

## ITAMAR AREL, Ph.D., M.B.A.

Machine Intelligence Lab  
Department of Electrical Engineering and Computer Science  
The University of Tennessee

email: [itamar@eecs.utk.edu](mailto:itamar@eecs.utk.edu)  
Tel: 865-974-3891

### EDUCATION

- Ph.D.** Electrical & Computer Engineering, Ben-Gurion University, Israel, June 2003.  
Advisor: Prof. Dan Sadot
- M.Sc.** Electrical & Computer Engineering, Ben-Gurion University, Israel, June 1998.  
Advisor: Prof. Dan Sadot
- M.B.A.** Ben-Gurion University Business School, Israel, June 2002.
- B.Sc.** Electrical & Computer Engineering, Ben-Gurion University, Israel, June 1995.

### EMPLOYMENT AND APPOINTMENTS

- August 2009 – *present* **Associate Professor**, Department of Electrical Engineering and Computer Science, University of Tennessee, Director, [Machine Intelligence Lab](#)
- January 2014 – *July 2015* **Visiting Associate Professor**, Stanford University  
Computer Science Department (*on leave from the University of Tennessee*)
- January 2008 – *April 2015* **Chief Technology Officer**, Binatix Labs, Palo Alto, CA
- August 2003 – July 2009 **Assistant Professor**, Department of Electrical Engineering and Computer Science, University of Tennessee.
- February 2000 – July 2003 **Chief Scientist** (co-founder), TeraCross, Inc., Campbell, CA.
- June 1995 – January 2000 **Active Duty Engineering Officer**, Israel Defense Forces.
- June 1995 – January 2000 **Research Assistant**, Optical Communication Laboratory, Ben-Gurion University, Israel.

### HONORS AND AWARDS

- Recipient of Intel scholarship award for excellence in Ph.D. studies – 1999
- Recipient of the *US Department of Energy Young Investigator CAREER Award*, August 2004
- The University of Tennessee Chancellor's *Professional Development Award*, May 2004
- Southeastern Center for Electrical Engineering Education *Junior Faculty Development Award*, 2005
- Min Kao Faculty Fellowship Award, 2006
- Best Poster, IEEE International Joint Conference on Neural Networks (IJCNN), Dallas, TX, 2013.
- The University of Tennessee Chancellor's *Success in Multidisciplinary Research award*, April 2014.

## PROFESSIONAL SERVICE & MEMBERSHIP

### PROFESSIONAL AFFILIATIONS

- IEEE Senior Member, 2004 – present
- Member of the following IEEE societies:
  - Computer Society, Computational Intelligence Society
- Member of the Association for the Advancement of Artificial Intelligence (AAAI), 2004 – present
- Founding Member, Biologically Inspired Cognitive Architectures (BICA) Society, 2010-present
- Member, *Lifeboat Foundations*, 2005 - present
- Board member, Committee on Advanced Technology, *The Cure is Now Organization*, Dec. 2011 - present

### PROFESSIONAL SERVICE

- Session Chair, IEEE International Conference on Networking (ICN), March 2004, Guadalupe, France
- Session Chair, IEEE International Conference on Computer Communications and Networks (ICCCN), August 2004 (Rosemont, IL), 2005 (San Diego, CA)
- Session Chair, International Conference on Electronics, Circuits and Systems (ICECS), Tel-Aviv, Israel, December 2004.
- Member, technical program committee, IEEE Globecom, December 2004 (Dallas, TX), 2005 (St. Louis, MO) and 2007 (Washington, DC)
- Member, technical program committee, IEEE International Conference on Networking (ICN), April 2005, Reunion, France, April 2007
- Session Chair, IEEE International Workshop on High-Performance Switching and Routing (HPSR), May 2005 (Hong Kong), May 2007 (New York, NY)
- Panel Presenter, IEEE International Workshop on High-Performance Switching and Routing (HPSR), May 2005 (Hong Kong)
- Member, technical program committee, IEEE International Workshop on High-Performance Switching and Routing (HPSR), May 2005 (Hong Kong, PRC), 2007 (New York, NY), 2008 (Shanghai, PRC), and 2009 (Paris, France)
- Member, technical program committee, IEEE International Conference on Communications (ICC), June 2005 (Seoul, Korea), 2006 (Istanbul, Turkey), 2007 (Glasgow, Ireland) and 2008 (Beijing, PRC)
- Member, technical program committee, IEEE International Conference on Computer Communications and Networks (ICCCN), August 2007 (Honolulu, Hawaii) and 2008 (St. Thomas U.S. Virgin Islands)
- Member, organizing committee for the First Workshop on the Sociocultural, Ethical and Futurological Implications of Artificial General Intelligence, Memphis, TN, March 2008
- Co-general Chair of the 51<sup>st</sup> IEEE Midwest Symposium on Circuits and Systems (MWSCAS), held in Knoxville, TN, August 10-13, 2008
- Member, IEEE MWSCAS steering committee, 2008 - 2010
- Action Editor, International Journal of Artificial General Intelligence (AGI), 2008 – 2010

- Member, organizing committee for the second International Conference on Artificial General Intelligence (AGI), Washington DC, March 2009
- Member, organizing committee for the 53<sup>rd</sup> IEEE Midwest Symposium on Circuits and Systems (MWSCAS) August 2010, Seattle, Washington
- Co-chair, Student Contest Committee, for the 53<sup>rd</sup> IEEE Midwest Symposium on Circuits and Systems (MWSCAS) August 2010, Seattle, Washington
- Session chair (Robotics and Embodiment), The Second International Conference on Artificial General Intelligence (AGI), March 2009, Washington, DC
- Created and maintained the Artificial General Intelligence Roadmap website – a research community resource and reference (<http://AGI-Roadmap.org>), March 2009
- Member, Kurzweil Best Paper Award Committee, The Second International Conference on Artificial General Intelligence (AGI), March 2009, Washington, DC
- Member, program committee, 8<sup>th</sup> International Conference on Development and Learning (ICDL), Shanghai, China, June 2009
- Member, organizing committee, International Workshop on Knowledge Discovery for Patient-Centric Healthcare (PCH), Paris, France, July 2009
- Co-general Chair of the National Science Foundation Workshop on Improving Domestic Student Participation in Electrical and Computer Engineering Graduate Programs, Knoxville, TN, October 2009
- Co-general Chair of the Workshop on Creating a Roadmap toward Human-Level Artificial General Intelligence, Knoxville, TN, October 2009
- Member, Program Committee for First International Conference on Biologically-Inspired Cognitive Architectures, Washington DC, November 2010
- Member, Program Committee, 2<sup>nd</sup> International Conference on Advanced Intelligence (ICAI), Beijing, China, August, 2010
- Member, technical program committee, Parallel and Distributed Computational Intelligence (PDCI-2011) minitrack held as part of the the 44<sup>th</sup> Hawaii International Conference on System Science (HICSS-44), January 2011, Koloa, Kauai, Hawaii
- Founding member, Biologically Inspired Cognitive Architectures (BICA) Society, 2010.
- Session Chair on “*Theoretical Topics in BICA*”, International Conference on Biologically Inspired Cognitive Architectures, Washington, DC, November 2010
- Demo Track Chair, 3<sup>rd</sup> International Conference on Artificial General Intelligence (AGI), San Francisco, CA, August 2011
- Committee Member, Speech Recognition Conference, Afeka Center for Language Processing (ACLSP), June 2011, Tel-Aviv, Israel.
- Panel Member, Embodiment in Biologically Inspired Cognitive Architectures, BICA 2010, Washington, DC, November 2010.
- Member, Program Committee, Biologically Inspired Cognitive Architectures Conference, November 2011, Washington, DC.
- Session Chair, 4<sup>th</sup> Conference on Artificial General Intelligence (AGI), Mountain View, CA, August 2011.
- Member, IEEE Task Force on Human-like Intelligence, established August 2011.
- Founding Member, Artificial General Intelligence (AGI) Society, September 2011.

- Organizing Committee Member, 5<sup>th</sup> International conference on Artificial General Intelligence (AGI), Oxford University, England, December 2012.
- Local organization co-chair for the 2012 IEEE International Conference on Machine Learning and Applications (ICMLA), Boca Raton, Florida, December 2012.
- Member, Program Committee, 5<sup>th</sup> Conference on Artificial General Intelligence (AGI), Oxford University, England, December 2012.
- Member, Program Committee, 2012 Computational Data Analytics Workshop (CDAW), Oak Ridge National Lab, Oak Ridge, TN, October 2012.
- Member, Program Committee, 2013 IEEE Symposium on Adaptive Dynamic Programming and Reinforcement Learning (ADPRL), Singapore, April 2013.
- Member, Program Committee, 2013 IEEE symposium on Computational Intelligence for Human-like Intelligence (CIHLI), Singapore, April 2013.
- Panelist (invited) at the 2012 Deep Learning and Supervised Feature Learning NIPS Workshop, Lake Tahoe, CA, December 2012.
- Reviewer, First International Conference on Learning Representations (ICLR), Scottsdale, AZ, May 2013.
- Member, Program Committee, 6<sup>th</sup> International Conference on Artificial General Intelligence (AGI), Beijing, China, July 2013.
- Member, organizing committee, IEEE 12<sup>th</sup> International Conference on Machine Learning and Applications ICMLA 2013, Miami, Florida, December 2013.
- Member, program committee, IEEE Symposium Series on Computational Intelligence (SSCI '14), Orlando, Florida, December 2014.
- Member, Technical Program Committee, IEEE International Joint Conference on Neural Networks (IJCNN), Beijing, China, July 2014.
- Member, Technical Program Committee, 2014 IEEE Symposium on Computational Intelligence for Human-like Intelligence, Orlando, FL, December 2014.
- Member, Technical program committee, 2014 Artificial General Intelligence (AGI) Conference, Quebec City, Canada, August 2014.
- Reviewer, 2014 International Conference on Learning Representations (ICLR), Banff, Canada, April 2014.
- Reviewer, PLOS ONE (Machine Learning area), 2013 – present
- Member, organization committee, Workshop on General Intelligence for Humanoid Robots at the International Conference on Robotics and Automation (ICRA), Hong Kong, June 2014.
- Reviewer, IEEE Symposium Series on Computational Intelligence 2014 (SSCI 2014), Orlando, FL, Dec 2014.
- Reviewer, NIPS Workshop on Deep Learning and Representation Learning 2014, Montreal, Canada, December 2014.
- Member, Program Committee, 2015 Artificial General Intelligence (AGI) Conference, Berlin, Germany, August 2015.

## **EDITORIAL REVIEW**

### *Book Chapters*

- P. Wang, B. Goertzel (Eds.), *Artificial General Intelligence*, Atlantis Press, 2012.

### *Journals*

- IEEE Transactions on Cybernetics, 2013 – present
- IEEE Transactions on Communications, 2005 – 2010
- IEEE/ACM Transactions on Networking, 2005, 2006, 2007
- IEEE Journal on Selected Areas in Communications, 2005, 2006
- IEEE Communications Letters, 2005, 2006, 2007, 2008
- IEEE Journal of Lightwave Technology, 2006
- Computer Communications Journal, 2006, 2007
- Multimedia Systems Journal, 2006
- IEEE Transactions on Parallel and Distributed Systems, 2006 - present
- IEEE Transactions on Wireless Communications, 2007
- IEE Proceedings on Communications, 2007
- International Journal of System Architecture, 2007
- IEEE Transactions on Neural Networks, 2007, 2008
- IEEE Transactions on System, Man and Cybernetics, 2007
- IEEE Transactions on Vehicular Technology, 2008
- IEEE Transactions on Intelligent Transportation Systems, 2009
- Neurocomputing, 2009 – present
- IEEE Transactions on Autonomous Mental Development (TAMD), 2010 – present
- Biologically Inspired Cognitive Architectures (BICA Journal) – 2012 – present
- Journal of Artificial Intelligence Research (JAIR) – 2012 – present
- IEEE Computational Intelligence Magazine, 2012 – present
- Communications of the ACM (journal), 2013 - present

### *Conferences, Symposiums and Workshops*

- IEEE International Symposium on Circuits and Systems (ISCAS 2000)
- IEEE/ACM International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2002)
- International Workshop on Cryptographic Hardware and Embedded Systems (CHES), 2003
- IEEE International Conference on Communications (ICC) 2004, 2005, 2006
- IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM), 2004
- IEEE Globecom 2004, 2005, 2006
- IEEE International Conference on Networking (ICN) 2005, 2006, 2007
- IEEE Workshop on High-Performance Switching and Routing (HPSR) 2005, 2006, 2007
- IEEE Midwest Symposium on Circuits & Systems (MWSCAS) 2005, 2006, 2007, 2008
- IEEE Conference on High Performance Computing Architectures (HPCA), 2006.
- ASEE/IEEE Frontiers in Education Conference (FIE), 2006, 2007.
- IEEE INFOCOM 2007, 2008
- IEEE Conference on Decision and Control (CDC), 2007
- International Symposium on Knowledge Communication and Peer Reviewing, 2007
- American Control Conference (ACC), 2008
- International Conference on Application of Advanced Technologies in Transportations, 2008

- AAI 2008 Workshop on Biologically-Inspired Cognitive Architectures (BICA), Washington, DC, November 2009
- IEEE International Conference on Decision and Control (CDC), Atlanta, GA, 2010
- IEEE International Conference on Decision and Control (CDC), Orlando, FL, 2011
- IEEE International Conference on Decision and Control (CDC), Maui, Hawaii, 2012
- International Conference on Biologically Inspired Cognitive Architectures (BICA), Washington DC, November, 2011
- The 50<sup>th</sup> ACM Southeast Conference, Tuscaloosa, Alabama, March 29-31, 2012
- International Conference on Biologically Inspired Cognitive Architectures (BICA), Palermo, Italy, November, 2012
- International Conference on Neural Information Processing (ICONIP'12), November 2012, Doha, Qatar.
- IEEE International Conference on Machine Learning and Applications (ICMLA '12), December 2012, Boca Raton, FL.
- International Conference on Learning Representation (ICLR), Scottsdale, AZ, May 2013.
- IEEE Symposium Series on Computational Intelligence 2014 (SSCI 2014), Orlando, FL, Dec 2014.
- International Conference on Machine Learning (ICML), LILLE GRAND PALAIS, France, June 2015.

#### UNIVERSITY SERVICE

- Member, EECS Graduate Committee, May 2004 – 2011
- Member, ECE strategic planning committee, 2004 – 2006
- Member, EECS new building instructional lab committee, 2004
- Member, EECS Faculty Search Committee – computer engineering, Spring 2004, Spring 2005, Spring 2007, Spring 2008
- Judge, Sigma Xi Graduate Student Presentation Competition, April 2004
- Technical editor of the ECE departmental newsletter (*The VOLtage*), 2005 – 2007.
- Chair, Gonzales Family Staff Excellence Award committee, 2006
- Member, ECE/CS Merger Committee, 2006
- Member, Min Gao Graduate Scholarship committee, Spring 2007
- Chair, Graduate admissions committee for the Electrical and Computer Engineering programs in the EECS department, 2007
- Member, UT Graduate Council, 2007 – 2009
- Member, UT Graduate Appeals Committee, 2007 - 2009
- Member, EECS Department Head Search Committee – January through October, 2007
- Member, Dean of the College of Engineering Search Committee, 2008 - 2009
- Member, UT subcommittee on academic expansion as part of the Provost's UT strategic planning committee, January – April, 2008
- Member, UT Governor's Chair in computational science search committee, 2008 – 2009
- Panelist at new faculty orientation (invited), The University of Tennessee, 2009
- Referee, Sigma-Xi Graduate Research Competition, University of Tennessee, March 2010
- Senator, UT Faculty Senate, August 2010 – June 2013

- Member of the University of Tennessee Research Council, 2011 - 2013
- Chair of the EECS Graduate Affairs Committee, 2010-2011
- Departmental coordinator of Graduate Teaching Assistantship (GTA) allocations – AY 2001
- Chair of the Faculty Search Committee in Computer Engineering, Spring 2012
- Chair of the Faculty Search Committee in Computer Engineering, Fall 2012
- Member of the Faculty Senate SARIF Graduate Research Assistantship (GRA) Committee, Fall 2012 – Spring 2013
- Member of the Faculty Senate SAIR Equipment and Infrastructure Grants Committee, Fall 2012 – Spring 2013
- Member of the 2013 Chancellor’s research and creative awards committee

#### **PUBLIC SERVICE**

- Technical editor, Network Processing Forum (industry technological consortium), 2002
- Proposal Reviewer, US Department of Energy, Young Investigator CAREER award, 2005
- Proposal Reviewer, US Department of Energy SBIR/STTR (small business innovation research), 2005, 2006
- Member, Computer Architectures National Science Foundation proposal review panels, 2006 – 2009.
- Reviewer for Prentice Hall book on probability theory, 2007
- Member, DOE Proposal Review Panel, 2009
- Ph.D. Dissertation review panel, Ben-Gurion University, Israel, August 2011
- Reviewer for a book proposal in the area of artificial intelligence for World Scientific Publishing (based in Hong Kong), September 2012.
- Member, BIGDATA National Science Foundation proposal review panel, 2012.
- Member, Robust Intelligence National Science Foundation proposal review panel, 2014

#### **PUBLICATIONS** *\*former last name is Elhanany*

##### **BOOKS**

- [B1] **I. Elhanany**, M. Hamdi (Eds.), *High-Performance Packet Switching Architectures*, Springer-Verlag, London, September 2006.

##### **BOOK CHAPTERS**

- [BC4] **I. Arel**, “Deep Reinforcement Learning as Foundation for Artificial General Intelligence,” *Theoretical Foundations of Artificial General Intelligence*, P. Wang, B. Goertzel (eds.), pp. 89-102, Atlantis Press (series Atlantis Thinking Machines), October 2012.
- [BC3] **I. Arel**, “The Threat of a Reward-Driven Adversarial Artificial General Intelligence,” *The Singularity Hypothesis: A Scientific and Philosophical Assessment (edited by A. Eden)*, Springer, 2012.
- [BC2] **I. Elhanany**, V. Tabatabaee, W. B. Matthews, “Fabric on a Chip: A Memory Management Perspective,” *High-Performance Packet Switching Architectures*, pp. 101-120, Springer-Verlag, London, September 2006.

- [BC1] **I. Elhanany**, D. Sadot, "A Contention-Free Tbit/sec Packet-Switching Architecture for ATM over WDM Networks," *High-Performance Backbone Network Technology*, pp. 355-361, Marcel Dekker, 2005.

**REFEREED JOURNALS** (*in reverse chronological order*)

- [J33] J. Lu, S. Young, **I. Arel**, J. Holleman, "A 1 TOPS/W Analog Deep Machine-Learning Engine with Floating-Gate Storage in 0.13  $\mu\text{m}$  CMOS," in *IEEE Journal of Solid State Circuits*, January, 2015.
- [J32] S. Young, J. Liu, **I. Arel**, J. Holleman, "On the Impact of Approximate Computation in an Analog DeSTIN Architecture," in Proc. *IEEE Transactions on Neural Networks and Learning Networks*, Vol. 25, No. 5, pp 934-958, May 2014.
- [J31] S. Young, A. Davis, A. Mishtal, **I. Arel**, "Hierarchical Spatiotemporal Feature Extraction using Recurrent Online Clustering," *Pattern Recognition Letters*, Vol. 37, pp. 115-123, Feb. 2014.
- [J30] R. Coop, A. Mishtal, **I. Arel**, "Ensemble Learning in Fixed Expansion Layer Networks for Mitigating Catastrophic Forgetting," *IEEE Transactions on Neural Networks and Learning Systems*, Vol. 24, No. 10, pp. 1623 – 1634, October, 2013.
- [J29] B. Goertzel, S. Adams, J. Bach, **I. Arel**, J. Hall, R. Coop, "A Roadmap Toward Human Level Artificial General Intelligence," *AAAI Artificial Intelligence Magazine*, March 2012.
- [J28] K. Habgood, **I. Arel**, "A Condensation-based Application of Cramer's Rule for Solving Large-Scale Linear Systems," *Journal of Discrete Algorithms*, Vol. 10, pp. 98-109, January 2012.
- [J27] B. Goertzel, R. Lian, **I. Arel**, H. de Garis, S. Chen, "World Survey of Artificial Brains, Part II: Biologically Inspired Cognitive Architectures," *Neurocomputing*, September 2010.
- [J26] B. Matthews, **I. Arel**, D. Rose, B. Bollinger, "Multicast and QoS Provisioning in Parallel Shared Memory Switches," *IET Communications*, Vol. 4, No. 14, pp. 1665-1676, September 2010.
- [J25] **I. Arel**, D. Rose, T. Karnowski, "Deep Machine Learning – A New Frontier in Artificial Intelligence Research," *IEEE Computational Intelligence Magazine*, Vol. 14, pp. 12-18, November, 2010.
- [J24] **I. Arel**, C. Liu, T. Urbanik, A. Kohls, "A Reinforcement Learning based Multi-Agent System for Network Traffic Signal Control," *IET Intelligent Transport Systems*, Vol. 4, No. 2, pp. 128-135, June, 2010.
- [J23] **I. Arel**, S. Livingston, "Beyond the Turing Test," *IEEE Computer*, Vol. 42, No. 3, pp. 104-105, March 2009.
- [J22] **I. Elhanany**, C. Niedzwiedz, Z. Liu, S. Livingston, "A Consolidated Actor-Critic Model for Partially-Observable Markov Decision Processes," *IET Electronics Letters*, Vol. 44, No. 22, October, 2008.
- [J21] J. Togelius, S. Lucas, J. Garibaldi, T. Nakashima, C. Hiong Tan, **I. Elhanany**, "The 2007 IEEE CEC Simulated Car Racing Competition," *Genetic Programming and Evolvable Machines*, pp. 1-35, October, 2008.
- [J20] R. Wunderlich, **I. Elhanany**, C. Liu, T. Urbanik, "A Novel Signal Scheduling Algorithm with Quality of Service Provisioning for an Isolated Intersection," *IEEE Transactions on Intelligent Transportation Systems*, Vol. 9, No. 3, pp. 536-547, September, 2008.
- [J19] **I. Elhanany**, Z. Liu, "A Fast and Scalable Recurrent Neural Network based on Stochastic Meta-Descent," *IEEE Transactions on Neural Networks*, Vol. 19, No. 9, pp. 1652-1658, September, 2008.



- [J18] B. Matthews, **I. Elhanany**, "Hardware Architecture for High-Speed Real-Time Dynamic Programming Applications," *IET Proceedings on Computers and Digital Techniques*, Vol. 2, No. 3, pp. 164-171, May 2008.
- [J17] X. Li, **I. Elhanany**, "Stability of a Frame-Based Oldest-Cell-First Maximal Weight Matching Algorithm," *IEEE Transactions on Communications*, Vol. 56, No. 1, pp. 21-26, January 2008.
- [J16] **I. Elhanany**, K. Busch, "Is Time Ripe for Fabric on a Chip?," *IEEE Computer*, Vol. 39, No. 9, pp. 112-113, September 2006.
- [J15] Z. Liu, **I. Elhanany**, "RL-MAC: Reinforcement Learning based MAC Protocol for Wireless Sensor Networks," *International Journal of Sensor Networks (IJSNet)*, Vol. 1, No. 3, pp. 117-124, 2006.
- [J14] **I. Elhanany**, B. Matthews, "On the Performance of Output-Queued Cell Switches with Non-Uniformly Distributed Bursts Arrivals," *IEE Proceedings on Communications*, Vol. 153, No. 2, pp. 201-204, April 2006.
- [J13] **I. Elhanany**, B. Arazi, O. Arazi, H. Qi, "Revisiting Public Key Cryptography for Wireless Sensor Networks," Vol. 38, No. 11, *IEEE Computer*, pp. 83-85, Nov. 2005.
- [J12] X. Li, **I. Elhanany**, "Stability of a Frame-Based Maximal Weight Matching Algorithm with Transfer Speedup," *IEEE Communication Letters*, Vol.9, No. 10, pp. 942-944, October 2005.
- [J11] **I. Elhanany**, M. Kahane, "Heterogeneous Bursty Traffic Dispersion over Multiple Server Clusters," *IEEE Communication Letters*, Vol. 9, No. 3, pp. 261-263, March 2005.
- [J10] **I. Elhanany**, D. Chiou, V. Tabatabaee, R. Noro, A. Poursepanj, "The Network Processing Forum Switch Fabric Benchmark Specifications: An Overview," *IEEE Network*, Vol. 19, No. 2, pp. 5-9, March/April 2005.
- [J9] **I. Elhanany**, V. Tabatabaee, "The Network Processing Forum Tackles Benchmarking of Next-Generation Switch Fabrics," *IEEE Computer*, pp. 109-110, Oct. 2003.
- [J8] **I. Elhanany**, K. Busch, D. Chiou, "Switch Fabric Interfaces," *IEEE Computer*, pp. 106-108, Sept. 2003.
- [J7] **I. Elhanany**, D. Sadot, "DISA: A Robust Scheduling Algorithm for Scalable Crosspoint-Based Switch Fabrics," *IEEE Journal on Selected Areas in Communications*, Vol. 21, No. 4, pp. 535-545, May 2003.
- [J6] **I. Elhanany**, D. Sadot, "Analysis of Non-Uniform Cell Destination Distribution in Virtual Output Queuing Systems," *IEEE Communications Letters*, Vol. 6, No. 9, pp. 367-369, September 2002.
- [J5] **I. Elhanany**, M. Kahane, and D. Sadot, "Packet-Scheduling in Next-Generation Multi-Terabit Networks," *IEEE Computer*, No. 34, Vol. 4, pp. 104-106, April 2001.
- [J4] **I. Elhanany**, J. Nir, and D. Sadot, "A Contention-Free Packet Scheduling Scheme for Provision of Quality-of-Service in Tbit/sec WDM Networks," (Invited Paper) *SPIE Optical Networks*, No. 3, pp. 19-24, July 2000.
- [J3] D. Sadot, **I. Elhanany**, "Optical Switching Speed Requirements for Terabit/sec Packet Over WDM Networks," *IEEE Photonic Technology Letters*, Vol. 12, No.4, pp. 440-442, April 2000.
- [J2] **I. Elhanany**, D. Sadot, "A Contention-Free Tbit/sec Packet-Switching Architecture for ATM over WDM Networks," *IEEE/IEICE (joint issue) Trans. on Communications*, Vol. E83-B, No. 2, pp. 225-230, Feb. 2000.
- [J1] J. Nir, **I. Elhanany** and D. Sadot, "Tbit/s Switching Scheme for ATM/WDM Networks," *IEE Electronics Letters*, Vol. 35, No.1, pp. 30-31, January 7<sup>th</sup> 1999.

**REFEREED CONFERENCE AND WORKSHOP PUBLICATIONS** (*in reverse chronological order*)

- [C83] J. Holleman, **I. Arel**, J. Lu, S. Young, "Analog Inference Circuits for Deep Learning," to appear in the *2015 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, October, October 2015.
- [C82] B. Goodrich, **I. Arel**, "Mitigating Catastrophic Forgetting in Temporal Difference Learning with Function Approximation," in Proc. the *2<sup>nd</sup> International Conference of Reinforcement Learning and Decision Making (RLDM)*, Alberta, CA, June 2015.
- [C81] T. Lancewicki, **I. Arel**, "Covariance Matrix Estimation in Reinforcement Learning," in Proc. the *2<sup>nd</sup> International Conference of Reinforcement Learning and Decision Making (RLDM)*, Alberta, CA, June 2015.
- [C80] J. Holleman, **I. Arel**, "Low-Power Analog Deep Learning Architecture for Image Processing," in Proc. the *Government Microcircuit Applications & Critical Technology Conference (GOMAC Tech)*, St. Louis, MO, March, 2015.
- [C79] B. Goodrich, **I. Arel**, "Neuron Clustering for Mitigating Catastrophic Forgetting in Feed Forward Neural Networks," in Proc. *IEEE Symposium Series on Computational Intelligence*, December, 2014.
- [C78] B. Goodrich, **I. Arel**, "Unsupervised Neuron Selection for Mitigating Catastrophic Forgetting in Neural Networks," in Proc. *IEEE MWSCAS 2014*, August, 2014.
- [C77] A. Davis, **I. Arel**, "Low-rank Approximations for Conditional Feedforward Computation in Deep Neural Networks," in Proc. *International Conference on Learning Representations (ICLR)*, Banff, Canada, April, 2014.
- [C76] J. Lu, S. Young, **I. Arel**, J. Holleman, "A 1TOPS/W Analog Deep Machine Learning Engine with Floating-Gate Storage in 0.13um CMOS," in Proc. *2014 IEEE international Solid-State Circuits Conference (ISSCC)*, February 2014.
- [C75] J. Lu, S. Young, **I. Arel**, J. Holleman, "An Analog Online Clustering Circuit in 130nm CMOS," in Proc. in *IEEE Asian Solid-State Circuits Conference (A-SSCC)*, November, 2013.
- [C74] R. Coop, **I. Arel**, "Mitigation of Catastrophic Forgetting in Recurrent Neural Networks using a Fixed Expansion Layer," in Proc. *IEEE 2013 International Joint Conference on Neural Networks (IJCNN)*, Dallas, TX, August 2013. [Recipient of **BEST POSTER AWARD**].
- [C73] D. Rose, **I. Arel**, "Gradient Driven Learning for Pooling in Visual Pipeline Feature Extraction Models," in Proc. *International Conference on Learning Representations (ICLR)*, Scottsdale, AZ, May 2013.
- [C72] C. Symons, R. Vatsavai, G. Jun, **I. Arel**, "Bias Selection Using Task-Targeted Random Subspaces for Robust Application of Graph-Based Semi-Supervised Learning," in Proc. the *IEEE International Conference on Machine Learning and Applications (ICMLA)*, December, 2012.
- [C71] A. Mishtal, **I. Arel**, "Jensen-Shannon Divergence in Ensembles of Concurrently-Trained Neural Networks," in Proc. *IEEE International Conference on Machine Learning and Applications (ICML)*, December, 2012. (**received best presentation award**)
- [C70] D. Rose, **I. Arel**, "Toward a Sequential Approach to Pipelined Image Recognition," in Proc. *IEEE International Conference on Machine Learning and Applications (ICMLA)*, December, 2012.

- [C69] S. Young, **I. Arel**, "Recurrent Clustering for Unsupervised Feature Extraction with Application to Sequence Detection," in Proc. *IEEE International Conference on Machine Learning and Applications (ICMLA)*, December, 2012.
- [C68] R. Coop, **I. Arel**, "Mitigation of Catastrophic Interference in Neural Networks Using a Fixed Expansion Layer," in Proc. IEEE Midwest Symposium on Circuits and Systems (MWSCAS) 2012, August, 2012.
- [C67] B. Goodrich, **I. Arel**, "Reinforcement Learning based Visual Attention with Application to Face Detection," in Proc. *3<sup>rd</sup> IEEE International Workshop on Computer Vision for Computer Games*, pp. 19-24, Providence, Rhode Island, June, 2012.
- [C66] B. Martin, **I. Arel**, "Intrinsically Motivated Exploration via Intrinsic Value Calculation," in Proc. *50<sup>th</sup> ACM Southeast Conference*, Tuscaloosa, AL, March, 2012.
- [C65] B. Goodrich, **I. Arel**, "Consolidated Actor Critic Reinforcement Learning Model Applied to Face Detection," (*BEST STUDENT POSTER AWARD*) in Proc. *50<sup>th</sup> ACM Southeast Conference*, Tuscaloosa, AL, March, 2012.
- [C64] N. Pennington, B. Goodrich, **I. Arel**, "Contrasting Infant Perception Data with a Reinforcement Learning Visual Search Model," in Proc. *Second International Conference on Artificial General Intelligence (BICA)*, Washington, DC, November, 2011.
- [C63] T. Karnowski, **I. Arel**, S. Young, "Modeling Temporal Dynamics with Function Approximation in Deep Spatio-Temporal Inference Network," in Proc. *Second International Conference on Artificial General Intelligence (BICA)*, Washington, DC, November, 2011.
- [C62] C. Symons, **I. Arel**, "Multi-View Budgeted Learning under Label and Feature Constraints Using Label-Guided Graph-Based Regularization," in Proc. *ICML 2011 Workshop on Combining Learning Strategies to Reduce Label Cost*, Washington, June, 2011.
- [C61] **I. Arel**, J. Holleman, "Scalable Low-Power Deep Machine Learning with Analog Computation," (INVITED TALK) in Proc. 2011 International Joint Conference on Neural Networks (IJCNN), San Jose, CA, August 2011.
- [C60] **I. Arel**, S. Berant, T. Slonim, A. Moyal, L. Bo, "Acoustic Spatiotemporal Modeling using Deep Machine Learning for Robust Phoneme Recognition," in Proc. The 2011 Afeka-AVIOS Speech Processing Conference, June, 2011.
- [C59] T. Karnowski, **I. Arel**, D. Rose, "Semi-Supervised Deep Spatiotemporal Learning with Application to Image Classification," in Proc. *9th International Conference on Machine Learning and Applications (ICMLA'10)*, December, 2010.
- [C58] **I. Arel**, T. Karnowski, "Application Feedback in Guiding a Deep-layered Perception Model," in Proc. *First International Conference on Biologically Inspired Cognitive Architectures (BICA)*, Washington, DC, November, 2010.
- [C57] D. Rose, **I. Arel**, P. Karnowski, V. Paquit, "Applying Deep-Layered Clustering to Mammography Image Analytics," in Proc. *2010 Annual Oak Ridge National Laboratory Biomedical Science & Engineering Conference (BSEC)*, Oak Ridge, TN, May, 2010.
- [C56] K. Habgood, **I. Arel**, "Revisiting Cramer's Rule for Solving Dense Linear Systems," in Proc. *2010 High Performance Computing Symposium (HPC)*, Orlando, FL, April 2010.
- [C55] S. Bulusu, **I. Arel**, B. Arazi, A. Davis, G. Bitar, "A Data Security Protocol for the Trusted Truck<sup>®</sup> System," in Proc. *6th Annual Cyber Security and Information Intelligence Research Workshop*, Oak Ridge National Lab, Oak Ridge, TN, April, 2010.

- [C54] S. Young, **I. Arel**, T. Karnowski, D. Rose, "A Fast and Stable Online Clustering Algorithm," in Proc. *Data Mining Track of the 7<sup>th</sup> International Conference on Information Technology: Next Generations (ITNG)*, Las Vegas, NV, April 2010.
- [C53] **I. Arel**, D. Rose, T. Karnowski, "A Deep Learning Architecture Comprising Homogeneous Cortical Circuits for Scalable Spatiotemporal Pattern Inference," in Proc. *NIPS 2009 Workshop on Deep Learning for Speech Recognition and Related Applications*, Whistler, BC, Canada, Dec 2009.
- [C52] **I. Arel**, D. Rose, R. Coop, "DeSTIN: A Scalable Deep Learning Architecture with Application to High-Dimensional Robust Pattern Recognition," in Proc. *AAAI 2009 Fall Symposium on Biologically Inspired Cognitive Architectures*, Washington, DC, November, 2009.
- [C51] S. Young, **I. Arel**, O. Arazi, "Pi-PIFO: A Scalable Pipelined PIFO Memory Management Architecture," in Proc. of the *10<sup>th</sup> International Conference on Telecommunications*, Zagreb, Croatia, June, 2009.
- [C50] **I. Arel**, "Working Toward Pragmatic Convergence: AGI Axioms and a Unified Roadmap," *Workshop on the Future of AGI (as part of the 2<sup>nd</sup> Conference on Artificial General Intelligence)*, Washington, DC, March, 2009.
- [C49] V. Mahoney, **I. Elhanany**, "A Backpropagation Neural Network Design Using Adder-Only Arithmetic," in Proceedings of the *2008 IEEE Midwest Symposium on Circuits and Systems (MWSCAS)*, August, 2008.
- [C48] A. Nagari, **I. Elhanany**, B. Thompson, F. Li, T. King, "Parallel Processing Architecture for Solving Large-Scale Linear Systems," in Proceedings of the *2008 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'08)*, pp. 442-446, Las Vegas, July, 2008.
- [C47] C. Niedzwiedz, **I. Elhanany**, Z. Liu, S. Livingston, "A Consolidated Actor-Critic Model with Function Approximation for High-Dimensional POMDPs," in Proceedings of the *2008 AAAI Workshop for Advancement in POMDP Solvers*, pp. 322-327, Chicago, July, 2008.
- [C46] S. Livingston, J. Garvey, **I. Elhanany**, "On the Broad Implications of Reinforcement Learning to Artificial General Intelligence," in Proceedings of the *AGI-08 Workshop on the Sociocultural, Ethical and Futurological Implications of Artificial General Intelligence*, Vol. 171, pp. 478 – 482, Memphis, TN, March 2008.
- [C45] R. Wunderlich, **I. Elhanany**, T. Urbanik, "Advanced Traffic Signal Control Using Intelligent Vehicle Infrastructure," in Proceedings of the *10<sup>th</sup> International Conference on Applications of Advanced Technologies in Transportation (AATT 2008)*, Athens, Greece, May 2008.
- [C44] R. Wunderlich, **I. Elhanany**, T. Urbanik, "A Stable Longest Queue First Signal Scheduling Algorithm for an Isolated Intersection," in Proceedings of the *2007 IEEE International Conference on Vehicular Electronics and Safety*, pp. 1-6, Beijing, PRC, December 2007.
- [C43] J. Turnmire, **I. Elhanany**, "A Distributed Architecture for Temporal Difference Learning with Eligibility Traces," in Proceedings *2007 IEEE Midwest Symposium on Circuits and Systems (MWSCAS)*, pp. 848-850, August 2007, Montreal, Canada.
- [C42] Z. Liu, **I. Elhanany**, "Large-Scale Tabular-Form Hardware Architecture for Q-Learning with Delays," in Proceedings *2007 of the IEEE Midwest Symposium on Circuits and Systems (MWSCAS)*, pp. 827-830, August 2007, Montreal, Canada.
- [C41] E. Farquhar, **I. Elhanany**, P. Hasler, M. Buckner, "Analog Recurrent Neural Networks for Visual Control Applications," in *Proceedings of the US Department of Defense Reconfigurable Systems, Microsystems, and Nanotechnology Conference*, May 2007.

- [C40] B. Matthews, **I. Elhanany**, "A Scalable Memory-Efficient Architecture for Parallel Shared Memory Switches," in *Proceedings 2007 IEEE Symposium on High Performance Switching and Routing (HPSR)*, pp. 1-5, New York, June 2007.
- [C39] X. Li, **I. Elhanany**, "A Scalable Frame-based Multi-Crosspoint Packet Switching Architecture," in *Proceedings 2007 IEEE Symposium on High Performance Switching and Routing (HPSR)*, pp. 20-25, New York, June 2007.
- [C38] T. Goodspeed, R. Wunderlich, **I. Elhanany**, "Enhancing Reinforcement Learning Class Curriculum using a Matlab Interface Library for use with the Sony AIBO Robot," in *Proceedings of the ASEE/IEEE 2007 Frontiers in Education Conference (FIE 2007)*, pp. 17-20, Milwaukee, Oct. 2007.
- [C37] B. Matthews, **I. Elhanany**, V. Tabatabaee, "Accelerated Packet Placement Architecture for Parallel Shared Memory Routers," in *Proceedings of the IFIP Networking 2007*, pp. 797-807, Atlanta, May, 2007.
- [C36] Z. Liu, **I. Elhanany**, "Fast and Scalable Recurrent Neural Network Learning based on Stochastic Meta-Descent," in *Proceedings of the 26<sup>th</sup> American Control Conference (ACC)*, , pp. 5695-5699, New York City, July 2007.
- [C35] Z. Liu, **I. Elhanany**, "A Scalable Recurrent neural Network Framework for Model-Free POMDPs," in *Proceedings of the IEEE International Symposium on Approximate Dynamic Programming and Reinforcement Learning (ADPRL)*, pp. 119-126, April, 2007.
- [C34] B. Matthews, **I. Elhanany**, "Switch Fabric on a Reconfigurable Chip using an Accelerated Packet Placement Architecture," in *Proceedings of the 15<sup>th</sup> ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA)*, (poster presentation), Monterey, CA, February 2007.
- [C33] O. Arazi, **I. Elhanany**, D. Rose, H. Qi, B. Arazi, "Self-Certified Public Key Generation on the Intel Mote 2 Sensor Network Platform," in *Proceedings of the 3<sup>rd</sup> Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)*, pp. 118-120, September, 2006, Reston, VA.
- [C32] S. Fields, **I. Elhanany**, "A Symmetric Multiprocessor Architecture for Multi-Agent Temporal Difference Learning," in *Proceedings of the 2006 IEEE International Midwest Symposium on Circuits & Systems (MWSCAS)* (poster presentation), San Juan, Puerto Rico, August 6-9, 2006.
- [C31] D. Budik, **I. Elhanany**, "TRTRL: A Localized Resource-Efficient Learning Algorithm for Recurrent Neural Networks," in *Proceedings of the 2006 IEEE International Midwest Symposium on Circuits & Systems (MWSCAS)*, pp. 371-374, San Juan, Puerto Rico, August 6-9, 2006.
- [C30] O. Arazi, B. Arazi, H. Qi, **I. Elhanany**, D. Rose, "Self-Certified Public Key Cryptography for Resource-Constrained Sensor Networks," in *Proceedings of the 2006 Cyber Security and Information Infrastructure Research Workshop*, Oak Ridge National Lab (ORNL), TN, May 10-11, 2006.
- [C29] B. Matthews, **I. Elhanany**, "Scalable Hardware Architecture for Real-Time Dynamic Programming Applications," in *Proceedings of the 2006 IEEE Symposium on Field Programmable Custom Computing Machines (FCCM)*, pp. 347-348, Napa, CA, April 2006.
- [C28] B. Matthews, **I. Elhanany**, V. Tabatabaee, "Fabric on a Chip: Towards Consolidating Packet Switching Functions on Silicon," in *Proceedings of the 2006 IEEE International Conference on Communications (ICC)*, pp. 110-115, Istanbul, Turkey, June 2006.

- [C27] Z. Liu, **I. Elhanany**, "RL-MAC: A QoS-Aware Reinforcement Learning based MAC Protocol for Wireless Sensor Networks," in Proceedings of the *2006 IEEE Conference on Networking, Sensing and Control (ICNSC)*, pp. 768-773, Ft. Lauderdale, FL, April 2006.
- [C26] Y. Liu, **I. Elhanany** and H. Qi, "An Energy-Efficient QoS-Aware Media Access Control (Q-MAC) Protocol," in Proceedings of the *2<sup>nd</sup> IEEE International Conference on Mobile Ad Hoc and Sensor Systems (MASS) 2005*, pp. 703-706, Washington, DC, Nov. 7-10, 2005.
- [C25] O. Arazi, **I. Elhanany**, "A Scalable Architecture for High-Speed Digital Companding," in Proceedings of the *IEEE 48<sup>th</sup> Midwest Symposium on Circuits & Systems (MWSCAS 2005)*, pp. 448-450, Cincinnati, Ohio, August 2005.
- [C24] B. Matthews, **I. Elhanany**, "A High-Speed Reconfigurable Architecture for Heterogeneous Multimodal Packet Traffic Generation," in Proceedings of the *IEEE 48<sup>th</sup> Midwest Symposium on Circuits & Systems (MWSCAS 2005)*, pp. 1143-1146, Cincinnati, Ohio, August 2005.
- [C23] M. J. McCollum, **I. Elhanany**, "A Mutli-Stage Pipelined Memory Management Algorithm for Parallel Shared Memory Switches," in Proceedings of the *IEEE 48<sup>th</sup> Midwest Symposium on Circuits & Systems (MWSCAS 2005)*, pp. 1911-1914, Cincinnati, Ohio, August 2005.
- [C22] X. Li, **I. Elhanany**, "Stability of Frame-Based Maximal Weight Matching Algorithms with Reconfiguration Delays," in Proceedings of the *IEEE 2005 High-Performance Switching and Routing Symposium*, (HPSR) Hong-Kong, pp. 192-197, May 12-14, 2005.
- [C21] X. Li, **I. Elhanany**, "A Heterogeneous Maximal-Throughput Bursty Traffic Model with Application to High-Speed Packet Switches," in Proceedings of the *IEEE 2005 SARNOFF Symposium*, pp. 212-216, Princeton, NJ, April 2005.
- [C20] X. Li, **I. Elhanany**, "A Pipelined Memory Management Algorithm for Distributed Shared Memory Switches," in Proceedings of the *IEEE International Conference on Communications (ICC) 2005*, pp. 1507-1511, May 2005, Seoul, Korea.
- [C19] **I. Elhanany**, O. Arazi and M. Kahane, "Virtual Input Queued Switches with Non-Uniform Arrivals and Bursty Service," in Proceedings of the *11<sup>th</sup> IEEE International Conference on Electronics, Circuits and Systems, (ICECS) 2004*, pp. 93-96, Dec. 13-15, Tel-Aviv, Israel.
- [C18] J M. Kahane, U. Barzilai and **I. Elhanany**, "CWT: An Efficient Queue Urgency Metric with Application to High-Speed Packet Switching," in Proceedings of the *13<sup>th</sup> IEEE International Conference on Computer Communications and Networks (ICCCN) 2004*, pp. 125-157, Oct. 2004.
- [C17] J. Pfaffman, **I. Elhanany**, "Adaptation of a Computer Networks Curriculum for Non-Technical Audience," in Proceedings of the *IEEE Frontiers in Education Conference (FIE) 2004*, F4C-22-23, Oct. 2004.
- [C16] **I. Elhanany**, M. Kahane, "On the Performance of Bursty Traffic Dispersion over Multiple Server Clusters," in Proceedings of the *IEEE International Conference on Networking (ICN) 2004*, pp. 544-549, March 2004.
- [C15] **I. Elhanany**, "Analysis of Output-Queued Cell Switches with Random Arbitration and Generic Arrival Processes," in Proceedings of *IEEE GLOBECOM 2003*, pp. 4091-4095, San Francisco, Dec. 2003.
- [C14] **I. Elhanany**, M. Kahane, D. Sadot, "A Performance Study of Virtual Output Queued Switches with Heterogeneous Bursty Traffic," in Proceedings of the *IEEE Conference on High-Performance Switching and Routing (HPSR) 2003*, pp. 165-170, Italy.

- [C13] **I. Elhanany**, D. Sadot, "Performance Analysis of a Robust Scheduling Algorithm for Scalable Input-Queued Switches," in Proceedings of the *IEEE Conference on Communications (ICC 2003)*, pp. 588-594, Alaska.
- [C12] **I. Elhanany**, M. Kahane, and D. Sadot, "On Uniformly Distributed ON/OFF Arrivals in Virtual Output Queued Switches with Geometric Service Times," in Proceedings of the *IEEE Conference on Communications (ICC 2003)*, pp. 173-177, Alaska.
- [C11] **I. Elhanany**, D. Sadot, "Queueing Analysis of Markov Modulated ON/OFF Arrivals with Geometric Service Times," in Proceedings of the *22<sup>nd</sup> IEEE Israel Section Convention*, pp. 189-191, Dec. 2002.
- [C10] **I. Elhanany**, D. Sadot, "A Flexible ATM Traffic Synthesizer for Evaluating High-Performance Packet-Switched Networks," in Proceedings of the *IEEE International Conference on Software, Telecommunications and Computer Networks (SoftCom 2000)*, Split, pp. 10-15, Croatia, Oct. 2000.
- [C9] **I. Elhanany**, M. Sheinfeld, A. Beck, Y. Kadmon, D. Tirosh, "Robust Image Registration based on Feedforward Neural Networks," in Proceedings of the *2000 IEEE International Conference on Systems, Man and Cybernetics (SMC 2000)*, Vol. 2, pp. 1507-1511, Oct. 2000.
- [C8] **I. Elhanany**, D. Sadot, "A Prioritized Packet Scheduling Architecture for Provision of Quality-of-Service in Tbit/sec WDM Networks," in Proceedings of the *IEEE International Conference on Communications (ICC 2000)*, New-Orleans, Vol. 2, pp. 695-700, June 2000.
- [C7] **I. Elhanany**, O. Arazi, "Redundant Linear Coding for Accelerating Counting and Comparison Operations," in Proceedings of the *20th IEEE International Symposium on Circuits and Systems (ISCAS 2000)*, Geneva, Switzerland, Vol. 5, pp. 333-336, May 2000.
- [C6] **I. Elhanany**, D. Sadot, "Optical Switching-Speed Requirements for Terabit/sec Packet over WDM Networks," (poster presentation) in Proceedings of the *IEEE/OSA European Conference on Optical Communications (ECOC '99)*, Nice, France, Sep. 1999.
- [C5] **I. Elhanany**, D. Sadot, "Tbit/sec Switching Scheme for ATM/WDM High-Speed Computer Networks," in Proceedings of the *7th IEEE Mediterranean Conference on Control and Automation (MED'99)*, pp. 2438-2441, June 1999.
- [C4] **I. Elhanany**, S. Jacobi, M. Kahane, E. Marcus, D. Tirosh and D. Barak, "A Novel Architecture for Digital Pulse Height Analysis with Applications to Radiation Spectroscopy," in Proceedings of the *7th IEEE Mediterranean Conference on Control and Automation (MED'99)*, pp. 2143-2151, June 1999.
- [C3] **I. Elhanany** and D. Sadot, "A Novel Tbit/sec Switch Architecture for ATM/WDM High-Speed Networks," in Proceedings of the *IEEE ATM Workshop '99*, Kochi-City, Japan, pp. 97-101, May 1999.
- [C2] M. Sheinfeld, **I. