

# Yoonsuck Choe

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## 1 Current Appointment

**Associate Professor**, Department of Computer Science and Engineering, Texas A&M University. September 2007–Present

**Assistant Professor**, Department of Computer Science, Texas A&M University. September 2001–August 2007

## 2 Education

- **Ph.D.:** Department of Computer Sciences, The University of Texas at Austin (August 2001)  
Dissertation Title: *Perceptual Grouping in a Self-Organizing Map of Spiking Neurons*. Dissertation Advisor: Prof. Risto Miikkulainen.
- **M.A.:** Department of Computer Sciences, The University of Texas at Austin (December 1995)  
Thesis Title: *Laterally Interconnected Self-Organizing Feature Map in Handwritten Digit Recognition*. Thesis Advisor: Prof. Risto Miikkulainen.
- **B.S.:** Department of Computer Science, Yonsei University, Seoul, Korea (August 1993)  
Report Title: *Visual Programming Using SmallTalk*. Advisor: Prof. Joo S. Song.

## 3 Research Interests

- Computational neuroscience: development, temporal aspects, internal states, analogy
- Neural networks and neuroevolution
- Computational neuroanatomy and neuroinformatics: reconstruction, visualization, statistical analysis
- Biologically motivated vision and image processing
- Microscopy instrumentation and automation

## 4 Experience

### 4.1 Academic Research:

**Head**, Neural Intelligence Laboratory, Department of Computer Science, Texas A&M University.

- See the research interests section above and the publications section.
- Duration: 9/2001–present.

**Director**, Brain Networks Laboratory, Department of Computer Science, Texas A&M University.

- See the research interests section above and the publications section.
- Duration: 9/2001–present (member), 9/2005–present (director).

**Research Assistant**, Department of Computer Sciences, The University of Texas at Austin.

- Supervising Professor: Prof. Risto Miikkulainen.
- Projects:

- Contour integration in a self-organizing map of spiking neurons. Statistical analysis of functional connection properties.
  - Effect of normalization in binding and segmentation.
  - Orientation map of spiking neurons and object segmentation.
  - Topographical map of spiking neurons and object segmentation.
- Duration: 6/1996–8/1996; 6/1997–8/1997; 6/1998–5/1999; 11/1999–1/2001.

**Research Assistant**, Department of Chemical Engineering, The University of Texas at Austin.

- Supervising Professor: Prof. Roger Bonnacaze.
- Project: Operating system analysis and administration.
- Duration: 6/1995–5/1996.

## 4.2 Industrial Research

**Intern**, Exploratory Research & Development Group, Advanced Technology Division, HNC Inc. San Diego (now merged with Fair Isaac).

- Supervisors: Dr. Marc Ilgen and Dr. Joseph Sirosh.
- Project: Text-to-image retrieval system in C, Tcl/Tk, and SWIG using context vectors for text representation and hierarchical self-organizing maps for image representation (DARPA CVIM Project).
- Duration: 6/1999–10/1999.

**Database Programmer/Consultant**, Doping Control Center, Korea Institute of Science and Technology.

- Supervisor: Dr. Jong-Sei Park.
- Projects: Development of research project management system and scientific bibliography management system.
- Duration: 12/1992–5/1993.

## 5 Publications

### 5.1 Books

1. Lee, K., and **Choe, Y.** (2011). *Elements of Computer Science*. Seoul, Korea: KNOU Press. In Korean. 393 pages.
2. Miikkulainen, R., Bednar, J. A., **Choe, Y.**, and Sirosh, J. (2005). *Computational Maps in the Visual Cortex*. Berlin: Springer. URL: <http://www.computationalmaps.org>.
3. Sirosh, J., Miikkulainen, R., and **Choe, Y.**, editors (1996). *Lateral Interactions in the Cortex: Structure and Function*. Austin, TX: The UTCS Neural Networks Research Group. Electronic book, ISBN 0-9647060-0-8, <http://www.cs.utexas.edu/users/nn/web-pubs/htmlbook96>.

## 5.2 Journals

4. **Choe, Y.**, Kwon, J., and Chung, J. R. (2012). Time, consciousness, and mind uploading. *International Journal on Machine Consciousness*, 4:xxx–xxx. In press.
5. **Choe, Y.**, Mayerich, D., Kwon, J., Miller, D. E., Sung, C., Chung, J. R., Huffman, T., Keyser, J., and Abbott, L. C. (2011). Specimen preparation, imaging, and analysis protocols for knife-edge scanning microscopy. *Journal of Visualized Experiments*, 58:e3248. doi: 10.3791/3248.
6. Chung, J. R., and **Choe, Y.** (2011). Emergence of memory in reactive agents equipped with environmental markers. *IEEE Transactions on Autonomous Mental Development*, 3:257–271.
7. Chung, J. R., Sung, C., Mayerich, D., Kwon, J., Miller, D. E., Huffman, T., Abbott, L. C., Keyser, J., and **Choe, Y.** (2011). Multiscale exploration of mouse brain microstructures using the knife-edge scanning microscope brain atlas. *Frontiers in Neuroinformatics*, 5:29.
8. Mayerich, D., Kwon, J., Sung, C., Abbott, L. C., Keyser, J., and **Choe, Y.** (2011). Fast macro-scale transmission imaging of microvascular networks using kesm. *Biomedical Optics Express*, 2:2888–2896.
9. Kwon, J., and **Choe, Y.** (2009). Facilitating neural dynamics for delay compensation: A road to predictive neural dynamics?. *Neural Networks*, 22:267–276.
10. Lim, H., and **Choe, Y.** (2008). Extrapolative delay compensation through facilitating synapses and its relation to the flash-lag effect. *IEEE Transactions on Neural Networks*, 19:1678–1688.
11. Xiong, H., and **Choe, Y.** (2008a). Dynamic pathway analysis. *BMC Systems Biology*, 2:9. 17 pages (online open-access journal).
12. Xiong, H., and **Choe, Y.** (2008b). Structural systems identification of genetic regulatory networks. *Bioinformatics*, 24:553–560.
13. Yu, Y., and **Choe, Y.** (2008). Neural model of disinhibitory interactions in modified Poggendorff illusion. *Biological Cybernetics*, 98:75–85.
14. **Choe, Y.**, Yang, H.-F., and Eng, D. C.-Y. (2007). Autonomous learning of the semantics of internal sensory states based on motor exploration. *International Journal of Humanoid Robotics*, 4:211–243.
15. Oh, S., and **Choe, Y.** (2007). Segmentation of textures defined on flat vs. layered surfaces using neural networks: Comparison of 2D vs. 3D representations. *Neurocomputing*, 70:2245–2255.
16. Lim, H., and **Choe, Y.** (2006). Compensating for neural transmission delay using extrapolatory neural activation in evolutionary neural networks. *Neural Information Processing—Letters and Reviews*, 10:147–161.
17. Yu, Y., and **Choe, Y.** (2006). A neural model of the scintillating grid illusion: Disinhibition and self-inhibition in early vision. *Neural Computation*, 18:521–544.
18. Bednar, J. A., **Choe, Y.**, Paula, J. D., Mikkulainen, R., Provost, J., and Tversky, T. (2004). Modeling cortical maps with Topographica. *Neurocomputing*, 58–60:1129–1135.
19. **Choe, Y.** (2004). The role of temporal parameters in a thalamocortical model of analogy. *IEEE Transactions on Neural Networks*, 15:1071–1082.
20. **Choe, Y.**, and Mikkulainen, R. (2004). Contour integration and segmentation in a self-organizing map of spiking neurons. *Biological Cybernetics*, 90:75–88.
21. McCormick, B. H., **Choe, Y.**, Koh, W., Abbott, L. C., Keyser, J., Melek, Z., Doddapaneni, P., and Mayerich, D. (2004). Construction of anatomically correct models of mouse brain networks. *Neurocomputing*, 58–60:379–386.
22. **Choe, Y.** (2003). Analogical cascade: A theory on the role of the thalamo-cortical loop in brain function. *Neurocomputing*, 52–54:713–719.

