

CURRICULUM VITAE

ERHAN OZTOP, Ph.D.

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RESEARCH INTERESTS

Investigating how humans and other biological systems process information and solve problems from a computational viewpoint.

Developing paradigms and techniques for science and engineering based on the principles obtained by the study of biological systems.

EDUCATION

- 2002 **PhD, Computer Science**, University of Southern California, Los Angeles, CA
Thesis: Modeling the Mirror: Grasp Learning and Action Recognition
Advisor: Prof. Michael A. Arbib
- 1996 **MS, Computer Engineering**, Middle East Technical University, Ankara, Turkey
- 1993 **BS, Mathematics**, Middle East Technical University, Ankara, Turkey
- 1993 **BS, Computer Engineering**, Middle East Technical University, Ankara, Turkey

PROFESSIONAL EXPERIENCE

April 2014 – Present,

Department Head, Ozyegin University, Computer Science Department

August 2013 – Present

Associate Professor, Ozyegin University, Computer Science Department

September 2011 – July 2013

Assistant Professor, Ozyegin University, Computer Science Department

December 2009 – September 2011

Vice Department Head, Communication and Cognitive Cybernetics Department, Advanced Telecommunications Research Institute International (ATR), Computational Neuroscience Laboratories (Cognitive Mechanisms Laboratories as of April 2010)

Also Researcher (after April 1st, 2011) of National Institute of Information and Communications Technology (NICT), Advanced ICT Research Institute, Brain ICT Laboratory

Visiting Associate Professor, Osaka University, School of Engineering Science

April 2009 – November 2009

Vice Department Head, Communication and Cognitive Cybernetics Department,
Advanced Telecommunications Research Institute International (ATR),
Computational Neuroscience Laboratories

April 2008 – March 2009

Vice Department Head, Humanoid Robotics and Computational Neuroscience
Department, Advanced Telecommunications Research Institute International
(ATR), Computational Neuroscience Laboratories

Group Leader, Humanoid Brain Science Group in ICORP Computational Brain
Project, Japan Science and Technology Agency (JST)

April 2004 – March 2008

Researcher, Japan Science and Technology Agency (JST), ICORP Computational
Brain Project

June 2002 - March 2004

Researcher, Advanced Telecommunications Research Institute International,
Computational Neuroscience Laboratories, Department of Cognitive Neuroscience

PUBLICATIONS

International Journal Publications

1. Sezener E, Oztop E (2015) Minimal sign representation of Boolean functions: algorithms and exact results for low dimensions. *Neural Computation* 27(8):1796-823
2. Ugur E, Sahin E, Nagai Y, Oztop E (2015) Staged Development of Robot Skills: Behavior Formation, Affordance Learning and Imitation, *IEEE Transactions on Autonomous Mental Development* 7 (2), pp. 119-139
3. Ugur E, Nagai Y, Celikkanat H, Oztop E (2015) Parental scaffolding as a bootstrapping mechanism for learning grasp affordances and imitation skills. *Robotica* 33 (05): 1163-1180
4. Peternel L, Petric T, Oztop E, Babic J (2014) Teaching robots to cooperate with humans in dynamic manipulation tasks based on multi-modal human-in-the-loop approach. *Autonomous Robots*. 36 (1-2): 123-136
5. Arbib M, Bonaiuto J, Bornkessel-Schlesewsky I, Kemmerer D, MacWhinney B, Nielsen F, Oztop E (2014) Action and Language Mechanisms in the Brain: Data, Models and Neuroinformatics. *Neuroinformatics*. 12: 209-225
6. Oztop E, Kawato M, Arbib M (2013) Mirror Neurons: Functions, Mechanisms and Models. *Neuroscience Letters* 540: 43-55

7. Kober J, Wilhelm A, Oztop E, Peters J (2012) Reinforcement Learning to Adjust Parameterized Motor Primitives to New Situations. *Autonomous Robots* 33(4): 361-379
8. Moore B, Oztop E (2012) Robotic grasping and manipulation through human visuomotor learning. *Robotics and Autonomous Systems* 60: 441-451
9. Gurbuz S, Oztop E, Inoue N (2012) Model free head pose estimation using stereovision. *Pattern Recognition* 45(1): 33-42
10. Babic J, Hale JG, Oztop E (2011) Human sensorimotor learning for humanoid robot skill synthesis. *Adaptive Behavior* 19(4): 250-263
11. Ugur E, Oztop E, Sahin E (2011) Goal emulation and planning in perceptual space using learned affordances. *Robotics and Autonomous Systems* 59: 580-595
12. Oztop E (2009) Sign representation of Boolean functions using a small number of monomials. *Neural Networks* 22: 938-948
13. Chaminade T, Oztop E, Gordon C, Kawato M (2008) From self-observation to imitation: visuomotor association on a robotic hand. *Brain Research Bulletin* 75(6): 775-784
14. Oztop E (2006) An upper bound on the minimum number of monomials required to separate dichotomies of $\{-1, 1\}^n$. *Neural Computation* 18: 3119-3138
15. Oztop E, Kawato M, Arbib M (2006) Mirror neurons and imitation: A computationally guided review. *Neural Networks* 19: 254-271
16. Oztop E, Imamizu H, Cheng G, Kawato M (2006) A computational model of anterior intraparietal (AIP) neurons. *Neurocomputing* 69: 1354-1361
17. Oztop E, Franklin DW, Chaminade T, Cheng G (2005) Human-humanoid interaction: Is a humanoid robot perceived as a human? *International Journal of Humanoid Robotics* 2:(4) 537-559
18. Oztop E, Wolpert D, Kawato M (2005) Mental state inference using visual control parameters. *Cognitive Brain Research* 22: 129-151
19. Oztop E, Bradley NS, Arbib MA (2004) Infant grasp learning: a computational model, *Exp Brain Res.* 158:480-503
20. Oztop E., Arbib MA (2002) Schema design and implementation of the grasp-related mirror neuron system. *Biological Cybernetics* 87: (2) 116-140
21. Arbib MA, Billard A, Iacoboni M, Oztop E (2000) Synthetic brain imaging: Grasping, mirror neurons and imitation. *Neural Networks* 13: (8-9) 975-997
22. Oztop E, Mulayim AY, Atalay V, Yarman-Vural F. (1999) Repulsive attractive network for baseline extraction on document images. *Signal Processing* 75 (1) 1-10

Online and Domestic Journal Publications

23. Oztop E (2007) Models of mirror system. *Scholarpedia* (online encyclopedia), 2(10):3276

24. Oztop E, Kawato M (2005) Conceptual and Computational Models of Mirror Neurons. *The Brain & Neural Networks (Journal of Japanese Neural Network Society)* 12: 61-73
25. Arbib MA, Oztop E, Zukow-Goldring P (2005) Language and the Mirror System: A Perception/Action Based Approach to Communicative Development. *Cogniție, Creier, Comportament / Cognition, Brain, Behavior* vol. IX(3) 239-272

Manuscripts Submitted or in Preparation

26. Babic J, Oztop E, Kawato M (in preparation) Human balance control: a comparison with control of reaching and pointing movements

Invited Book Chapters

1. Oztop E, Ugur E, Shimizu Y, Imamizu H (in press) Humanoid Brain Science In: Cheng G (ed) *Humanoid Robotics and Neuroscience: Science, Engineering and Society*. Taylor & Francis
2. Oztop E, Kawato M (2009) Models For The Control of Grasping In: Nowak D, Hermsdoerfer J (eds) *Sensorimotor Control of Grasping: Physiology and Pathophysiology*. Cambridge University Press
3. Oztop E (2009) Mirror Neurons: Extraordinary or Ordinary? In: Minett JW, Wang W (eds) *Language, Evolution, and the Brain*. City University of Hong Kong Press
4. Oztop E, Arbib M, Bradley N (2006) The Development of Grasping and the Mirror System. In: Arbib M (ed) *Action to Language via the Mirror Neuron System*. Cambridge University Press
5. Crowley M, Marmol S, Oztop E. (2002) Crowley-Arbib Saccade Model. Chapter in *The Neural Simulation Language*, MIT Press, MA 2002

Theses

6. Oztop E (2002) Modeling the Mirror: Grasp Learning and Action Recognition. Ph.D. thesis, University of Southern California
7. Oztop E (1996) A New Content Addressable Memory Utilizing High Order Neurons. Master thesis, Middle East Technical University, Turkey

Peer Reviewed Conference Papers

1. Zamani MA, Oztop E (2015.7) Simultaneous Human-Robot Adaptation for Effective Skill Transfer. *International Conference on Advanced Robotics (ICAR)*, Istanbul (to appear)
2. Ozturk N, Oztop E (2015.7) "Cooperative Multi-Task Assignment for Heterogonous UAVs. *International Conference on Advanced Robotics (ICAR)*, Istanbul (to appear)
3. Kirtay M, Oztop E (2013.5) Emergent Emotion via Neural Computational Energy Conservation on a Humanoid Robot. *IEEE-RAS Intl. Conf. on Humanoid Robots*, Georgia, Atlanta, USA
4. Ugur E, Sahin E, Oztop E (2012.9) Self-discovery of motor primitives and learning grasp affordances. *IEEE/RSJ International Conference on Intelligent Robots and*

Systems, Algarve, Portugal

5. Ugur E, Celikkanat H, Sahin E, Nagai Y, Oztop E (2011.10) Learning to Grasp with Parental Scaffolding, IEEE-RAS Intl. Conf. on Humanoid Robots, Bled, Slovenia.
6. Ugur E, Sahin E, Oztop E (2011.5) Unsupervised learning of object affordances for planning in a mobile manipulation platform, IEEE Intl. Conf. on Robotics and Automation, 4326-4332, Shanghai, China.
7. Ugur E, Oztop E, Sahin E (2011.5) Going beyond the perception of affordances: Learning how to actualize them through behavioral parameters, IEEE Intl. Conf. on Robotics and Automation pp. 4768-4773, Shanghai, China.
8. Kober K, Oztop E, Peters J (2010.06) Reinforcement Learning to adjust Robot Movements to New Situations, Robotics: Science and Systems, Proc., Zaragoza, Spain
9. Steffen J, Oztop E, Ritter H (2010.10) Structured Unsupervised Kernel Regression for Closed-loop Motion Control, IEEE International Conference on Robotics and Automation, Proc., Taipei, Taiwan
10. Moore B, Oztop E (2010.8) Redundancy parameterization for flexible motion control, ASME IDETC 2010, Montreal, Canada
11. Ugur E, Sahin E, Oztop E (2009.11) Affordance learning from range data for multi-step planning. International Conference on Epigenetic Robotics: Modeling Cognitive Development in Robotic Systems, Proc., Venice, Italy
12. Hajdinjak B, Babic J, Oztop E (2009.9) Improving Balance Regulation In Visuomotor Control For Humanoid Robots. IEEE International Symposium on Computer and Information Science, Guzelyurt, Proc., Northern Cyprus
13. Ugur E, Sahin E, Oztop E (2009.9) Predicting Future Object States Using Learned Affordances. IEEE International Symposium on Computer and Information Science, Guzelyurt, Proc., Northern Cyprus
14. Oztop E, Lin LH, Kawato M, Cheng G (2007.4) Extensive Human Training for Robot Skill Synthesis: Validation on a Robotic Hand. IEEE International Conference on Robotics and Automation, Proc., Roma, Italy
15. Oztop E, Lin LH, Kawato M, Cheng G (2006.12) Dexterous Skills Transfer by Extending Human Body Schema to a Robotic Hand. IEEE-RAS/RSJ International Conference on Humanoid Robots, Proc., Genova, Italy
16. Gump T, Azad P, Welke K, Oztop E, Dillmann R, Cheng G (2006.12) Unconstrained Real-time Markerless Hand Tracking for Humanoid Interaction. IEEE-RAS/RSJ International Conference on Humanoid Robots, Proc., Genova, Italy
17. Welke K, Oztop E, Ude A, Dillmann R, Cheng G (2006.12) Learning feature representations for an object recognition system. IEEE-RAS/RSJ International Conference on Humanoid Robots, Proc., Genova, Italy
18. Oztop E, Chaminade T, Cheng G, Kawato M (2005.12) Imitation Bootstrapping: Experiments on a Robotic Hand IEEE-RAS/RSJ International Conference on Humanoid Robots, Proc., Tsukuba, Japan

19. Oztop E, Imamizu H, Cheng G, Kawato M (2005.7) A Computational Model of Anterior Intraparietal (AIP) Neurons 14th Annual Computational Neuroscience Meeting, Madison, Wisconsin, USA
20. Chaminade T, Franklin D, Oztop E, Cheng G (2005. 7) Motor interference between Humans and Humanoid Robots: Effect of Biological and Artificial Motion. 4th IEEE International Conference on Development and Learning. INTEX Osaka, Japan
21. Oztop E, Franklin D, Chaminade T (2004.11) Human-Humanoid Interaction: Is a humanoid robot perceived as human? IEEE-RAS/RSJ International Conference on Humanoid Robots, Proc., Santa Monica, California, USA
22. Oztop E, Wolpert D, Kawato M (2003) Mirror neurons: key for mental simulation? Proceedings of Computational Neuroscience Meeting, Alicante, Spain

Invited Talks at International Workshops and Conferences

1. Oztop E (2013.11) Adaptive Systems through Human Sensorimotor Learning, IEEE IROS Workshop on Cognitive Robotics Systems: Replicating Human Actions and Activities, Tokyo, Japan
2. Oztop E (2013.06) Adaptive Systems through Human Sensorimotor Learning, Chist-Era Conference (Keynote), Brussels, Belgium
3. Oztop E (2011.5) From robot skill synthesis to understanding human motor control, The fourth Symposium on Cognitive Neuroscience Robotics, Osaka, Japan
4. Oztop E (2010.9) Human sensorimotor learning for robot skill synthesis (Keynote Speech), IEEE International Symposium in Robot and Human Interactive Communication (RO-MAN 2010), Viareggio, Italy
5. Oztop E (2010.5) Can we learn from biology about object representation for grasping and manipulation? Workshop on Representations for object grasping and manipulation, IEEE International Conference on Robotics and Automation, Anchorage, Alaska, USA
6. Oztop E (2009.9) Human Visuomotor Learning for Robot Skill Synthesis. First IEEE Workshop on Computer Vision for Humanoid Robots in Real Environments, IEEE International Conference on Computer Vision, Kyoto, Japan
7. Oztop E, Hale J, Babic J, Kawato M (2009.5) Connecting humans and robots for efficient robot skill generation. Workshop on Approaches to Sensorimotor Learning on Humanoid Robots, International Conference on Intelligent Robots and Systems, Kobe, Japan
8. Oztop E, Hale J, Babic J, Kawato M (2008.9) Robots as complex tools for humans to control: Human visuo-motor learning for robot skill synthesis. Workshop on Grasp and Task Learning by Imitation, International Conference on Intelligent Robots and Systems, Nice, France
9. Oztop E, Babic J, Hale J, Cheng G, Kawato M (2007.11) From Biologically Realistic Imitation to Robot Teaching via Human Motor Learning. 14th International Conference on Neural Information Processing, Kitakyushu, Japan
10. Oztop E (2007.4) Modeling Mirror Neurons. International Seminar on Language, Evolution, and the Brain, International Institute for Advanced Studies, Kyoto, Japan

11. Oztop E. (2004.9) Modeling the Mirror Neurons. In: the Workshop on Robotic Imitation, International Conference on Intelligent Robots and Systems, Sendai, Japan

Other Articles, Talks and Poster Presentations (selected)

1. Oztop E (2014.8) Robot Skill Acquisition via Human Sensorimotor Learning, Okinawa Institute of Technology, Okinawa, Japan
2. Oztop E (2014.4) Adaptive Systems through Human Sensorimotor Learning, Koc University, Istanbul, Turkey
3. Ugur E, Oztop E (2011.1) Development of early cognitive skills in humans and robots. Mechanisms of Brain and Mind, 11th Winter Workshop, Rusutsu, Japan.
4. Ugur E, Shimizu Y, Oztop E, Imamizu H (2011) Reconstruction of Grasp Posture from MEG Brain Activity, The 34th Annual Meeting of the Japan Neuroscience Society, Yokohama, Japan.
5. Moore B, Ugur E, Oztop E (2010) Biologically inspired robot grasping through human-in-the-loop robot control, IROS Workshop on grasp planning and task learning by imitation, Taiwan.
6. Ugur E, Oztop E, Sahin E (2010) Discovering action-oriented object meanings in an anthropomorphic robot platform, Neuro 2010, 2010, Kobe.
7. Ugur E, Sahin E, Oztop E (2009), Use of range cameras for the perception of push and grasp affordances, Computer Vision for Humanoid Robots in Real Environments Workshop, ICCV, 2009, Kyoto.
8. Oztop E, Cheng G, Imamizu H, Kawato M (2008.7) Mirror Neurons: Do we really know their function? The 31st Annual Meeting of the Japan Neuroscience Society, Tokyo.
9. Fujimoto I, Shimada Y, Kimura M, Kamitani Y, Erhan Oztop, Alexander Harner, Murase K (2007.4) Real-time f-MRI system for non-invasive BMI (in Japanese), Japanese Society of Radiological Technology 63th Science Meeting
10. Kimura M, Imamizu H, Shimada Y, Oztop E, Harner A, Kamitani Y (2007.2) Online fMRI decoding ~ Reading Janken gesture from brain activity ~, Japanese Electronic Telecommunication Society, 2nd Brain Interface Meeting
11. Kimura M, Imamizu H, Shimada Y, Nakamura T, Oztop E, Kamitani Y (2006.1) Real time fMRI Decoding, Mechanisms of Brain and Mind, 6th Winter Workshop
12. Oztop E, Imamizu H, Cheng G, Kawato M (2005.1) Emergent Grasp Affordance Encoding via Grasp Learning. Mechanisms of Brain and Mind, 5th Winter Workshop, Rusutsu, Japan.
13. Oztop E, Arbib MA (2001) Mirror neuron system for grasping: a model for the monkey, In Society for Neuroscience 31st. Annual Meeting Abstracts (27) 58.6

Patents

US Patent (20090049085) Binary data classification method, binary data classification device, computer program, and storage medium

Grants and Awards

2012-2016: Grant for the project “Convergent Human Learning for Robot Skill Generation”, EU FP7 Marie Curie Career Integration Grants (funding: EU Commission)

2014-2016: Grant for the project “Neurophysiology of Action Observation and its Computational Modeling”, Greek-Turkey bilateral project (funding: TUBITAK and GSRT)

2011 Outstanding Research Award, Advanced Telecommunications Research International (ATR)

PROFESSIONAL SERVICE

Reviewer for the Journals

(Computationally oriented Journals)

Neural Networks
IEEE Transactions on Neural Networks
IEEE Transactions on Systems, Man, and Cybernetics
Biological Cybernetics
PLoS Computational Biology
Connection Science
Artificial Life

(Neuroscience oriented Journals)

Experimental Brain Research
Cerebral Cortex
European Journal of Neuroscience
Philosophical Psychology
Brain Research

(Robotics Journals)

International Journal of Robotics Research
Advanced Robotics
Robotics and Autonomous Systems
Autonomous Robots
IEEE Transactions on Robotics
Journal of NeuroEngineering and Rehabilitation

Other Reviewing Activities

IEEE/RSJ International Conference on Intelligent Robots and Systems
IEEE International Conference on Robotics and Automation
IEEE/RAS International Conference on Humanoid Robots
The Scientific Committee of the Association Française contre les Myopathies

Memberships

IEEE
ACM