

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:

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

2012-Current 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.: “Exploring Robotic Minds: Actions, Symbols, and Consciousness as Self-Organizing Dynamic Phenomena”, *Oxford University Press*, in press in 2016.

Journal Papers

1. White J., Tani J.: “From biological to synthetic neurorobotics approaches to understanding the structure essential to consciousness. (part 1)”, *American Philosopher Association Newsletter*, in press.
2. Park, G., & Tani, J.: “Development of compositional and contextual communicable congruence in robots by using dynamic neural network models”, *Neural Networks*, Vol. 72, pp109-122, 2015.
3. Murata, S., Yamashita, Y., Arie, H., Ogata, T., Sugano, S., & Tani, J.: “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*, published Online DOI: 10.1109/TNNLS.2015.2492140, 2015.
4. Jung, M., Hwang, J., & Tani, J.: “Self-organization of spatio-temporal hierarchy via learning of dynamic visual image patterns on action sequences”, *PLoS One*, 10(7): e0131214.
5. Tani J., Friston K., Haykin S.: “Further Thoughts on the paper by Tani: Self-Organization and Compositionality in Cognitive Brains”, *Proceedings of the IEEE*, Special Issue on Cognitive Dynamic Systems, Vol. 102, no. 4, pp. 606—607, 2014.
6. Tani J.: “Self-Organization and Compositionality in Cognitive Brains: A Neuro-Robotics Study,” *Proceedings of the IEEE*, Special Issue on Cognitive Dynamic Systems, Vol. 102, no. 4, pp. 586—605, 2014.
7. Murata S., Namikawa J., Arie H., Sugano S., Tani J.: “Learning to Generate Proactive and Reactive Behavior Using a Dynamic Neural Network Model with Time-Varying Variance Prediction Mechanism”, *Advanced Robotics*, Online publication, Vol. 28, Issue 17, pp.1189-1203, 2014.
8. Komatsu M., Namikawa J., Chao Z., Nagasaka Y., Fujii N., Nakamura K., Tani J.: “An artificial network model for estimating the network structure underlying partially observed neuronal Signals, *Neuroscience Research*, Vol. 81-82, pp 69-77, 2014
9. Murata S., Namikawa J., Arie H., Sugano S., Tani J.: ”Learning to reproduce fluctuating time series by inferring their time-dependent stochastic properties: application in robot learning via tutoring”, *IEEE Trans. on Autonomous Mental Development*, Vol. 5, No 4, pp. 298—310, 2013.
10. Jeong S., Park Y., Mallipeddia P., Tani J., Lee M.: “Goal-oriented Behavior Sequence Generation based on Semantic Commands using Multiple Timescales Recurrent Neural Network with Initial State Correction”, *Neurocomputing*, Available online, 4 November 2013.
11. Alnajjar F., Yamashita Y., Tani J.: “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 2013.
12. Yamashita Y., Tani J.: “Spontaneous Prediction Error Generation in Schizophrenia”, *PLoS One*, 7(5): e37843. doi:10.1371/journal.pone.0037843, 2012
13. Maniadakisa M., Trahaniasa P., Tani J.: “Self-organizing high-order cognitive functions in artificial agents: implications for possible prefrontal cortex mechanisms”, *Neural Networks*, Vol. 33, pp. 76—87, 2012
14. Nishide S., Tani J., Takahashi T., Okuno H.G., Ogata T.: "Tool-Body assimilation of humanoid robot using neuro-dynamical system", *IEEE Trans. on Autonomous Mental Development*, Vol. 14, pp. 139—149, 2012.
15. Arie H., Arakaki T., Sugano S., Tani J.: "Imitating others by composition of primitive actions: a neuro-dynamic model", *Robotics and Autonomous Systems*, Vol.60, pp.729-741, 2012.
16. Namikawa J., Nishimoto R., Tani J.: “A neurodynamic account of spontaneous behaviour”, *PLoS Computational Biology*, Vol. 7, Issue 10, e1002221, 2011