23. **Choe, Y.**, and Miikkulainen, R. (2003). The role of postsynaptic potential decay rate in neural synchrony. *Neurocomputing*, 52–54:707–712.
24. **Choe, Y.**, Miikkulainen, R., and Cormack, L. K. (2000). Effects of presynaptic and postsynaptic resource redistribution in Hebbian weight adaptation. *Neurocomputing*, 32–33:77–82.
25. **Choe, Y.**, and Miikkulainen, R. (1998). Self-organization and segmentation in a laterally connected orientation map of spiking neurons. *Neurocomputing*, 21:139–157.

### 5.3 Journals: Commentaries and editorials

26. Mann, T. A., and **Choe, Y.** (2010). Grounding the meaning of nonprototypical smiles on motor behavior. *Behavioral and Brain Sciences*, 33:453–454. Commentary on Niedenthal et al. (same volume).
27. **Choe, Y.**, and Lee, M. (2006). Guest editorial for volume 10 numbers 4-6: Special issue on bio-inspired models and hardware. *Neural Information Processing—Letters and Reviews*, 10:59–60.
28. **Choe, Y.** (2005a). A deeper semantic role for the mirror system. *Behavioral and Brain Sciences*, 28. (On-line supplemental commentary on Arbib (2005) *Behavioral and Brain Sciences*, 28:105–167. URL: <http://www.bbsonline.org/Preprints/Arbib-05012002/Supplemental>.) 1 page.
29. **Choe, Y.** (2005b). How neural is the neural blackboard architecture?. *Behavioral and Brain Sciences*, 29:72–73. (Commentary on van der Velde and de Kamps (2006) *Behavioral and Brain Sciences*, 29:37–108.) 2 pages.

### 5.4 Conference and Workshop Proceedings: Peer-Reviewed

30. **Choe, Y.** (2011). Action-based autonomous grounding. In Modayil, J., Precup, D., and Singh, S., editors, *AAAI-11 Workshop on Lifelong Learning from Sensorimotor Experience*. In press (AAAI Technical Report Series).
31. **Choe, Y.**, Mayerich, D., Kwon, J., Miller, D. E., Chung, J. R., Sung, C., Keyser, J., and Abbott, L. C. (2011). Knife-edge scanning microscopy for connectomics research. In *Proceedings of the International Joint Conference on Neural Networks*, 2258–2265. Piscataway, NJ: IEEE Press.
32. Kwon, J., Mayerich, D., and **Choe, Y.** (2011). Automated cropping and artifact removal for knife-edge scanning microscopy. In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, 1366–1369.
33. Mann, T. A., and **Choe, Y.** (2011). Scaling up reinforcement learning through targeted exploration. In *Proceedings of the Twenty-Fifth AAAI Conference on Artificial Intelligence*, 435–440.
34. Mann, T. A., Park, Y., Jeong, S., Lee, M., and **Choe, Y.** (2011). Autonomously improving binocular depth estimation. In *The 21st Annual Conference of the Japanese Neural Network Society*, xxx–xxx.
35. Mayerich, D., Kwon, J., Panchal, A., Keyser, J., and **Choe, Y.** (2011). Fast cell detection in high-throughput imagery using gpu-accelerated machine learning. In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, 719–723.
36. Yang, H.-F., and **Choe, Y.** (2011a). Ground truth estimation by maximizing topological agreements in electron microscopy data. In *Proceedings of the 7th International Symposium on Visual Computing (LNCS 6938)*, 375–384.
37. Yang, H.-F., and **Choe, Y.** (2011b). An interactive editing framework for electron microscopy image segmentation. In *Proceedings of the 7th International Symposium on Visual Computing (LNCS 6938)*, 404–413.
38. Choi, H., Choi, S., Katake, A., and **Choe, Y.** (2010a). Learning alpha-integration with partially labeled data. In *Proceedings of the 2010 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2010)*, 2058–2061.

39. Choi, H., Choi, S., Katake, A., Kang, Y., and **Choe, Y.** (2010b). Manifold alpha-integration. In Zhang, B.-T., and Orgun, M. A., editors, *Lecture Notes in Computer Science, PRICAI 2010: Trends in Artificial Intelligence. 11th Pacific Rim International Conference on Artificial Intelligence*, 397–408. Berlin: Springer.
40. Choi, H., Katake, A., Choi, S., and **Choe, Y.** (2010c). Alpha-integration of multiple evidence. In *Proceedings of the 2010 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2010)*, 2210–2213.
41. Kwon, J., and **Choe, Y.** (2010). Predictive internal neural dynamics for delay compensation. In *Second World Congress on Nature and Biologically Inspired Computing (NaBIC2010)*, 443–448.
42. Mann, T. A., and **Choe, Y.** (2010). Prenatal to postnatal transfer of motor skills through motor-compatible sensory representations. In *Proceedings of the Ninth International Conference on Development and Learning*, 185–190.
43. Yang, H.-F., and **Choe, Y.** (2010). Electron microscopy image segmentation with estimated symmetric three-dimensional shape prior. In *Proceedings of the 6th International Symposium on Visual Computing*. In press.
44. Choi, H., Katake, A., Choi, S., Kang, Y., and **Choe, Y.** (2009). Probabilistic combination of multiple evidence. In *Proceedings of the International Conference on Neural Information Processing (Part I, Lecture Notes in Computer Science 5863)*, 302–311.
45. Chung, J. R., and **Choe, Y.** (2009). Emergence of memory-like behavior in reactive agents using external markers. In *Proceedings of the 21st International Conference on Tools with Artificial Intelligence, 2009. ICTAI '09*, 404–408.
46. Chung, J. R., Kwon, J., and **Choe, Y.** (2009). Evolution of recollection and prediction in neural networks. In *Proceedings of the International Joint Conference on Neural Networks*, 571–577. Piscataway, NJ: IEEE Press.
47. Han, D., Choi, H., Park, C., and **Choe, Y.** (2009a). Fast and accurate retinal vasculature tracing and kernel-isomap-based feature selection. In *Proceedings of the International Joint Conference on Neural Networks*, 1075–1082. Piscataway, NJ: IEEE Press.
48. Han, D., Keyser, J., and **Choe, Y.** (2009b). A local maximum intensity projection tracing of vasculature in Knife-Edge Scanning Microscope volume data. In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, 1259–1262.
49. Park, C., Bai, Y. H., and **Choe, Y.** (2009a). Tactile or visual?: Stimulus characteristics determine receptive field type in a self-organizing map model of cortical development. In *Proceedings of the 2009 IEEE Symposium on Computational Intelligence for Multimedia Signal and Vision Processing*, 6–13. **Best Student Paper Award.**
50. Park, C., Choi, H., and **Choe, Y.** (2009b). Self-organization of tactile receptive fields: Exploring their textural origin and their representational properties. In *Advances in Self-Organizing Maps: Proceedings of the 7th International Workshop, WSOM 2009*, 228–236. Heidelberg: Springer.
51. Yang, H.-F., and **Choe, Y.** (2009a). 3D volume extraction of densely packed cells in EM data stack by forward and backward graph cuts. In *Proceedings of the 2009 IEEE Symposium on Computational Intelligence for Multimedia Signal and Vision Processing*, 47–52.
52. Yang, H.-F., and **Choe, Y.** (2009b). Cell tracking and segmentation in electron microscopy images using graph cuts. In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, 306–309.
53. Bai, Y. H., Park, C., and **Choe, Y.** (2008). Relative advantage of touch over vision in the exploration of texture. In *Proceedings of the 19th International Conference on Pattern Recognition (ICPR 2008)*, 1–4, 10.1109/ICPR.2008.4760961. **Best Scientific Paper Award.**

