Curriculum Vitae

Name: Jun Tani, Dr. Eng.

Nationality: Japan

Affiliation:

Full Professor, Cognitive Neurorobotics Research Unit,
Okinawa Institute of Science and Technology Graduate University (OIST)
https://groups.oist.jp/cnru
Tel. +81 98-966-1655

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 ~
- IEEE Transactions on Autonomous Mental Development, Associate Editor, 2008 ~
- 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. 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*.
2. 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
3. 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.
4. Benureau, F. C., & Tani, J. (2020). Morphological Development at the Evolutionary Timescale: Robotic Developmental Evolution. *Alife*, 00: 1–19.
5. 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.
6. 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.
7. 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.
8. Chame H. F., Ahmadi A., & Tani, J. (2020). A Hybrid Human-Neurorobotics Approach to Primary Intersubjectivity via Active Inference. *Frontiers in Psychology,* 11, 584869.
9. Tani, J., & White, J. (2020). Cognitive neurorobotics and self in the shared world, a focused review of ongoing research. *Adaptive Behavior*, 1–20.
10. 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.
11. 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.
12. Matsumoto, T., & Tani, J. (2020). Goal-Directed Planning for Habituated Agents by Active Inference Using a Variational Recurrent Neural Network. *Entropy,* 22(5), 564.
13. 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.
14. 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.
15. Ahmadi, A., & Tani, J. (2019). A Novel Predictive-Coding-Inspired Variational RNN Model for Online Prediction and Recognition. *Neural Computation,* 31, 2025–2074.
16. 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.
17. 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.

