. *University of California Irvines CogSci colloquium (Online)*, October 2, 2020.
36. Invited talk, Tani, J. Exploring robotic minds. *Mind & Life Europe summer research institute 2020, 'Grounding Knowledge in Uncertainty' (Online)*, Aug.10 -15, 2020.
 37. Keynote talk, Tani, J. Cognitive Neurorobotics Study Using Predictive Coding and Active Inference Framework. *icra2020 rain PIL Workshop – virtual, New advances in brain-inspired perception, interaction and learning*, May 31, 2020.
 38. Invite talk, Tani, J. A Proposal of a Novel Variational Bayes Recurrent Neural Network Model Under Predictive Coding and Active Inference Frameworks. *Consciousness Club Tokyo*, Tokyo, Japan, February 7, 2020.
 39. Invited talk, Tani, J. Cognitive Neurorobotics Study Using Frameworks of Predictive Coding and Active Inference. BMW Group, Munich, Germany, December 17, 2019.
 40. Invited talk, Institute for Cognitive Systems Technische Universität München, Munich, Germany, December 18, 2019.
 41. Invited talk, Tani, J. Actions, Symbols and Selves as Self-Organizing Dynamic Phenomena: a View from Neurorobotics study. *CHAIN INTERNATIONAL SYMPOSIUM Adventures in Consciousness Science: Exploring the Crossover between Philosophy, Neuroscience, AI, and Robotics*, Sapporo, Japan, November 10, 2019.
 42. Invited talk, Tani, J. An account of the development of cognitive minds using predictive coding and active inference frameworks. *ATR Brain Information Communication Research Laboratory Group Symposium*, Kyoto, Japan, October 30, 2019.
 43. Keynote talk, Tani, J. Accounting social cognitive mechanisms by the framework of predictive coding and active inference: a synthetic experimental study using robotics interaction platforms. *7th International Conference on Human-Agent Interaction (HAI2019)*, Kyoto, Japan, October 8, 2019.
 44. Invited talk, Tani, J. Emergence in Neurorobotics Experimental Studies. *Riken Robotics Retreat*, Kyoto, Japan, September 13, 2019.
 45. Invited talk, Tani, J. ロボット構成論的アプローチで考える身体的自己と物語的自己について, 第19回Kフォーラム, Takayama, Japan, August 23, 2019.
 46. Invited talk, Tani, J. How can compositionality develop through self-exploration and supervised tutoring? *Fourth International Workshop on Intrinsically-Motivated Open-ended Learning (IMOL2019)*, Frankfurt, Germany, July 1-3, 2019.
 47. Invited talk, Tani, J. Generating goal-directed planning images using frameworks of predictive coding and active inference: Agency and object constancy. *NII Shonan Meeting, Language as Goal-Directed Sequential Behavior: Computational Theories, Brain Mechanisms, Evolutionary Roots*, Shonan, Japan, May 21, 2019.
 48. Invited talk, Tani, J. Accounts of the development of embodied cognition using predictive coding and active inference frameworks. *Marcus Wallenberg International Symposium on Affective and Developmental Processes in Cognitive and Autonomous Systems - Augmenting Deep Learning using Neural Dynamics and Predictive Coding*, Gothenburg, Sweden, May 6, 2019.
 49. Invited talk, NCM2019 Satellite Meeting, Toyama, Japan, April 23, 2019.
 50. Invited talk, IRCN Neuro-inspired Computation Course, Tokyo, Japan, March 22, 2019.
 51. Invited talk, SoAIR2019 JST-CREST/IEEE-RAS Spring School on “Social and Artificial Intelligence for User-Friendly Robots”, Shonan, Japan, March 19, 2019.
 52. Invited talk, 第1回公開シンポジウム 自己をめぐる冒険～現象学・ロボティクス・神経科学・精神医学の境界を超えて～, Tokyo, Japan, February 21, 2019.
 53. Invited talk, MEXT Grant-in-Aid for Scientific Research on Innovative Areas: Evolinguistics and OIST Joint Workshop, Okinawa, Japan, February 19, 2019.
 54. Invited talk, 2018 年度 第10回在日科協碩博セミナー “Robotics&AI(第四次産業革命の展望の中で)”, Tokyo, Japan, October 13, 2018.
 55. Invited talk, Humboldt University, Berlin, Germany, September 26, 2018.
 56. Invited talk, Bernstein Conference 2018 Satellite Workshops, Berlin, Germany, September 26, 2018.
 57. Keynote talk, Workshop for the Synthetic Approach to Biology and the Cognitive Sciences,