54. **Choe, Y.**, Yang, H.-F., and Misra, N. (2008). Motor system's role in grounding, receptive field development, and shape recognition. In *Proceedings of the Seventh International Conference on Development and Learning*, 67–72. IEEE.
55. Choi, H., Choi, S., and **Choe, Y.** (2008a). Manifold integration with markov random walks. In *Proceedings of the 23rd National Conference on Artificial Intelligence(AAAI 2008)*, 424–429.
56. Choi, H., Gutierrez-Osuna, R., Choi, S., and **Choe, Y.** (2008b). Kernel oriented discriminant analysis for speaker-independent phoneme spaces. In *Proceedings of the 19th International Conference on Pattern Recognition*. In press.
57. Eng, D. C.-Y., and **Choe, Y.** (2008). Stereo pseudo 3D rendering for web-based display of scientific volumetric data. In *Proceedings of the IEEE/EG International Symposium on Volume Graphics*.
58. Jang, B. S., Mann, T., and **Choe, Y.** (2008). Effects of varying the delay distribution in random, scale-free, and small-world networks. In *Proceedings of the 2008 IEEE International Conference on Granular Computing*, 316–321.
59. Kwon, J., and **Choe, Y.** (2008). Internal state predictability as an evolutionary precursor of self-awareness and agency. In *Proceedings of the Seventh International Conference on Development and Learning*, 109–114. IEEE.
60. Kwon, J., Mayerich, D., **Choe, Y.**, and McCormick, B. H. (2008). Lateral sectioning for knife-edge scanning microscopy. In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, 1371–1374.
61. Mayerich, D., Kwon, J., **Choe, Y.**, Abbott, L., and Keyser, J. (2008). Constructing high-resolution microvascular models. In *Proceedings of the 3rd International Workshop on Microscopic Image Analysis with Applications in Biology (MIAAB 2008)*. Online.
62. Kwon, J., and **Choe, Y.** (2007). Enhanced facilitatory neuronal dynamics for delay compensation. In *Proceedings of the International Joint Conference on Neural Networks*, 2040–2045. Piscataway, NJ: IEEE Press.
63. Xiong, H., and **Choe, Y.** (2007). Constrained estimation of genetic networks. In *BIOCOMP'07, Proceedings of the 2007 International Conference on Bioinformatics and Computational Biology*, 51–57.
64. **Choe, Y.**, and Smith, N. H. (2006). Motion-based autonomous grounding: Inferring external world properties from internal sensory states alone. In Gil, Y., and Mooney, R., editors, *Proceedings of the 21st National Conference on Artificial Intelligence(AAAI 2006)*, 936–941.
65. Lim, H., and **Choe, Y.** (2006a). Delay compensation through facilitating synapses and STDP: A neural basis for orientation flash-lag effect. In *Proceedings of the International Joint Conference on Neural Networks*, 8385–8392. Piscataway, NJ: IEEE Press.
66. Lim, H., and **Choe, Y.** (2006b). Facilitating neural dynamics for delay compensation and prediction in evolutionary neural networks. In Keijzer, M., editor, *Proceedings of the 8th Annual Conference on Genetic and Evolutionary Computation, GECCO-2006*, 167–174.
67. Sarma, S., and **Choe, Y.** (2006). Saliency in orientation-filter response measured as suspicious coincidence in natural images. In Gil, Y., and Mooney, R., editors, *Proceedings of the 21st National Conference on Artificial Intelligence(AAAI 2006)*, 193–198.
68. Yu, Y., and **Choe, Y.** (2006). Selective attention in time: An extended model of stimulus onset asynchrony (SOA) in Stroop effect. In *Proceedings of the Fifth International Conference on Development and Learning ICDL 2006 [electronic]*. Bloomington, IN: Department of Psychological and Brain Sciences, Indiana University.
69. Lim, H., and **Choe, Y.** (2005). Facilitatory neural activity compensating for neural delays as a potential cause of the flash-lag effect. In *Proceedings of the International Joint Conference on Neural Networks*, 268–273. Piscataway, NJ: IEEE Press.

70. **Choe, Y.**, and Bhamidipati, S. K. (2004). Autonomous acquisition of the meaning of sensory states through sensory-invariance driven action. In Ijsspeert, A. J., Murata, M., and Wakamiya, N., editors, *Biologically Inspired Approaches to Advanced Information Technology*, Lecture Notes in Computer Science 3141, 176–188. Berlin: Springer.
71. Oh, S., and **Choe, Y.** (2004). Texture segmentation in 2D vs. 3D: Did 3D developmentally precede 2D?. In Triesh, J., and Jebara, T., editors, *Proceedings of the 2004 International Conference on Development and Learning [electronic]*, 175–182. UCSD Institute for Neural Computation.
72. Yu, Y., and **Choe, Y.** (2004). Angular disinhibition effect in a modified Poggendorff illusion. In Forbus, K. D., Gentner, D., and Regier, T., editors, *Proceedings of the 26th Annual Conference of the Cognitive Science Society*, 1500–1505.
73. Yu, Y., Yamauchi, T., and **Choe, Y.** (2004). Explaining low-level brightness-contrast illusions using disinhibition. In Ijsspeert, A. J., Murata, M., and Wakamiya, N., editors, *Biologically Inspired Approaches to Advanced Information Technology*, Lecture Notes in Computer Science 3141, 166–175. Berlin: Springer.
74. **Choe, Y.** (2003). Processing of analogy in the thalamocortical circuit. In *Proceedings of the International Joint Conference on Neural Networks*, 1480–1485. IEEE.
75. Lee, H.-C., and **Choe, Y.** (2003). Detecting salient contours using orientation energy distribution. In *Proceedings of the International Joint Conference on Neural Networks*, 206–211. IEEE.
76. **Choe, Y.** (2002). Second order isomorphism: A reinterpretation and its implications in brain and cognitive sciences. In Gray, W. D., and Schunn, C. D., editors, *Proceedings of the 24th Annual Conference of the Cognitive Science Society*, 190–195. Erlbaum.
77. **Choe, Y.**, and Miikkulainen, R. (2000). A self-organizing neural network for contour integration through synchronized firing. In *Proceedings of the 17th National Conference on Artificial Intelligence*, 123–128. Cambridge, MA: MIT Press.
78. Miikkulainen, R., Bednar, J. A., **Choe, Y.**, and Sirosh, J. (1998). A self-organizing neural network model of the primary visual cortex. In Usui, S., and Omori, T., editors, *Proceedings of the Fifth International Conference on Neural Information Processing*, vol. 2, 815–818. Tokyo; Burke, VA; Amsterdam: IOS Press.
79. **Choe, Y.**, and Miikkulainen, R. (1997a). Self-organization and segmentation with laterally connected maps of spiking neurons. In *Workshop on Self-Organizing Maps*, 20–31. Espoo, Finland: Helsinki University of Technology.
80. **Choe, Y.**, and Miikkulainen, R. (1997b). Self-organization and segmentation with laterally connected spiking neurons. In *Proceedings of the 15th International Joint Conference on Artificial Intelligence*, 1120–1125. San Francisco, CA: Morgan Kaufmann.
81. **Choe, Y.**, Sirosh, J., and Miikkulainen, R. (1996). Laterally interconnected self-organizing maps in hand-written digit recognition. In Touretzky, D. S., Mozer, M. C., and Hasselmo, M. E., editors, *Advances in Neural Information Processing Systems 8*, 736–742. Cambridge, MA: MIT Press.

## 5.5 Conference and Workshop Proceedings: Other

82. Yang, H.-F., and **Choe, Y.** (2007). Co-development of visual receptive fields and their motor-primitive-based decoding scheme. In *Proceedings of the International Joint Conference on Neural Networks 2007 Post conference Workshop on Biologically-inspired Computational Vision (BCV) 2007*. [Online] <https://umdrive.memphis.edu/iftexhar/public/IJCNN/BCV.htm>.
83. Xiong, H., and **Choe, Y.** (2006). Significantly different dynamic behaviors of biological networks between normal and abnormal cells in response to perturbation of environmental stressors and drugs. In *Engineering Principles in Biological Systems (Cold Spring Harbor Laboratory, New York, December 3–6, 2006)*, 52.