18. 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.
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20. 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.
21. Tatsch, C., Ahmadi, A., Bottega. F., Tani, J., & da Silva Guerra, R. (2018). Dimitri: An Open-Source Humanoid Robot with Compliant Joints. J*ournal of Intelligent &Robotic Systems,* (91), 291–300.
22. 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.
23. 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.
24. 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.
25. Hwang, J., & Tani, J. (2017). Seamless Integration and Coordination of Cognitive Skills in Humanoid Robots: A Deep Learning Approach. *arXiv preprint arXiv:*1706.02423, DOI: 10.1109/TCDS.2017.2714170
26. 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.
27. 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
28. 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.
29. 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
30. 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.
31. 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
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33. 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
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35. 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
36. 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.
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tutoring. *IEEE Transactions on Autonomous Mental Development*, 5(4), 298-310, DOI: 10.1109/TAMD.2013.2258019
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39. Alnajjar, F., Yamashita, Y., & Tani, J. (2013). The Hierarchical and Functional Connectivity of Higher-order Cognitive Mechanisms: Neurorobotic Model to Investigate the Stability and Flexibility of Working Memory. *Frontiers in Neurorobotics*, Vol. 7, Article 2, February.
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41. Maniadakisa, M., Trahaniasa, P., & Tani, J. (2012). Self-organizing high-order cognitive functions in artificial agents: implications for possible prefrontal cortex mechanisms. *Neural Networks*, 33, 76-87.
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43. 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.
44. 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 tracheosyringealis in Bengalese finches (Lonchura striata var. domestica). *Neuroscience Research*, 71(4), 361-368.
45. Namikawa, J., Nishimoto, R., & Tani, J.(2011). A neurodynamic account of spontaneous behaviour", *PLoS Computational Biology*, Vol. 7, Issue 10, e1002221.
46. Rohlfing, K.J., &Tani, J. (2011). Grounding language in action. *IEEE Transactions on Autonomous Mental Development*, 3(2), 109-112.
47. 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.
48. Sugita, Y., Tani, J., & Butz, M.V. (2011). Simultaneously emerging braitenberg codes and compositionality. *Adaptive Behavior*, 19(5), 295-316.
49. 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.
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51. 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.
52. 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.
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54. Namikawa, J. & Tani, J. (2010). Learning to imitate stochastic time series in a compositional way by chaos. *Neural Networks*, 23, 625-638.
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56. Tani, J. (2009). Autonomy of 'Self' at criticality: The perspective from synthetic neuro-robotics. *Adaptive Behavior*, 17(5), 421-443.
57. 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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59. 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.
60. 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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62. Igari, I., & Tani, J. (2009). Incremental learning of sequence patterns with a modular network model. *Neurocomputing*, 72, 1910-1919.
63. Tani, J. (2008). Objectifying the subjective self: An account from a synthetic robotics approach. *Constructivist Foundations*, 4(1), 28-30.
64. 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.
65. 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.
66. 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.
67. Yamashita, Y., Takahashi, M., Okumura, T., Ikebuchi, M., Yamada, H., Suzuki, M., Okanoya, K., & Tani, J. (2008). Developmental learning of complex syntactical song in theBengalese finch: A neural network model. *Neural Networks*, 21, 1224-1231.
68. Tani, J., Nishimoto, R., & Paine, R.W. (2008). Achieving 'organic compositionality' through self-organization: Reviews on brain-inspired robotics experiments. *Neural Networks*, 21, 584-603.
69. Nishide, S., Ogata, T., Tani, J., Komatani, K., & Okuno, H.G. (2008). Predicting object dynamics from visual images through active sensing experiences. *Advanced Robotics*, 22(5), 527-546.
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72. Tani, J. (2007). On the interactions between top-down anticipation and bottom-up regression. *Frontiers in Neurorobotics*, Vol. 1, Article 2.
73. 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.
74. Yokoya, R., Ogata, T., Tani, J., Komatani, K., & Okuno, H.G. (2007). Experience-based imitation using RNNPB. *Advanced Robotics*, 21(12), 1351-1367.
75. Arie, H., Ogata, T., Tani, J., & Sugano, S. (2007). Reinforcement learning of a continuous motor sequence with hidden states. *Advanced Robotics, Special Issue on Robotic Platforms for Research in Neuroscience*, 21(10), 1215-1229.
76. Ito, M., Noda, K., Hoshino, Y., & Tani, J. (2006). Dynamic and interactive generation of object handling behaviors by a small humanoid robot using a dynamic neural network model. *Neural Networks*, 19, 323-337.
77. Tobari, Y., Okumura, T., Tani, T., & Okanoya, K. (2006). Non-singing female Bengalese Finches (Lonchura striata var. domestica) possess neuronal projections connecting a song learning region to a song motor region. *Ornithological Science*, 5, 47-55.
78. Ogata, T., Ohba, H., Tani, J., Komatani, K., & Okuno, H.G. (2005). Extracting multimodal dynamics of objects using RNNPB. *Journal of Robotics and Mechatronics*, 17(6), 681-688.
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Adaptive Behavior, 13(3), 211-225.
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86. Tani, J., Ito, M., & Sugita, Y. (2004). Self-organization of distributedly represented multiple behavior schemata in a mirror system: Reviews of robot experiments using RNNPB. *Neural Networks*, 17, 1273-1289.
87. Nishimoto, R., & Tani, J. (2004). Learning to generate combinatorial action sequences utilizing the initial sensitivity of deterministic dynamical systems. *Neural Networks*, 17, 925-933.
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91. Ikegami, T., & Tani, J. (2001). Chaotic itinerancy needs embodied cognition to explainmemory dynamics. *Behavioral and Brain Sciences*, 24(5), 818-819.
92. Tani, J., & Nolfi, S. (1998). Learning to perceive the world as articulated: an approach for hierarchical learning in sensory-motor systems. *Proc. 5th Int. Conf. on Simulation of Adaptive Behavior*, pp.270-279, (Eds) R. Pfeifer, B. Blumberg, J.A. Meyer, S.W. Wilson, MA: The MIT Press. The revised version is in *Neural Networks*, 12, 1131-1141, 1999.
93. 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. Han, D., Kozuno, T., Luo, X., Chen, Z. Y., Doya, K., Yang, Y., & Li, D. (2022). Variational oracle guiding for reinforcement learning. In *International Conference on Learning Representations*.
2. Lanillos, P., Meo, C., Pezzato, C., Meera, A. A., Baioumy, M., Ohata, W., Tschantz, A., Millidge, B., Wisse, M., Buckley, C. L., & Tani, J. (2021). Active Inference in Robotics and Artificial Agents: Survey and Challenges. *arXiv preprint arXiv:2112.01871*
3. Idei, H., Ohata, W. Yamashita, Y., Ogata, T., & Tani, J. (2021). Sensory attenuation develops as a result of sensorimotor experience. *arXiv preprint arXiv:2111.02666*.
4. Han, D., Doya, K., & Tani, J. (2020). Goal-Directed Planning by Reinforcement Learning and Active Inference. *arXiv preprint arXiv:2106.09938v2*.
5. Nikulin, V., & Tani, J. (2020). Efficient decomposition of latent representation in generative models. *2020 IEEE Symposium Series on Computational Intelligence (SSCI),* pp. 611-615, Canberra, Australia, December 1-4.
6. Han, D., Doya, K., & Tani, J. (2020). Variational recurrent models for solving partially observable control tasks. Accepted for presentation in *ICLR 2020*. *arXiv preprint arXiv:1912.10703v2.*
7. Chame, H. F., & Tani, J. (2020). Cognitive and motor compliance in intentional human-robot interaction. In *2020 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 11291-11297.
8. Chame, H. F., Ahmadi A., & Tani, J. (2020). Towards hybrid primary intersubjectivity: a neural robotics library for human science. *arXiv preprint arXiv:2006.15948v1.*
9. Ohata, W., & Tani, J. (2020). Investigation of Multimodal and Agential Interactions in Human-Robot Imitation, based on frameworks of Predictive Coding and Active Inference. *arXiv preprint arXiv:2002.01632.*
10. Jung, M., Matsumoto, T., & Tani, J. (2019). Goal-Directed Behavior under Variational Predictive Coding: Dynamic Organization of Visual Attention and Working Memory. *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* pp. 1040-1047, Macau, China, November 4-8.
11. Hwang, J., Wirkuttis, N., & Tani, J. (2019). A Neurorobotics Approach to Investigating the Emergence of Communication in Robots. *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI),* pp. 622-623.
12. Tani, J. (2019). Tani, J. (2019). Accounting for the Minimal Self and the Narrative Self: Robotics Experiments Using Predictive Coding. In *CEUR workshop proceedings* (Vol. 2287), *TOCAIS19 AAAI Spring Symposium "Towards conscious AI systems",* Stanford, USA, March 26.
13. Huang, J., & Tani, J. (2018). Visuomotor Associative Learning under the Predictive Coding Framework: a Neuro-robotics Experiment. In *The Proceedings of the 28th Annual Conference of the Japanese Neural Network Society (JNNS2018),* pp. 30-31, Okinawa, Japan, October 26.
14. Jung, M, & Tani, J. (2018). Adaptive Detrending for Accelerating the Training of Convolutional Recurrent Neural Networks. In *The Proceedings of the 28th Annual Conference of the Japanese Neural Network Society (JNNS2018),* pp. 48-49, Okinawa, Japan, October 25.
15. Matsumoto, T., Choi, M., Jung, M., & Tani, J. (2018). Generating Goal-directed Visuomotor Plans with Supervised Learning using a Predictive Coding Deep Visuomotor Recurrent Neural Network. In *The Proceedings of the 28th Annual Conference of the Japanese Neural Network Society (JNNS2018),* pp. 134-135, Okinawa, Japan, October 26.
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122. Tani, J., & Fukumura, N. (1993). Learning task-based behavior as attractor dynamics: an experiment of autonomous mobile robot. *Proc. Int. Symp. on Nonlinear Theory and Its Applications (NOLTA'93)*, 2, 431-434, Hawaii, USA.
123. Tani, J., & Fukumura, N. (1993). Learning goal-directed navigation as attractor dynamics for a sensory motor system: an experiment by the mobile robot YAMABICO". IEEE *Proc. Int. Joint Conf. on Neural Networks (IJCNN'93)*, pp. 1747-1753, Nagoya, Japan.
124. Tani, J. (1992). Diversity and regularity in chaotic wandering of robot. *Proc. 2nd Int. Conf. on Fuzzy Logic and Neural Networks*, pp. 127-132, Iizuka, Japan.