- ALIFE2018, Tokyo, Japan, July 25, 2018.
58. Invited talk, Eighth International Symposium on Biology of Decision Making, Satellite workshop, Paris, France, May 24, 2018.
 59. Invited talk, Cognitive systems for non-specialists, Munich, Germany, March 14, 2018.
 60. Invited talk, Workshop on Mechanism of Brain and Mind, The Winter Workshop 2018 "Body control and self representation", Rusutsu, Japan, January 9, 2018.
 61. Invited talk, NBNi2017, Wako, Japan, November 17, 2017.
 62. Invited talk, Consciousness Research Network CoRN201, Taipei, Taiwan, November 3, 2017.
 63. Invited talk, RIKEN BSI Retreat, Omiya, Japan, October 31, 2017.
 64. Invited talk, Rebooting Matter and Memory Multidisciplinary Perspectives on Expanded Bergsonism, Tokyo, Japan, October 27, 2017.
 65. Invited talk, International Forum on Singularity: Exponential X, Kyoto, Japan, June 9, 2017.
 66. Invited lecture, ISSA Summer School 2017, Osaka, Japan, May 26, 2017.
 67. Invited lecture, Korean Society for Computational Neuroscience winter school 2017, Pohang, Korea, February 6-10, 2017.
 68. Invited talk, International Forum on Singularity: Exponential X, Kyoto, Japan, June 9, 2017.
 69. Invited lecture, ISSA Summer school 2017, Osaka, Japan, May 22 – June 02, 2017.
 70. Invited lecture, Kyoto Univ. Informatics Seminar, Kyoto, Japan, December 15, 2016.
 71. Invited talk, 2nd Joint UAE Symposium on Social Robotics, UAE, November 20-23, 2016.
 72. Invited lecture, Autumn School for Computational Neuroscience, Japan, November 3-6, 2016.
 73. Invited talk, IROS Workshop on Machine Learning Methods for High-Level Cognitive Capabilities in Robotics 2016 (ML-HLCR 2016), Daejeon, South Korea, October 14, 2016.
 74. Invited talk, Workshop on Bio-inspired Social Robot Learning in Home Scenarios at IEEE/RSJ IROS 2016, Daejeon, South Korea, October 10, 2016.
 75. Invited talk, International Symposium on Temporal Perception and Experience, Time in Tokyo, Tokyo, Japan, October 11, 2016.
 76. Invited lecture, National Center of Neurology and Psychiatry, Tokyo, Japan, August 24, 2016.
 77. Plenary talk, The 9th International Conference on Intelligent Robotics and Applications, Tokyo, August 24, 2016.
 78. Invited lecture, Artificial Intelligence Research Center, AIST, Tokyo, Japan, July 4, 2016.
 79. Invited talk, CFC symposium on “Illuminating neuronal circuits: development to function”, KIST, Seoul, South Korea, November 17, 2015.
 80. Invited seminar, Riken Brain Science Institute, Saitama, Japan, October 29, 2015.
 81. Invited talk, KAIST Brain & Cognitive Engineering Symposium, KAIST, South Korea, September 24, 2015.
 82. Invited lecture, Interdisciplinary College 2015, From Neuron to Person: Assembling Behavior and Cognition, Gunne, Germany, March 11-13, 2015.
 83. Invited talk, International Symposium on Cognitive Neuroscience Robotics, Osaka Univ., Japan, December 11, 2014.
 84. Invited lecture, KOFAC International Conference on Science & Creativity 2014, Seoul, South Korea, December 4-5, 2014.
 85. Invited talk at the symposium on robot consciousness at BICA 2014, MIT, Boston, USA, November 7-9, 2014.
 86. Keynote speech, The 24th Int. Conf. on Artificial Neural Networks (ICANN2014), Hamburg, Germany, September 15-19, 2014.
 87. Invited talk, A-talk series in Aldebaran Robotics, Paris, France, September 19, 2014.
 88. Invited talk, Korean-Swiss Science Days, Seoul, South Korea, October 7-8, 2014.
 89. Invited talk, Neurobiologically inspired robotics workshop, Hong Kong, June 5, 2014.
 90. Invited talk, Korean Society Cognitive Science Conference at Seoul National Univ., Symposium on “Embodied Mind”, Seoul, South Korea, May 24, 2014.
 91. Plenary talk, Japan Workshop on Emergent Intelligence on Networked Agents (JWEIN2013), Keio Univ., Yokohama, Japan, August 30-September 1, 2013.
 92. Invited seminar, Cognitive Science Colloquium, Seoul National University, South Korea, May 28, 2013.
 93. Invited talk, Robotics-Specialized Education Consortium (RoSEC) Winter School, Hanyang Univ,

- South Korea, January 10-12, 2013.
94. Invited talk, Artificial Cognitive Memory (ACM) workshop, Singapore, October 13, 2013.
 95. Plenary talk, First International Conference on Robot Intelligence Technology and Applications (RiTA 2012), Gwangju, South Korea, December 16-18, 2012.
 96. Invited talk, Humanoids 2012 Workshop on Developmental Robotics: Can developmental robotics yield human-like cognitive abilities?, Osaka, Japan, November 29, 2012.
 97. Invited talk, 12th China-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics, Korea University, Seoul, Korea, November 21-23, 2012.
 98. Invited seminar, Dept. of Computer Science and Engineering, POSTECH, Department Seminar, November 14, 2012.
 99. Keynote lecture, The 7th APCTP-KAIST School for Brain Dynamics: Young Computational Neuroscientist Workshop (2012), South Korea, November 25, 2012.
 100. Invited seminar at the distinguished seminar series, Dept. of Brain and Cognitive Engineering, Korea University, South Korea, October 26, 2012.
 101. Invited talk, Cognitive Neuroscience Workshop at IROS2012, Portugal, October 12, 2012.
 102. Invited seminar, Center of Human-friendly Robotics Based on Cognitive Neuroscience, Osaka Univ., Japan, April 2012.
 103. Invited talk, Workshop on "Cognitive Dynamics in Neural Systems: Mathematical and Computational Modeling", Lyon, France, March 29-30, 2012.
 104. Invited seminar at FIAS Colloquium, Frankfurt Institute for Advanced Studies, Germany, November 24, 2011.
 105. Invited seminar, The Life & Mind Seminar Network, University of Tokyo, November 14, 2011.
 106. Invited seminar at Honda Research Institute Europe, Germany, November 23, 2011.
 107. Invited talk at AAAI Workshop on Language-Action Tools for Cognitive Artificial Agents: Integrating Vision, Action and Language, San Francisco, USA, August 8, 2011, Generating cognitive behavior through top-down and bottom-up interaction in hierarchically organized cortical networks: neuro-robotics experiments.
 108. Invited talk at the 5th Workshop on the Anticipatory Behavior in Adaptive Learning Systems (ABIALS2010/11), Bielefeld, Germany, February 22, 2011, Generation of cognitive behavior through top-down and bottom-up interaction in hierarchical cortical networks: neuro-robotics experiments.
 109. Invited talk at Santa Barbara Workshop on Multi-level Integration organized by Michael Gazzaniga, Santa Barbara, USA, November 3, 2010, Emergence of functional hierarchy in multiple timescale neuronal network model.
 110. Invited talk at Workshop "Mirror Code for Social Interactions". Capri, Italy, June 29, 2010, An account for mirror neuron systems by generative models with functional hierarchy.
 111. Invited talk at the 2nd International Symposium on Computational Neuroscience "Phenomenology, Function, and Computation of Consciousness". Seoul, Korea, June 18, 2010, Autonomy of 'Self' at criticality: the perspective from synthetic neuro-robotics.
 112. Plenary talk at International Interdisciplinary Conference "Mirror Neurons: from Action to Empathy". Torun, Poland, April 16, 2010, Emergence of functional hierarchy: neuro-robotics experiments.
 113. Invited talk at Cognitive Robotics Research Methods Workshop, Plymouth, UK, March 9, 2010, Dynamical Systems.
 114. Invited talk at Joint Workshop on Neural Information Processing, Pyeongchang, Korea, January 21, 2010, Synthetic brain modeling studies via neuro-robotics experiments: from the sensory-motor processes to the high order cognitive processes.
 115. Invited talk at the 2nd bilateral German-Japanese Workshop, Berlin, Germany, May 27, 2009, Emergence of functional hierarchy, neuro-robotics experiments.
 116. Invited talk at Recent Advances in Neuro-Robotics Symposium, Freiburg, Germany, July 21, 2008, Achieving "Organic Compositionality" through self-organization: reviews on brain-inspired robotics experiments.
 117. Plenary talk at the 5th Six-Monthly euCognition Meeting, Munich, Germany, June 27, 2008, Toward "Organic Compositionality": neuro-dynamical systems accounts for cognitive behavior.
 118. Invited talk at Future of AI in Robotics Workshop, Gotenba, Japan, November 30, 2007, Brain

science for robotics.