## 5.6 Book Chapters: Peer-Reviewed

84. Chung, J. R., Kwon, J., Mann, T. A., and **Choe, Y.** (2012). Evolution of time in neural networks: From the present to the past, and forward to the future. In Rao, A. R., and Cecchi, G. A., editors, *The Relevance of the Time Domain to Neural Network Models*, Springer Series in Cognitive and Neural Systems 3, 99–116. New York: Springer.
85. **Choe, Y.**, Abbott, L. C., Han, D., Huang, P.-S., Keyser, J., Kwon, J., Mayerich, D., Melek, Z., and McCormick, B. H. (2008). Knife-edge scanning microscopy: High-throughput imaging and analysis of massive volumes of biological microstructures. In Rao, A. R., and Cecchi, G., editors, *High-Throughput Image Reconstruction and Analysis: Intelligent Microscopy Applications*, 11–37. Boston, MA: Artech House.
86. Misra, N., and **Choe, Y.** (2007). Shape recognition through dynamic motor representations. In Kozma, R., and Perlovsky, L., editors, *Neurodynamics of Higher-Level Cognition and Consciousness*, 185–210. Berlin: Springer.
87. Miikkulainen, R., Bednar, J. A., **Choe, Y.**, and Sirosh, J. (1999). Modeling self-organization in the visual cortex. In Oja, E., and Kaski, S., editors, *Kohonen Maps*. New York: Elsevier.
88. Miikkulainen, R., Bednar, J. A., **Choe, Y.**, and Sirosh, J. (1997). Self-organization, plasticity, and low-level visual phenomena in a laterally connected map model of the primary visual cortex. In Goldstone, R. L., Schyns, P. G., and Medin, D. L., editors, *Perceptual Learning*, vol. 36 of *Psychology of Learning and Motivation*, 257–308. San Diego, CA: Academic Press.

## 5.7 Thesis and Dissertation

89. **Choe, Y.** (2001). *Perceptual Grouping in a Self-Organizing Map of Spiking Neurons*. PhD thesis, Department of Computer Sciences, The University of Texas at Austin, Austin, TX. Technical Report AI01-292.
90. **Choe, Y.** (1995). *Laterally Interconnected Self-Organizing Feature Map in Handwritten Digit Recognition*. Master's thesis, Department of Computer Sciences, The University of Texas at Austin. Technical Report AI95-236.

## 5.8 Abstracts

91. Sung, C., Chung, J. R., Mayerich, D., Kwon, J., Miller, D. E., Huffman, T., Keyser, J., Abbott, L. C., and **Choe, Y.** (2011). Knife-edge scanning microscope brain atlas: A submicrometer-resolution web-based mouse brain atlas. In *Neuroscience Meeting Planner, Washington, DC: Society for Neuroscience*. Program No. 328.05. Online.
92. **Choe, Y.**, Abbott, L. C., Miller, D. E., Han, D., Yang, H.-F., Chung, J. R., Sung, C., Mayerich, D., Kwon, J., Micheva, K., and Smith, S. J. (2010a). Multiscale imaging, analysis, and integration of mouse brain networks. In *Neuroscience Meeting Planner, San Diego, CA: Society for Neuroscience*. Program No. 516.3. Online.
93. **Choe, Y.**, Abbott, L. C., Ponte, G., Keyser, J., Kwon, J., Mayerich, D., Miller, D., Han, D., Grimaldi, A. M., Fiorito, G., Edelman, D. B., and McKinstry, J. L. (2010b). Charting out the octopus connectome at submicron resolution using the knife-edge scanning microscope. *BMC Neuroscience*, 11(Suppl 1):P136. Nineteenth Annual Computational Neuroscience Meeting: CNS\*2010.
94. Choi, H., and **Choe, Y.** (2010). Simultaneous grounding and receptive field learning in visuomotor agents. *BMC Neuroscience*, 11(Suppl 1):P89. Nineteenth Annual Computational Neuroscience Meeting: CNS\*2010.
95. Mann, T. A., and **Choe, Y.** (2010). Neural conduction delay forces the emergence of predictive function in an evolving simulation. *BMC Neuroscience*, 11(Suppl 1):P62. Nineteenth Annual Computational Neuroscience Meeting: CNS\*2010.

96. Yang, H.-F., and **Choe, Y.** (2010). Reconstruction of neuronal morphologies from electron microscopy images using graph cuts. *BMC Neuroscience*, 11(Suppl 1):P142. Nineteenth Annual Computational Neuroscience Meeting: CNS\*2010.
97. **Choe, Y.**, Han, D., Huang, P.-S., Keyser, J., Kwon, J., Mayerich, D., and Abbott, L. C. (2009). Complete submicrometer scans of mouse brain microstructure: Neurons and vasculatures. In *Neuroscience Meeting Planner, Chicago, IL: Society for Neuroscience*. Program No. 389.10. Online.
98. Park, C., Choi, H., and **Choe, Y.** (2009). Textural-input-driven self-organization of tactile receptive fields. *BMC Neuroscience*, Suppl 1:P62. Eighteenth Annual Computational Neuroscience Meeting: CNS\*2009.
99. **Choe, Y.**, and Yang, H.-F. (2008). Decoding spikes without stimulus information: Its implications on receptive-field learning. In *Proceedings of the 5th Computational and Systems Neuroscience Meeting (COSYNE 2008 Abstracts)*, 267.
100. **Choe, Y.**, Abbott, L. C., Keyser, J., Kwon, J., Mayerich, D. M., Melek, Z., and McCormick, B. H. (2007). Enhanced microvascular staining and tracing in large volumes of mouse brain tissue. In *Neuroscience Meeting Planner, San Diego, CA: Society for Neuroscience*. Program No. 845.14. Online.
101. Mayerich, D. M., Abbott, L. C., **Choe, Y.**, Han, D., Keyser, J., Melek, Z., and McCormick, B. H. (2007). Efficient methods for tracing and visualization of neural morphology in microscopy image stacks. In *Neuroscience Meeting Planner, San Diego, CA: Society for Neuroscience*. Program No. 845.2. Online.
102. **Choe, Y.**, and Yang, H.-F. (2006). Co-development of visual receptive fields and their motor primitive-based decoding scheme. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 734.6. Online.
103. McCormick, B. H., Abbott, L. C., Mayerich, D. M., , Keyser, J., Kwon, J., Melek, Z., and **Choe, Y.** (2006). Full-scale submicron neuroanatomy of the mouse brain. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 694.5. Online.
104. Bednar, J. A., **Choe, Y.**, Paula, J. D., Miikkulainen, R., and Provost, J. (2005a). Modeling the visual cortex using the topographica cortical map simulator. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 508.1.
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106. **Choe, Y.**, and Yu, Y. (2005). Propagation of the results of cortical computation through the thalamo-cortical loop: Involvement of corticothalamic feedback and the thalamic reticular nucleus. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 274.11. Online.
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110. Yu, Y., and **Choe, Y.** (2005). Asymptotic stability analysis of the thalamocortical circuit. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 274.23. Online.
111. **Choe, Y.** (2004). Role of the thalamic reticular nucleus in selective propagation of the results of cortical computation. In *Cortical Function: A View from the Thalamus*. Abstract p. 21.

112. **Choe, Y.**, McCormick, B. H., and Koh, W. (2004). Network connectivity analysis on the temporally augmented *c. elegans* web: A pilot study. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 921.9. Online.
113. McCormick, B. H., Mayerich, D. M., Abbott, L. C., Gutierrez-Osuna, R., Keyser, J., **Choe, Y.**, Koh, W., and Busse, B. L. (2004). Whole mouse brain mapped at submicron resolution using Knife-Edge Scanning Microscope. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 1033.4. Online.
114. Miikkulainen, R., Bednar, J. A., and **Choe, Y.** (2004). Sparse, redundancy-reduced visual coding through self-organized lateral connections. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 490.3. Online.
115. Yu, Y., and **Choe, Y.** (2004). Explaining the scintillating grid illusion using disinhibition and self-inhibition in the early visual pathway. In *Society for Neuroscience Abstracts*. Washington, DC: Society for Neuroscience. Program No. 301.10. Online.

## 5.9 Technical Reports

116. **Choe, Y.** (2003). The role of temporal parameters in a thalamocortical model of analogy. Technical Report 2003-8-5, Department of Computer Science, Texas A&M University.
117. **Choe, Y.**, and Bhamidipati, S. K. (2003). Learning the meaning of neural spikes through sensory-invariance driven action. Technical Report 2003-8-3, Department of Computer Science, Texas A&M University.
118. **Choe, Y.**, and Sarma, S. (2003). Relationship between suspicious coincidence in natural images and oriented filter response distributions. Technical Report 2003-8-4, Department of Computer Science, Texas A&M University.
119. Yu, Y., and **Choe, Y.** (2003). Modeling disinhibition in the early visual pathway. Technical Report 2003-8-6, Department of Computer Science, Texas A&M University.
120. **Choe, Y.** (2002). Active representations: A primitive for analogical computing in the brain. Technical Report 2002-1-3, Department of Computer Science, Texas A&M University. 6 pages.
121. **Choe, Y.**, and Miikkulainen, R. (2000). Contour integration and segmentation with self-organized lateral connections. Technical Report AI2000-286, Department of Computer Sciences, The University of Texas at Austin.
122. **Choe, Y.**, and Miikkulainen, R. (1996). Self-organization and segmentation with laterally connected spiking neurons. Technical Report AI96-251, Department of Computer Sciences, The University of Texas at Austin.