125. 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.
126. 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.
127. 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. 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.
2. Invited talk, Tani, J. Predictive coding and active inference framework for cognitive neurorobotics. *ECoGs seminar organized by Tom Froese (Online),* February 28, 2022.
3. Plenary talk, Tani, J. Cognitive Neurorobotics Study Using the Free Energy Principle. *FEP workshop (Online),* December 14, 2021.
4. 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.
5. 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.
6. Invited talk, Tani, J. Cognitive neurorobotic self in the shared world. *International Conference on Philosophy of Information ICPI 2021 (Online)*, September 18, 2021.
7. 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.
8. 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.
9. 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.
10. Invited talk, Tani, J. Understanding Embodied Cognition through Free Energy Minimization. *2021 International Workshop on Embodied Intelligence (Online)*, March 24, 2021.
11. 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.
12. Invited talk, Tani, J. Exploring minds using predictive coding and active inference frameworks. *1st SMILES workshop 2020 (Online)*, November 2, 2020.
13. 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.
14. 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.
15. Invited talk, Tani, J. Exploring robotic minds. *Mind & Life Europe summer research institute 2020, 'Grounding Knowledge in Uncertainty' (Online)*, Aug.10 -15, 2020.
16. 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.
17. 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.
18. Invited talk, Tani, J. Cognitive Neurorobotics Study Using Frameworks of Predictive Coding and Active Inference. BMW Group, Munich, Germany, December 17, 2019.