17. Jeong S., Arie H., Lee M., Tani J.: "Neuro-robotics study on integrative learning of proactive visual attention and motor behaviors", *Cognitive Neurodynamics*, Published online Oct. 08, 2011
18. Tobari Y., Okumura T., Tani J., and Okanoya K.: "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*, Vol.71, Issue 4, pp 361–368, 2011
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21. Hinoshita W., Arie H., Tani J., Okuno H. and Ogata T.: "Emergence of hierarchical structure mirroring linguistic composition in a recurrent neural network", *Neural Networks*, Vol.24, pp.311-320, 2011.
22. Nishide S., Tani J., Okuno H.G. and Ogata T.: "Towards written text recognition based on handwriting experiences using recurrent neural network", *Advanced Robotics*, Vol.25, No.17, pp2173-2187,2011.
23. Rohlfing K.J., Tani T.: "Grounding language in action.", *IEEE Transactions on Autonomous Mental Development*, Vol.3, No.2, pp.109-112, 2011
24. Namikawa J. and Tani J.: "Learning to imitate stochastic time series in a compositional way by chaos", *Neural Networks*, Vol.23, pp.625-638, 2010.
25. Tani J.: "Studies of symbols from 'Robot Science' ", *Journal of the Robotics Society of Japan*, Vol.28, No.4, pp.522-531, 2010.
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28. Tani J.: "Autonomy of 'Self' at criticality: The perspective from synthetic neuro-robotics. *Adaptive Behavior*, Vol.17, No.5, pp.421-443, 2009.
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- J.: “Developmental learning of complex syntactical song in the Bengalese finch: A neural network model”, *Neural Networks*, Vol.21, pp.1224-1231, 2008.
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70. Tani J., Fukumura N.: "Learning goal-directed sensory-based navigation of a mobile robot", *Neural Networks*, Vol.7, No.3, pp.553-563, 1994.
71. Tani J., Fujita M.: "Coupling of memory search and mental rotation by a nonequilibrium dynamics neural network", *IEICE Trans. Fundamentals*, Vol.E75-A, No.5, pp.578-585, 1992.
72. Tani J., "Proposal of chaotic steepest descent method for neural networks and analysis of their dynamics", *Electronics and Communications in Japan*, Part 3, Vol.75, No.4, pp.62-70, 1992.

International Conference Proceedings and Book Chapters

1. Jung M., Hwang J., Tani J.: "Multiple Spatio-Temporal Scales Neural Network for Contextual Visual Recognition of Human Actions", Proc. of the Fourth Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-Epirob2014), Genoa, Italy, pp. 227-233, October 2014.
2. Murata S., Yamashita Y., Arie H., Ogata T., Tani J., Sugano S., "Generation of Sensory Reflex Behavior versus Intentional Proactive Behavior in Robot Learning of Cooperative Interactions with Others," In Proceedings of the Fourth Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EpiRob 2014), Genoa, Italy, pp.234-240, October 2014.
3. Tan B.H., Tang H., Yan R., Tani, J.: "A Flexible and Robust Robotic Arm Design and Skill Learning by Using Recurrent Neural Networks", In Proc. of IEEE Int. Conf. on Intelligent Robots and Systems (IROS2014), pp.522-529, September 2014.
4. Murata S., Arie H., Ogata T., Tani J., Sugano S.: "Learning and Recognition of Multiple Fluctuating Temporal Patterns Using S-CTRNN," The 24th International Conference on Artificial Neural Networks (ICANN 2014), Hamburg, Germany, p9-16, September 2014.
5. Tani J., Maniadakis M., Paine RW.: "Understanding Higher-Order Cognitive Brain Mechanisms by Conducting Evolutional Neuro-robotics Experiments", In *The Horizons of Evolutionary Robotics*, ed., P.A. Vargas, E.A. Di Paolo, I. Harvey and P. Husband, MIT Press, p.219-236, 2014.

6. Murata S., Namikawa J., Arie H., Tani J., Sugano S.: "Development of Proactive and Reactive Behavior via Meta-Learning of Prediction Error Variance," The 20th International Conference on Neural Information Processing, Daegu, Korea, pp. 537-544, November 2013.
7. Murata S., Namikawa J., Arie H., Tani J., and Sugano H.: "Learning to Reproduce Fluctuating Behavioral Sequences Using a Dynamic Neural Network Model with Time-Varying Variance Estimation Mechanism," The Third Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics, Osaka, Japan, pp. 1-6, August 2013.
8. Nishide S., Tani J., Okuno H.G., Ogata T.: "Self-organization of Object Features Representing Motion Using Multiple Timescales Recurrent Neural Network", Proc. of Int. Joint. Conf. of Neural Networks (IJCNN2012), June 2012.
9. Komatsu M., Namikawa J., Tani J., Chao C.Z., Nagasaka Y., Fujii N., Nakamura K.: "Estimation of functional brain connectivity from electrocorticograms using an artificial network model", Proc. of Int. Joint. Conf. of Neural Networks (IJCNN2012), June 2012.
10. Alnajjar F., Yamashita Y., Tani J.: "Formulating a Cognitive Branching Task by MTRNN:A Robotic Neuroscience Experiments to Simulate the PFC and its Neighboring Regions", Advances in Cognitive Neurodynamics (III): Proceedings of the Third International Conference on Cognitive Neurodynamics , pp. 267-274, 2011.
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14. Peniak M., Marocco D., Tani J., Yamashita Y., Fischer K., Cangelosi A.: "Multiple time scales recurrent neural network for complex action acquisition", *Proc. IEEE Int. Conf. on Development and Learning and Epigenetic Robotics (ICDL-EpiRob)*, Frankfurt, Germany, 2011, in press.
15. Nishide S., Tani T., Okuno H.G., Ogata T.: "Handwriting prediction based character recognition using recurrent neural network", *2011 IEEE Int. Conf. on Systems, Man, and Cybernetics*, Anchorage, USA, pp. 2549-2554, October, 2011.
16. Nishimoto, R., Tani, J.: Schemata Learning. In *Perception-Action Cycle* (pp. 219-241). Springer New York, 2011
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18. Awano H., Nishide S., Arie H., Tani J., Takahashi T., Okuno H.G., Ogata T.: "Use of a sparse structure to improve learning performance of recurrent neural networks", *Lecture Notes in Computer Science*, Vol.7064, pp.323-331, 2011; *Proc. 18th Int. Conf, ICONIP 2011*, Shanghai, China, November, 2011.
19. Nishide S., Ogata T., Tani J., Takahashi T., Komatani K., Okuno HG.: "Motion generation based on reliable predictability using self-organized object features", *Proc. IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS2010)*, Taipei, Taiwan, pp.3453-3458, 2010.
20. Arie H., Endo T., Jeong S., Lee M., Sugano S., Tani J.: "Integrative learning between language and action: a neuro-robotics experiment", *Lecture Notes in Computer Science*, Vol.6353, pp. 256-265: *Proc. 20th Int. Conf. on Artificial Neural Networks (ICANN2010)*, Thessaloniki, Greece, 2010.
21. Jeong S., Lee M., Arie H., Tani J.: "Developmental learning of integrating visual attention shifts and bimanual object grasping and manipulation tasks", *Proc. IEEE 9th Int. Conf. on Development and Learning (ICDL2010)*, Ann Arbor, USA, pp.165-170, 2010.
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 86. Tani J.: "Embedding symbolic process into deterministic chaos", *Proc. Biologically Inspired Evolutionary Systems (BIES95)*, Tokyo, Japan, pp.156-162, 1995.
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 93. Tani J.: "The role of chaos in processing language", *IEEE Proc. Int. Joint Conf. on Neural Networks (IJCNN'92)*, Vol. 3, pp. 444-449, Baltimore, USA, 1992.
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Recent Talks and Seminars (since 2006):

1. Invited talk, CFC symposium on “Illuminating neuronal circuits: development to function”, KIST, Seoul, South Korea, Nov. 17, 2015
2. Invited seminar, Riken Brain Science Institute, Saitama, Japan, Oct. 29, 2015
3. Invited talk, KAIST Brain & Cognitive Engineering Symposium, KAIST, South Korea, Sept. 24, 2015
4. Invited lecture, Interdisciplinary College 2015, From Neuron to Person: Assembling Behavior and Cognition, Gunne, German, March 11-13, 2015.
5. Invited talk, International Symposium on Cognitive Neuroscience Robotics, Osaka Univ., Japan, Dec. 11, 2014
6. Invited lecture, KOFAC International Conference on Science & Creativity 2014, Seoul, South Korea, Dec. 4-5, 2014.
7. Invited talk at the symposium on robot consciousness at BICA 2014, MIT, Boston, USA, November 7-9, 2014
8. Keynote speech, The 24th Int. Conf. on Artificial Neural Networks (ICANN2014), Hamburg, German, September 15-19, 2014.
9. Invited talk, A-talk series in Aldebaran Robotics, Paris, France, September 19, 2014.
10. Invited talk, Korean-Swiss Science Days, Seoul, South Korea, October 7-8, 2014.
11. Invited talk, Neurobiologically inspired robotics workshop, Hong Kong, (June 5, 2014)
12. Invited talk, Korean Society Cognitive Science Conference at Seoul National Univ., Symposium on “Embodied Mind”, Seoul, South Korea (May 24, 2014)
13. Plenary talk, Japan Workshop on Emergent Intelligence on Networked Agents (JWEIN2013), Keio Univ., Yokohama, Japan (2013, Aug. 30-Sept.1)
14. Invited seminar, Cognitive Science Colloquium, Seoul National University, South Korea (2013, May 28)
15. Invited talk, Robotics-Specialized Education Consortium (RoSEC) Winter School, Hanyang Univ, South Korea (2013, Jan10-12)
16. Invited talk, Artificial Cognitive Memory (ACM) workshop, Singapore (2013, Oct.13)
17. Plenary talk, First International Conference on Robot Intelligence Technology and Applications (RiTA 2012), Gwangju, South Korea (2012, Dec 16-18)
18. Invited talk, Humanoids 2012 Workshop on Developmental Robotics: Can developmental robotics yield human-like cognitive abilities?, Osaka, Japan (2012, Nov 29)
19. Invited talk, 12th China-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics, November 21-23, Korea University, Seoul, Korea (Nov 21-23)
20. Invited seminar, Dept. of Computer Science and Engineering, POSTECH, Department Seminar, (2012, Nov 14)
21. Keynote lecture, The 7th APCTP-KAIST School for Brain Dynamics: Young Computational Neuroscientist Workshop (2012), South Korea (2012, Nov.25)
22. Invited seminar at the distinguished seminar series, Dept. of Brain and Cognitive Engineering, Korea University, South Korea (2012, Oct 26)
23. Invited talk, Cognitive Neuroscience Workshop at IROS2012, Portugal (2012, Oct 12)
24. Invited seminar, Center of Human-friendly Robotics Based on Cognitive Neuroscience, Osaka Univ., Japan (2012, April)
25. Invited talk, Workshop on "Cognitive Dynamics in Neural Systems: Mathematical and Computational Modeling", Lyon, France (2012 March 29-30)
26. Invited seminar at FIAS Colloquium, Frankfurt Institute for Advanced Studies, German (2011, Nov. 24)
27. Invited seminar, The Life & Mind Seminar Network, University of Tokyo (2011, Nov. 14)
28. Invited seminar at Honda Research Institute Europe, German, (2011, Nov. 23)
29. Invited talk at AAI Workshop on Language-Action Tools for Cognitive Artificial Agents: Integrating Vision, Action and Language, San Francisco, USA (2011, 8.08), Generating cognitive behavior through top-down and bottom-up interaction in hierarchically organized cortical networks: neuro-robotics experiments.

30. Invited talk at the 5th Workshop on the Anticipatory Behavior in Adaptive Learning Systems (ABIALS2010/11), Bielefeld, Germany (2011, 2.22), Generation of cognitive behavior through top-down and bottom-up interaction in hierarchical cortical networks: neuro-robotics experiments.
31. Invited talk at Santa Barbara Workshop on Multi-level Integration organized by Michael Gazzaniga, Santa Barbara, USA (2010, 11.03), Emergence of functional hierarchy in multiple timescale neuronal network model.
32. Invited talk at Workshop “Mirror Code for Social Interactions”. Capri, Italy (2010, 6.29), An account for mirror neuron systems by generative models with functional hierarchy.
33. Invited talk at the 2nd International Symposium on Computational Neuroscience “Phenomenology, Function, and Computation of Consciousness”. Seoul, Korea (2010, 6.18), Autonomy of ‘Self’ at criticality: the perspective from synthetic neuro-robotics.
34. Plenary talk at International Interdisciplinary Conference “Mirror Neurons: from Action to Empathy”. Torun, Poland (2010, 4.16), Emergence of functional hierarchy: neuro-robotics experiments.
35. Invited talk at Cognitive Robotics Research Methods Workshop, Plymouth, UK (2010, 3.09), Dynamical Systems.
36. Invited talk at Joint Workshop on Neural Information Processing, Pyeongchang, Korea (2010, 1.21), Synthetic brain modeling studies via neuro-robotics experiments: from the sensory-motor processes to the high order cognitive processes.
37. Invited talk at the 2nd bilateral German-Japanese Workshop, Berlin, Germany (2009.5.27), Emergence of functional hierarchy, neuro-robotics experiments.
38. Invited talk at Recent Advances in Neuro-Robotics Symposium, Freiburg, Germany (2008.7.21), Achieving “Organic Compositionality” through self-organization: reviews on brain-inspired robotics experiments.
39. Plenary talk at the 5th Six-Monthly euCognition Meeting, Munich, Germany (2008.6.27), Toward “Organic Compositionality”: neuro-dynamical systems accounts for cognitive behavior.
40. Invited talk at Future of AI in Robotics Workshop, Gotenba, Japan (2007.11.30), Brain science for robotics.
41. Invited talk at IEEE-RAS/IFRR School of Robotics Science on Learning, Verona, Italy (2007.9.27), Dynamical systems approach to robot learning.
42. Invited talk at the 9th European Conference on Artificial Life (ECAL07), Lisbon, Portugal (2007.9.09), Co-developmental learning between human and humanoid robot through physical dynamic interactions.
43. Invited talk at International Conference on Morphological Computation (ICMC07), Venice, Italy (2007.3.27), Toward “Organic Compositionality”: dynamical systems accounts for cognitive behaviors.
44. Invited talk at Honda International Symposium “Creating Brain-Like Intelligence”, Frankfurt, Germany (2007.2.2), Brain-inspired robotics: a dynamical systems account for cognitive behavior.
45. Invited talk at International Symposium on Artificial Brain with Emotion and Learning (ISABEL2006), Seoul, Korea (2006.8.24), Neuro-cognitive robotics: experiments, analysis and interpretations.
46. Plenary Talk at IEEE International Conference on Robotics and Automation (ICRA06), Orland, U.S.A. (2006.5.17), 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
2. RIKEN BSI Director's Competition Fund (2010) JPY 18 million yen
3. RIKEN BSI Director's Competition Fund (2009) JPY 10.4 million yen
4. European Commission (FP7) Grant (ITALK) (2008-2011) EUR 28,800
5. Grants-in-Aid for Scientific Research on Innovative Areas No.22120523 (2010-2011) JPY 9.2 million yen
6. Grants-in-Aid for Scientific Research on Priority Areas No.454 (2008-2009) JPY 10.7 million yen
7. Grants-in-Aid for Scientific Research on Priority Areas No.454 (2006-2007) JPY 8.7 million yen