## 6 Talks and Presentations

### 6.1 Talks

1. Invited talk: *Computational Modeling of the Thalamocortical Loop*. Korean American Biomedical Scientists Symposium. 11/5/2011.
2. Invited talk: *Evolution of Time in Neural Networks: Present to Past to Future*. Forum for AI. University of Texas at Austin. 9/15/2011.
3. Invited talk: *Global Sub-Micrometer-Level Survey of the Mouse Brain Neural Circuits Using the Knife-Edge Scanning Microscope*. UH Network Cluster Seminar. University of Houston. 3/4/2011.
4. Invited talk: *Global Sub-Micrometer-Level Survey of the Mouse Connectome Using the Knife-Edge Scanning Microscope*. Biocomplexity Institute, Indiana University. Host: Prof. John Beggs. 10/26/2010.

5. Invited talk: *Motor System's Role in Grounding, Development, and Recognition in Vision*. Tsinghua University. Host: Prof. Li Zhaoping. 7/9/2010.
6. Brain, Cognitive Science, and Education Seminar Series: *Motor System's Role in Grounding, Development, and Recognition in Vision*. Department of Education. Texas A&M University. 4/14/2010.
7. Invited talk: *Current Trends in Autonomous Intelligent Agent Technology*. Samsung Thales, Yongin, Korea. 4/1/2010.
8. Invited talk at the conference "The Human Connectome: Views from MRI and Microscope." *Global Sub-Micrometer-Level Survey of the Mouse Connectome Using the Knife-Edge Scanning Microscope*. 3/30/2010.
9. ECE Seminar Series: *Global Sub-Micrometer-Level Survey of the Mouse Connectome Using the Knife-Edge Scanning Microscope*. Department of Electrical and Computer Engineering, Texas A&M University. 3/9/2010.
10. Korean American Biomedical Scientists Symposium. *Complete submicrometer scans of mouse brain microstructure using the Knife-Edge Scanning Microscope*. University of Texas Medical School, Houston. 11/13/2009.
11. Invited Seminar.  
*Imaging the Whole Mouse Brain at Submicrometer Resolution Using the Knife-Edge Scanning Microscope*. University of Texas Medical Branch. Galveston, TX. 11/6/2009.
12. Machine learning seminar. *Evolution of Recollection and Prediction in Neural Networks*. POSTECH, Pohang, Korea. Host: Prof. Seungjin Choi. 7/15/2009.
13. Computer Science Seminar. *Evolution of Recollection and Prediction in Neural Networks*. Yonsei University, Seoul, Korea. 7/7/2009.
14. Invited seminar. *Evolution of Recollection and Prediction in Neural Networks* Kyungbuk National University, Daegu, Korea. Host: Prof. Minho Lee. 7/29/2009.
15. Invited seminar. *Evolving Autonomous Agents and Scenarios to Support Interactive Training*. Agency for Defense Development, Seoul, Korea. 7/8/2009.
16. Invited seminar. *Evolving Autonomous Agents and Scenarios to Support Interactive Training*. Defense Acquisitions Program Administration, Seoul, Korea. 7/21/2009.
17. Invited seminar. *Evolution of Recollection and Prediction in Neural Networks Group addressed: Graduate students and faculty*. Seoul National University, Seoul, Korea. Host: Prof. Byung Tak Zhang. 7/8/2009.
18. Bio and Brain Science Seminar. *Evolution of Recollection and Prediction in Neural Networks*. KAIST, Daejeon, Korea. 7/22/2009.
19. Invited foreign expert seminar. *Nature of Texture: Visual or Tactile?* Electronics and Telecommunications Research Institute (ETRI), Daejeon, Korea. 7/14/2009.
20. Invited talk. *From Connectomics to Theories of Brain Function: An Internal, Dynamical Perspective*. Korea Institute of Advanced Studies (KIAS), Seoul, Korea. 7/31/2009.
21. Neurobiology and Anatomy Seminar Series (by invitation, voted on by postdocs). *Dissecting, Imaging, and Modeling the Mouse Brain Network*. University of Texas Medical School, Houston. 3/5/2009.
22. Invited talk: *Dissecting, Imaging, and Modeling Brain Networks*. KOCSEA Technical Symposium 2008 (Vienna, VA). 10/26/08.
23. Forum for AI (invited talk): *Motor System's Role in Grounding, Development, and Recognition in Vision*. The University of Texas at Austin. 10/10/08. Host: Forum for AI.

24. Invited talk: *Dissecting, Imaging, and Modeling Brain Networks*. Undergraduate Science Research Club, Texas A&M University. 10/3/08.
25. Invited talk: *Dissecting, Imaging, and Modeling Brain Networks*. Department of Neurosurgery, Neuroscience Institute, Scott & White Clinic/Texas A&M Health Science Center, College of Medicine, Temple, TX. 8/21/08. Host: Prof. Robert Buchanan.
26. Invited talk: *Knife-Edge Scanning Microscopy: High-throughput Imaging and Analysis of Massive Volumes of Neuronal Microstructures and Networks*. The Neuroscience Institute, San Diego, CA. 8/19/08. Host: Prof. Jeff McKinstry.
27. Invited talk: *Delay compensation through facilitating synapses and STDP: A Neural Basis for Orientation Flash-Lag Effect*. Workshop on recent advances in activity-dependent plasticity, 5th Computational and Systems Neuroscience Meeting (COSYNE 2008). 2/4/2008. Organizer: Prof. Paul Munro (University of Pittsburgh).
28. Invited presentation: *Academic Life Outside Classrooms/Labs*. Student Interaction Session, Korean Computer Scientists and Engineers' Association (KOCSEA) Technical Symposium. 12/15/2007.
29. Invited talk: *Co-development of Visual Receptive Fields and Their Motor Primitive-based Decoding Scheme*. Behavioral and Cellular Neuroscience Research Seminar, Department of Psychology, Texas A&M University. Host: Prof. Paul Wells, 10/16/2007.
30. Invited talk: *Data Processing for Serial Sectioning Microscopy of Neural and Vascular Microstructure*. Multiscale Modeling Consortium, Working Group 3 on Macro to Micro Scale Imaging and Transport in Human Systems Host: Prof. Rob Kunz (Penn State University), 8/24/2007. (Online webinar)
31. Invited talk: *Action as a Foundation of Autonomous Visual Understanding*. Computer Vision Lab, University of Central Florida. Host: Prof. Mubarak Shah, 8/16/2007.
32. Invited talk: *Prediction, a Prerequisite to Goal-directed Behavior, and Its Possible Origin in Delay Compensation*. IT Symposium, US-Korea Conference, Reston, VA. 8/11/2007
33. Invited talk: *Motion-Based Autonomous Grounding: Inferring External World Properties Solely Based on Encoded Internal Neural States*. Department of Physics, Chungbuk National University, Korea, 6/7/2007.
34. Invited talk: *Prediction, a Prerequisite to Goal-directed Behavior and Its Possible Origin in Delay Compensation*. Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), 6/7/2007.
35. Invited talk: *Motion-Based Autonomous Grounding: Inferring External World Properties Solely Based on Encoded Internal Neural States*. Department of Computer Science, Yonsei University, Korea, 6/5/2007.
36. Invited talk: *Detecting Salient Contours in Natural Images Using Orientation-Filter Response Distribution; Multiscale Imaging, Analysis, and Integration of Brain Networks* Virtual Reality Research Team, Electronics and Telecommunications Research Institute (ETRI), Korea, 6/4/2007.
37. KAIST Computer Science Colloquium: *Action as a Foundation of Autonomous Visual Understanding*. Department of Computer Science, Korea Advanced Institute of Science and Technology (KAIST), 5/28/2007.
38. Invited talk: *Autonomous Semantics: Towards a Meaningful Information Technology*. KOCSEA Technical Symposium, Arizona State University, 12/15/06.
39. Invited talk at the Conference on Goal-Directed Neural Systems: *Prediction, a Prerequisite to Goal-directed Behavior, and Its Possible Origin in Delay Compensation*. University of Arlington, 11/3/06.
40. Faculty of Neuroscience Seminar: *What makes your thought march forward?: a role for the thalamus and the thalamic reticular nucleus*. Neuroscience Program, Texas A&M University (Host: Prof. Gregg B. Wells), 9/14/06.

41. Biomedical Engineering Department Seminar: *Binding Problem for Input vs. Output Representations and the Role of the Thalamus in Its Solution*. Department of Biomedical Engineering, Texas A&M University (Host: Prof. Wally Wu), 4/3/06.
42. Cognoscenti (Cognitive Psychology Seminar): *Relationship between Flash-Lag Effect and Delay Compensation in the Nervous System*. Department of Psychology, Texas A&M University (Host: Prof. Jyotsna Vaid), 2/19/06.
43. CPSC 681 Graduate Seminar: *Learning about the Outside World, Trapped within Your Brain*. Department of Computer Science, Texas A&M University (Host: Prof. Nancy Amato), 2/15/06.
44. Invited Talk: *Intrinsic, Autonomous Semantics in Natural and Artificial Agents*. Department of Biosystems, Korea Advanced Institute of Technology, Korea (Host: Prof. Soo-Young Lee), 11/25/2005.
45. Invited Talk: *Intrinsic, Autonomous Semantics in Natural and Artificial Agents*. Virtual Reality Research Laboratory, Electronics and Telecommunications Research Institute, Korea (Host: Dr. Wookho Son), 11/24/2005.
46. Invited Talk: *Intrinsic, Autonomous Semantics in Natural and Artificial Agents*. Artificial Brain Research Laboratory, School of Electrical Engineering and Computer Science, Kyungbuk National University, Korea (Host: Prof. Minho Lee), 11/24/2005.
47. Molecular and Cellular Networks Seminar: *Importance of Temporal Factors in Inferring Network Function from Its Structure: A Lesson from the Thalamocortical Circuit in the Brain*. Department of Computer Science, Texas A&M University. 10/20/2005.
48. Research Seminar: *Grounding Sensory Neural States on Action That Maintains Sensory Invariance*. At the Cognitive Neuroscience Center at the Université du Québec à Montréal (Host: Prof. Stevan Harnad), 8/3/05.
49. Research Seminar: *Inferring External Stimulus Properties from Internal Sensory State Alone Through Action and Invariance*. At the Visual Motor Research Lab, McGill University (Host: Prof. James J. Clark), 8/3/05.
50. Research Seminar: *Binding Problem for Input vs. Output Representations and the Role of the Thalamus in Its Solution*. At Prof. Terrence Sejnowski's Lab (Computational Neurobiology Laboratory), at the Salk Institute. 6/14/05.
51. CPSC 681 Graduate Seminar: *Binding Problem of the Second Kind: Can the Brain Confuse Its Inputs from Its Outputs?* Department of Computer Science, Texas A&M University. 11/15/2004.
52. Summer Honors Invitational Program Lecture: *Autonomous Semantics in Natural and Artificial Agents*. A lecture for high-achieving high school students. 6/21/04.
53. CPSC 681 Graduate Seminar: *Autonomous Semantics in Natural and Artificial Agents*. Department of Computer Science, Texas A&M University. 10/22/2003.
54. Armadillo (Southwest Cognition Conference): *Learning the Semantics of Neural Representations Through Invariance-Driven Action*. Texas A&M University, College Station, TX. 10/17/2003.
55. Cognoscenti (Cognitive Psychology Seminar): *Learning the Meaning of Neural Spikes Through Sensory-Invariance Driven Action*. Department of Psychology, Texas A&M University. 9/8/2003.
56. Research Group Seminar @ OGI: *Processing of Analogy in the Thalamocortical Circuit*. At Prof. Melanie Mitchell's research group. Department of Computer Science, Oregon Graduate Institute. 7/25/2003.
57. Invited Talk: *Processing of Analogy in the Thalamocortical Loop: A Glue for Cortical Integration?*. Forum for Artificial Intelligence, Department of Computer Sciences, The University of Texas at Austin. 3/7/2003.
58. AI-Robotics Seminar: *An Analogical Framework for Understanding Brain and Intelligence*. Department of Computer Science, Texas A&M University. 10/11/2002.

59. Invited talk: *Second-Order Isomorphism: A Reinterpretation and Its Implications in Brain and Cognitive Sciences*. Department of Software Engineering, Sejong University, Seoul, Korea, 5/31/02.
60. Invited talk: *Neural Basis of Analogical Processing*. Department of Physics, Chungbuk National University, Chungju, Korea, 5/30/2002.
61. Invited talk: *Neural Basis of Analogical Processing*. Bioengineering Lab, School of Computer Science and Engineering, Seoul National University, Seoul, Korea, 5/29/2002.
62. Invited talk: *Neural Basis of Analogical Processing*. Department of Computer Science, Yonsei University, Seoul, Korea, 6/3/2002.
63. Cognoscenti (Cognitive Psychology Seminar): *Second-Order Isomorphism: A Reinterpretation and Its Implications in Brain and Cognitive Sciences*. Department of Psychology, Texas A&M University, 3/18/2002.
64. CPSC 681 Graduate Seminar: *Visual Perceptual Grouping in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Texas A&M University. 10/1/2001.
65. AI-Robotics Seminar: *Perceptual Grouping in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Texas A&M University. 9/14/2001.
66. Invited Talk: *Visual Contour Integration in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Texas A&M University. (Host: Prof. Don Friesen) 4/24/2001.
67. Invited Talk: *Visual Contour Integration in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Florida State University. (Host: Prof. Xiuwen Liu) 4/18/2001.
68. Invited Talk: *Visual Contour Integration in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Ohio State University. (Host: Prof. DeLiang Wang) 4/10/2001.
69. Invited Talk: *Visual Contour Integration in a Self-Organizing Map of Spiking Neurons*. Department of Computer Science, Rochester Institute of Technology. 4/3/2001.
70. Technology Seminar: *Security on the Internet*. Korean-American Scientists and Engineers Association Austin Chapter, Held at Samsung Austin Semiconductor. 4/8/2000.
71. Invited Talk: *A Self-Organizing Neural Network for Contour Integration through Synchronized Firing*, Fifth Annual University of Texas at Austin Symposium on Neuroscience, Austin, TX, 2/3/2000.

## 6.2 Posters and Demos

1. KOCSEA Technical Symposium 2009, 12/18/08, Las Vegas, NV. Choongseog Park, Yoon H. Bai, Heeyoul Choi, and Yoonsuck Choe. *Nature of Texture: Visual or Tactile?*
2. KOCSEA Technical Symposium 2008, 10/25/08, Vienna, VA. Jaerock Kwon and Yoonsuck Choe, *Internal State Predictability as an Evolutionary Precursor of Self-Awareness and Agency*.
3. WAM-BAMM (World Association of Modelers–Biologically Accurate Modeling Meeting, 3/24/2006, San Antonio, TX. Bruce H. McCormick, Louise C. Abbott, Yoonsuck Choe, John Keyser, Jaerock Kwon, and David Mayerich, *Full-scale Submicron Neuroanatomy to Constrain Computational Models of Biologically Accurate Neuron and Networks*.
4. 1st Annual Computational Cognitive Neuroscience Conference, 11/10/2005, Washington, DC. Bruce H. McCormick, Louise C. Abbott, Yoonsuck Choe, John Keyser, and David Mayerich, *Full-scale Submicron Neuroanatomy to Constrain Computational Models of the Brain*.
5. WAM-BAMM (World Association of Modelers–Biologically Accurate Modeling Meeting, 4/1/2005, San Antonio, TX. Choe, Y. and Yu, Y., *Role of the thalamic reticular nucleus in selective propagation of the results of cortical computation*.