19. Invited talk, Institute for Cognitive Systems Technische Universität München, Munich, Germany, December 18, 2019.
20. 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.
21. 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.
22. 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.
23. Invited talk, Tani, J. Emergence in Neurorobotics Experimental Studies. *Riken Robotics Retreat*, Kyoto, Japan, September 13, 2019.
24. 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.
25. 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.
26. Invited talk, Tani, J. Generating goal-directed planning images using frameworks of predictive coding and active inference: Agency and object constancy. *NII Shonam Meeting, Language as Goal-Directed Sequential Behavior: Computational Theories, Brain Mechanisms, Evolutionary Roots*, Shonan, Japan, May 21, 2019.
27. 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.
28. Invited talk, NCM2019 Satellite Meeting, Toyama, Japan, April 23, 2019.
29. Invited talk, IRCN Neuro-inspired Computation Course, Tokyo, Japan, March 22, 2019.
30. Invited talk, SoAIR2019 JST-CREST/IEEE-RAS Spring School on “Social and Artificial Intelligence for User-Friendly Robots”, Shonan, Japan, March 19, 2019.
31. 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.
32. Invited talk, MEXT Grant-in-Aid for Scientific Research on Innovative Areas: Evolinguistics and OIST Joint Workshop, Okinawa, Japan, February 19, 2019.
33. 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.
34. Invited talk, Humboldt University, Berlin, Germany, September 26, 2018.
35. Invited talk, Bernstein Conference 2018 Satellite Workshops, Berlin, Germany, September 26, 2018.
36. Keynote talk, Workshop for the Synthetic Approach to Biology and the Cognitive Sciences, ALIFE2018, Tokyo, Japan, July 25, 2018.
37. Invited talk, Eighth International Symposium on Biology of Decision Making, Satellite workshop, Paris, France, May 24, 2018.
38. Invited talk, Cognitive systems for non-specialists, Munich, Germany, March 14, 2018.
39. Invited talk, Workshop on Mechanism of Brain and Mind, The Winter Workshop 2018 "Body control and self representation", Rusutsu, Japan, January 9, 2018.
40. Invited talk, NBNI2017, Wako, Japan, November 17, 2017.
41. Invited talk, Consciousness Research Network CoRN201, Taipei, Taiwan, November 3, 2017.
42. Invited talk, RIKEN BSI Retreat, Omiya, Japan, October 31, 2017.
43. Invited talk, Rebooting Matter and Memory Multidisciplinary Perspectives on Expanded Bergsonism, Tokyo, Japan, October 27, 2017.
44. Invited talk, International Forum on Singularity: Exponential X, Kyoto, Japan, June 9, 2017.

45. Invited lecture, ISSA Summer School 2017, Osaka, Japan, May 26, 2017.
46. Invited lecture, Korean Society for Computational Neuroscience winter school 2017, Pohang, Korea, February 6-10, 2017.
47. Invited talk, International Forum on Singularity: Exponential X, Kyoto, Japan, June 9, 2017.
48. Invited lecture, ISSA Summer school 2017, Osaka, Japan, May 22 – June 02, 2017.
49. Invited lecture, Kyoto Univ. Informatics Seminar, Kyoto, Japan, December 15, 2016.
50. Invited talk, 2nd Joint UAE Symposium on Social Robotics, UAE, November 20-23, 2016.
51. Invited lecture, Autumn School for Computational Neuroscience, Japan, November 3-6, 2016.
52. 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.
53. Invited talk, Workshop on Bio-inspired Social Robot Learning in Home Scenarios at IEEE/RSJ IROS 2016, Daejeon, South Korea, October 10, 2016.
54. Invited talk, International Symposium on Temporal Perception and Experience, Time in Tokyo, Tokyo, Japan, October 11, 2016.
55. Invited lecture, National Center of Neurology and Psychiatry, Tokyo, Japan, August 24, 2016.
56. Plenary talk, The 9th International Conference on Intelligent Robotics and Applications, Tokyo, August 24, 2016.
57. Invited lecture, Artificial Intelligence Research Center, AIST, Tokyo, Japan, July 4, 2016.
58. Invited talk, CFC symposium on "Illuminating neuronal circuits: development to function", KIST, Seoul, South Korea, November 17, 2015.
59. Invited seminar, Riken Brain Science Institute, Saitama, Japan, October 29, 2015.
60. Invited talk, KAIST Brain & Cognitive Engineering Symposium, KAIST, South Korea, September 24, 2015.
61. Invited lecture, Interdisciplinary College 2015, From Neuron to Person: Assembling Behavior and Cognition, Gunne, Germany, March 11-13, 2015.
62. Invited talk, International Symposium on Cognitive Neuroscience Robotics, Osaka Univ., Japan, December 11, 2014.
63. Invited lecture, KOFAC International Conference on Science & Creativity 2014, Seoul, South Korea, December 4-5, 2014.
64. Invited talk at the symposium on robot consciousness at BICA 2014, MIT, Boston, USA, November 7-9, 2014.
65. Keynote speech, The 24th Int. Conf. on Artificial Neural Networks (ICANN2014), Hamburg, Germany, September 15-19, 2014.
66. Invited talk, A-talk series in Aldebaran Robotics, Paris, France, September 19, 2014.
67. Invited talk, Korean-Swiss Science Days, Seoul, South Korea, October 7-8, 2014.
68. Invited talk, Neurobiologically inspired robotics workshop, Hong Kong, June 5, 2014.
69. Invited talk, Korean Society Cognitive Science Conference at Seoul National Univ., Symposium on "Embodied Mind", Seoul, South Korea, May 24, 2014.
70. Plenary talk, Japan Workshop on Emergent Intelligence on Networked Agents (JWEIN2013), Keio Univ., Yokohama, Japan, August 30-September 1, 2013.
71. Invited seminar, Cognitive Science Colloquium, Seoul National University, South Korea, May 28, 2013.
72. Invited talk, Robotics-Specialized Education Consortium (RoSEC) Winter School, Hanyang Univ, South Korea, January 10-12, 2013.
73. Invited talk, Artificial Cognitive Memory (ACM) workshop, Singapore, October 13, 2013.
74. Plenary talk, First International Conference on Robot Intelligence Technology and Applications (RiTA 2012), Gwangju, South Korea, December 16-18, 2012.
75. Invited talk, Humanoids 2012 Workshop on Developmental Robotics: Can developmental robotics yield human-like cognitive abilities?, Osaka, Japan, November 29, 2012.
76. Invited talk, 12th China-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics, Korea University, Seoul, Korea, November 21-23, 2012.
77. Invited seminar, Dept. of Computer Science and Engineering, POSTECH, Department Seminar, November 14, 2012.
78. Keynote lecture, The 7th APCTP-KAIST School for Brain Dynamics: Young Computational Neuroscientist Workshop (2012), South Korea, November 25, 2012.

79. Invited seminar at the distinguished seminar series, Dept. of Brain and Cognitive Engineering, Korea University, South Korea, October 26, 2012.
80. Invited talk, Cognitive Neuroscience Workshop at IROS2012, Portugal, October 12, 2012.
81. Invited seminar, Center of Human-friendly Robotics Based on Cognitive Neuroscience, Osaka Univ., Japan, April 2012.
82. Invited talk, Workshop on "Cognitive Dynamics in Neural Systems: Mathematical and Computational Modeling", Lyon, France, March 29-30, 2012.
83. Invited seminar at FIAS Colloquium, Frankfurt Institute for Advanced Studies, Germany, November 24, 2011.
84. Invited seminar, The Life & Mind Seminar Network, University of Tokyo, November 14, 2011.
85. Invited seminar at Honda Research Institute Europe, Germany, November 23, 2011.
86. 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.
87. 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.
88. 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.
89. 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.
90. 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.
91. Plenary talk at International Interdisciplinary Conference “Mirror Neurons: from Action to Empathy”. Torun, Poland, April 16, 2010, Emergence of functional hierarchy: neuro-robotics experiments.
92. Invited talk at Cognitive Robotics Research Methods Workshop, Plymouth, UK, March 9, 2010, Dynamical Systems.
93. 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.
94. Invited talk at the 2nd bilateral German-Japanese Workshop, Berlin, Germany, May 27, 2009, Emergence of functional hierarchy, neuro-robotics experiments.
95. 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.
96. Plenary talk at the 5th Six-Monthly euCognition Meeting, Munich, Germany, June 27, 2008, Toward “Organic Compositionality”: neuro-dynamical systems accounts for cognitive behavior.
97. Invited talk at Future of AI in Robotics Workshop, Gotenba, Japan, November 30, 2007, Brain science for robotics.
98. Invited talk at IEEE-RAS/IFRR School of Robotics Science on Learning, Verona, Italy, September 27, 2007, Dynamical systems approach to robot learning.
99. 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.
100. Invited talk at International Conference on Morphological Computation (ICMC07), Venice, Italy, March 27, 2007, Toward “Organic Compositionality”: dynamical systems accounts for cognitive behaviors.
101. 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.

102. 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.
103. Plenary Talk at IEEE International Conference on Robotics and Automation (ICRA06), Orland, 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