119. Invited talk at IEEE-RAS/IFRR School of Robotics Science on Learning, Verona, Italy, September 27, 2007, Dynamical systems approach to robot learning.
120. Invited talk at the 9th European Conference on Artificial Life (ECAL07), Lisbon, Portugal, September 9, 2007, Co-developmental learning between human and humanoid robot through physical dynamic interactions.
121. Invited talk at International Conference on Morphological Computation (ICMC07), Venice, Italy, March 27, 2007, Toward “Organic Compositionality”: dynamical systems accounts for cognitive behaviors.
122. Invited talk at Honda International Symposium “Creating Brain-Like Intelligence”, Frankfurt, Germany, February 2, 2007, Brain-inspired robotics: a dynamical systems account for cognitive behavior.
123. Invited talk at International Symposium on Artificial Brain with Emotion and Learning (ISABEL2006), Seoul, Korea, August 24, 2006, Neuro-cognitive robotics: experiments, analysis and interpretations.
124. Plenary Talk at IEEE International Conference on Robotics and Automation (ICRA06), Orlando, U.S.A., May 17, 2006, Brain-inspired robotics: a dynamical systems account for cognitive behavior.

Issued Patents:

1. Tani, J, Nishimoto, R, & Ito, M. “Information processing apparatus, method, and program using recurrent neural networks”, US7877338, issued 2011.
2. Ito, M, Yoshiike, Y, Noda, K, & Tani, J. “Information processing apparatus and method, and program for teaching an action to a device in a time-series pattern”, US7814037, issued 2010.
3. Tani, J, Nishimoto, R, & Ito, M. “Information processing apparatus, information processing method, and program”, JP4388033, issued 2009.
4. Ito, M, & Tani, J. “Information processing apparatus and method, program storage medium and program”, US7373333, issued 2008.
5. Ito, M, & Tani, J. “Information processing apparatus and method”, US7324980, issued 2008.
6. Tani, J “Information processing apparatus and method, and recording medium”, US7089219, issued 2006.
7. Tani, J. “Data processing apparatus and method, recording medium, and program”, US6792413, issued 2004.
8. Tani, J. “Learning-type movement control apparatus, method therefor, and distribution medium therefor”, US6724364, issued 2004.
9. Tani, J. “Land mark recognition method for mobile robot navigation”, US5963663, issued 1999.
10. Tani, J. “Method of processing signals within a neural network to position a robot”, US5504841, issued 1996.
11. Niida, K, Koshijima, I, Tani, J, & Hirobe, T. “Method for recognition of abnormal conditions using neural networks”, US5402521, issued 1995.
12. Tani, J. “Neural network”, US5301257, issued 1994.

Recent Research Grants (since 2006):

1. National Research Foundation of Korea (NRF No. 2014R1A2A2A01005491), (2014-2016) 234 million won
2. Program (10044009) funded by the Korean Ministry of Trade, Industry and Energy, (2013-2014) 100 million won
3. US Air Force of Scientific Research, (AOARD 134067), (2013-2014) USD 39,941
4. Singapore-Korea Joint Research Grant, Institute for Infocomm Research, Singapore (2012-2014) USD 230,000
5. Korean Ministry of Education, Science, and Technology (2012K001342). (2012) 45 million won
6. RIKEN BSI Grants (2006-2011) JPY 364 million yen
7. RIKEN BSI Director’s Competition Fund (2010) JPY 18 million yen

8. RIKEN BSI Director's Competition Fund (2009) JPY 10.4 million yen
9. European Commission (FP7) Grant (ITALK) (2008-2011) EUR 28,800
10. Grants-in-Aid for Scientific Research on Innovative Areas No.22120523 (2010-2011) JPY 9.2 million yen
11. Grants-in-Aid for Scientific Research on Priority Areas No.454 (2008-2009) JPY 10.7 million yen
12. Grants-in-Aid for Scientific Research on Priority Areas No.454 (2006-2007) JPY 8.7 million yen