6. WAM-BAMM (World Association of Modelers–Biologically Accurate Modeling Meeting, 4/1/2005, San Antonio, TX. Lim, H. and Choe, Y., “Facilitatory neural dynamics for extrapolation and delay.”
7. The Society for Neuroscience Exhibit Program, National Institute of Mental Health Human Brain Project Booth, 11/16/2005, Washington, DC. Bednar, J. A., and Choe, Y., De Paula, J., Miikkulainen, M., and Provost, J. (2002). *Modeling Visual Cortex Using the Topographica Cortical Map Simulator*.
8. Cortical Function: A View from the Thalamus (Symposium): *Role of the Thalamic Reticular Nucleus in Selective Propagation of the Results of Cortical Computation*. University of Wisconsin. 9/12/04.
9. Human Brain Project Conference: *Modeling Cortical Function and Development with Topographica*. National Institute of Mental Health, Bethesda, MD. 5/12/2003.
10. Society for Neuroscience Exhibit Program: *Modeling Topographic Maps*. National Institute of Mental Health Human Brain Project Booth, Orlando, FL. 11/4/2002.
11. Society for Neuroscience Exhibit Program: *The Topographica Cortical Map Simulator*. National Institute of Mental Health Human Brain Project Booth, Orlando, FL. 11/4/2002.
12. Dynamical Neuroscience (Society for Neuroscience Satellite Symposium): *Processing of Analogy in the Thalamo-Cortical Loop: A Hypothesis*. Orlando, FL. 11/1/2002.
13. Armadillo (Southwest Cognition Conference): *Neural Basis of Simple Analogy Making*. Trinity University, San Antonio, TX. 10/26/2002.
14. Sensory Coding and the Natural Environment (Gordon Conference): *Contour Integration in a Self-Organizing Map of Spiking Neurons*. Mt. Holyoak College, CT. 7/3/2002.

## 7 Grants

1. **Texas Higher Education Coordinating Board (ATP):** Co-principal investigator for the project *On the statistical/bio-physical extraction of textural features of imagery databases*, Program #000512-0217-2001, 1/1/2002 – 12/31/2003. PI: Jyh-Charn Liu. \$100,000 (Choe: 50%).
2. **NIH/NIMH:** Principal investigator for the subcontracted portion of the project *Computational modeling of cortical maps*, #1R01-MH66991, 3/2002 – 2/2005. PI: Risto Miikkulainen (The University of Texas at Austin). \$766,500 (Choe: subcontract \$98,202).
3. **NIH/NINDS:** Principal investigator for the project *MSM: Multiscale Imaging, Analysis, and Integration of Brain Networks* (Co-PIs: Louise C. Abbott, John Keyser, Bruce H. McCormick), #1R01-NS54252, 9/2005 – 5/2008. \$965,992 (Choe: 20% ;\$300,000 subcontracted to Stanford, PI: Stephen J. Smith).
4. **NIH/NINDS:** Principal investigator for the project *MSM: Multiscale Imaging, Analysis, and Integration of Brain Networks*, Additional Funding for Equipment Support #R01 NS054252-03S1, 9/2005–5/2008. \$20,000.
5. **NSF:** Principal investigator for the project *CRCNS data sharing: Whole Mouse Brain Neuronal Morphology and Neurovascular Browser*, #0905041, 9/1/2009–8/31/2011. \$114,024.
6. **Realtime Visual Co.:** Principal investigator for the project *Evolving Autonomous Agents and Scenarios to Support Interactive Training*, 6/1/2009–6/31/2010. \$100,000.

## 8 Older Grants

1. Significant contribution to the funded proposal for *Modeling Development and Perceptual Phenomena in the Visual Cortex*, National Science Foundation #IIS-9811478, December 15, 1998 – November 30, 2001. Principal Investigator: Risto Miikkulainen.

2. Significant contribution to the funded proposal for *Synchronization and Segmentation in a Unified Neural Network Model of the Primary Visual Cortex*, National Science Foundation Advanced Computing Resources Grant #IRI-940004P, 25 Service Units on Cray-J90 and 5,000 SU on Cray T3D at Pittsburgh Supercomputing Center, July 15, 1996 - July 15, 1997. Principal Investigator: Risto Miikkulainen.
3. Significant contribution to the funded proposal for *Handwritten Digit Recognition with the Laterally Interconnected Self-Organizing Map*, High Performance Computer Time Grant (Cray J90), The University of Texas at Austin, September 1, 1995 - August 31, 1996. Principal Investigator: Risto Miikkulainen.

## 9 Teaching

### 9.1 Texas A&M University: Instructor

Department of Computer Science

- **Fall 2011:** CSCE 315, Programming Studio (undergraduate lecture + lab).
- **Spring 2011:** CSCE 633, Machine Learning (graduate lecture)
- **Fall 2010:** CSCE 315, Programming Studio (undergraduate lecture + lab); CPSC 625: Introduction to Artificial Intelligence (graduate lecture).
- **Spring 2010:** CSCE 644, Cortical Networks (graduate lecture)
- **Spring 2009:** CPSC 633, Machine Learning (graduate lecture)
- **Fall 2008:** CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture).
- **Spring 2008:** CPSC 636, Neural Networks (graduate lecture)
- **Fall 2007:** CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture).  
CPSC 625: Introduction to Artificial Intelligence (graduate lecture).
- **Spring 2007:** CPSC 633, Machine Learning (graduate lecture);  
CPSC 644, Cortical Networks (graduate lecture);
- **Fall 2006:** CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture).
- **Spring 2006:** CPSC 633, Machine Learning (graduate lecture);  
CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture).
- **Fall 2005:** CPSC 625: Introduction to Artificial Intelligence (graduate lecture).
- **Spring 2005:** CPSC 420 (honors), Introduction to Artificial Intelligence (undergraduate lecture);  
CPSC 689, Special Topics in Computation in Neural and Biological Systems (graduate seminar).
- **Fall 2004:** CPSC 625: Introduction to Artificial Intelligence (graduate lecture).
- **Spring 2004:** CPSC 420 (honors), Introduction to Artificial Intelligence (undergraduate lecture);  
CPSC 689, Special Topics in Intelligent Neural Systems (graduate seminar).
- **Fall 2003:** CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture).
- **Spring 2003:** CPSC 689, Special Topics in Intelligent Neural Systems (graduate seminar).
- **Fall 2002:** CPSC 420, Introduction to Artificial Intelligence (undergraduate lecture);  
CPSC 625: Introduction to Artificial Intelligence (graduate lecture).
- **Spring 2002:** CPSC 320 (honors), Introduction to Artificial Intelligence (undergraduate lecture).

## 9.2 The University of Texas at Austin: Teaching Assistant

Department of Computer Sciences

- **Spring 2001:** CS345, Programming Languages (undergraduate lecture); Instructor: Prof. Greg Lavender.
- **Spring 1997, Spring/Fall 1998:** CS378, Network Protocol Implementation; Instructor: Prof. Chris Edmondson-Yurkanan.
- **Fall 1996:** CS310, Computer Organization and Programming; Instructor: Prof. Chris Edmondson-Yurkanan.
  - Taught discussion sections twice a week.
  - Developed I/O library for Motorola 68000 and wrote user's manual with the instructor.

## 10 Student Advising

### 10.1 Doctorate

1. Heejin Lim (Texas A&M CS): defended (Spring 2004–Summer 2006). Now at Seismic Microtechnology, Houston, TX (specialized software engineer).
2. Yingwei Yu (Texas A&M CS): defended (Summer 2003–Summer 2006). Now at U. of Texas Medical School at Houston (research associate).
3. Ji Ryang Chung (Texas A&M CS): in progress (Fall 2005–).
4. Jaerock Kwon (Texas A&M CE): in progress (Fall 2005–).
5. Choon Seog Park (Texas A&M CE): in progress (Fall 2005–).
6. Huei-Fang Yang (Texas A&M CS): in progress (Spring 2006–).
7. Hao Xiong (Texas A&M CS): graduated (Spring 2006–Summer 2008). Now at UCSF (postdoc).
8. Dong Hyeop Han (Texas A&M CS): in progress (Spring 2007–).
9. Heeyoul "Henry" Choi (Texas A&M CS): in progress (Spring 2007–).
10. Timothy Mann (Texas A&M CS): in progress (Fall 2007–).

### 10.2 Master

1. S. Kumar Bhamidipati (Texas A&M CS): graduated (Fall 2002–Spring 2004). Now at Microsoft.
2. Navendu Misra (Texas A&M CS): graduated (Summer 2004–Summer 2005). Now at Inovant LLC (Visa Int'l), Austin, TX.
3. Sejong Oh (Texas A&M CS): graduated (Summer 2003–Summer 2004). Now at Korean Airforce.
4. Subramonia P. Sarma (Texas A&M CS): graduated (Spring 2002–Fall 2003). Now at Amazon.com, Seattle, WA.
5. Hari Shankar Muddana (Texas A&M CS): graduated (Spring 2005–Summer 2006; coadvisor: Bruce H. McCormick). Ph.D. student at Penn State U.
6. Jyothi Swaroop Guntupalli (Texas A&M CS): graduated (Spring 2006–Fall 2007). Ph.D. student at Dartmouth University
7. Beomsoon Jang (Texas A&M CS): graduated (Spring 2006–Summer 2007). Now at Korean Airforce Academy (Instructor)

8. Yoon Bai (Texas A&M CE): graduated (Spring 2007–Summer 2008) Now at Samsung.
9. Daniel C.-Y. Eng (Texas A&M CE): graduated (Spring 2007–Fall 2008)
10. Jiaqi Wang (Texas A&M CS): in progress (Fall 2008–; coadvisor: Sheng-Jen “Tony” Hsieh)

### 10.3 Undergraduate

1. Brad Bussee (Texas A&M CS): Summer 2003.
2. Jeffrey Cheak (Texas A&M CS): Summer 2003.
3. Gabriel Marquez (The University of Texas, El Paso): Summer 2003. Supported by Texas A&M College of Engineering Undergraduate Summer Research Grant (USRG) Program.
4. Josh Elkin (Texas A&M CS): Spring 2004.
5. J. Perry Evans (Rose-Hulman CS): Summer 2004. Supported by the National Science Foundation Research Experience for Undergraduates program (NSF REU).
6. Maritza Johnson (U of San Diego CS): Summer 2004. Supported by the Computing Research Association–Women’s Distributed Mentor Project (CRA-W DMP). Co-advised with Prof. Ricardo Gutierrez-Osuna.
7. Andrew Jones (Texas A&M CE): Summer 2005. Supported by Texas A&M College of Engineering Undergraduate Summer Research Grant (USRG) Program. Received the “Best Poster Award.”
8. Stuart Heinrich (U of Vermont CS): Summer 2005. Supported by the National Science Foundation Research Experience for Undergraduates program (NSF REU).
9. Timothy Mann (SUNY at Potsdam CS): Summer 2006. Supported by the National Science Foundation Research Experience for Undergraduates program (NSF REU).
10. Erica Bolan (Carleton U CS): Summer 2006. Supported by the Computing Research Association–Women’s Distributed Mentor Project (CRA-W DMP).
11. Daniel Chern-Yeow Eng (Texas A&M CS): Fall 2006.
12. Steven Snyder (Texas A&M CS): Spring 2007. Supported by the National Science Foundation Research Experience for Undergraduates program (NSF REU).
13. Gen Kazama (McGill CS) and Kasra Manavi (U of NM CS): Summer 2008. Supported by the National Science Foundation Research Experience for Undergraduates program (NSF REU).

### 10.4 Postdoctorate

1. Hyeon-Cheol Lee: 2/2002–2/2003. Now at Korean Aerospace Research Institute.

## 11 Service

External:

1. **Editorial board:** Neural Information Processing – Letters and Reviews (2002–). Neural Networks (2012–2014). Springer Encyclopedia on Computational Neuroscience (2011–2012, topic editor).
2. **Societal committees and leadership:** Special Interest Group Committee (SIGCOM) within the International Neural Networks Society (INNS, 2006–). IEEE CIS Vision and Speech Processing Technical Committee (2007–). Korean Computer Scientists and Engineers Association in America (KOCSEA: communications officer, 2006–2007; secretary, 2008; vice president, 2009; president, 2010)

3. **Working Group:** NIH/NSF/DOE/NASA Multiscale Modeling Consortium, Multiscale Imaging Working Group (lead, 2005–2010).
4. **Program committees and panels:** Workshop on Self-Organizing Maps (WSOM 2003, 2005). IASTED Conference on Neural Networks and Computational Intelligence (NCI 2004). International Conference on Machine Learning (ICML 2004). IEEE Cybernetics and Intelligent Systems (CIS 2004, 2006). IASTED International Conference on Computational Intelligence (CI 2005). Post-IJCNN Workshop on Bio-Inspired Models and Hardware (BIMH 2005). Post-IJCNN Workshop on Neurodynamics and Intentional Dynamic Systems (IDS 2005, panelist). International Symposium on Artificial Brain with Emotion and Learning (ISABEL 2006). International Joint Conference on Neural Networks (IJCNN 2008). Special session on Bio-inspired Computational Vision, World Congress on Computational Intelligence 2008, technical committee). IEEE International Conferences on Cybernetics and Intelligent Systems (CIS 2008). NSF Cyber-Enabled Discovery Initiative proposal review panel (2008). NSF Collaborative Research in Computational Neuroscience proposal review panel (2008). Society for Neuroscience Minisymposium on High-Throughput Microscopy and Computational/Theoretical Challenges in the Analysis of Neural Circuit Structure (Co-Chair, 2008). SIAM Conference on Life Sciences, Minisymposium on Multiscale Imaging and Image Analysis (session chair, 2008). IEEE Symposium on Computational Intelligence for Multimedia Signal and Vision Processing (2009). KOCSEA Technical Symposium (co-chair, 2008; sponsorship chair, 2007; publication chair, 2006). International Joint Conference on Neural Networks (IJCNN 2009). International Conference on Development and Learning (ICDL 2009, area chair). Workshop on Self-Organizing Maps (WSOM 2009, 2010, 2011, program committee). International Joint Conference on Neural Networks (IJCNN 2011, award chair), Samsung Humantech Thesis Prize (2012, reviewer).
5. **Reviewing:** IEEE Trans. on Neural Networks, Neurocomputing, Annual Meeting of the Cognitive Science Society, Neural Networks, Behavioral and Brain Sciences, Biological Cybernetics, IEEE Trans. on Image Processing, J. of Computational Neuroscience, Neural Information Processing—Letters and Reviews, Int'l J. of Humanoid Robotics, J. of Visual Communications and Image Representation, Connection Science (2007). Int'l Conf. on Development and Learning, Int'l Joint Conf. on Neural Networks, Nat'l Conf. on Artificial Intelligence, IEEE Int'l Conf. on Cybernetics and Intelligent Systems.

Intramural (Texas A&M)

1. Department of Computer Science: library committee, Fall 2001; web committee, Spring 2002, Summer 2002, Fall 2002; Bioinformatics faculty search committee, Spring 2002; graduate awards and admissions committee 2002–2003; graduate advisory committee 2002–2003; undergraduate curriculum committee 2003–2004; graduate advisory committee 2004–2005; REU program workgroup 2005–2006; undergraduate student awards committee 2006–2008; graduate admissions committee 2008–2009; faculty search committee (robotics) 2008–2009; colloquium coordinator 2008–2009 (with Andruid Kearne)

## 12 Professional Societies

1. American Association for Artificial Intelligence (AAAI): 2000–
2. International Neural Networks Society (INNS): 2001–
3. American Association for the Advancement of Science (AAAS): 2001–
4. Cognitive Science Society: 2002, 2004
5. Society for Neuroscience: 2004–
6. IEEE: 2006–

## **13 Honors and Awards**

1. Big 12 Faculty Fellowship Award, Summer 2006.
2. Graduate Faculty Teaching Excellence Award, Department of Computer Science, Texas A&M University, Spring 2004.
3. Service award, Korean Student Association, the University of Texas at Austin, Spring 2001.
4. Schlumberger graduate fellowship, 1999.

## **14 References**

Available upon request.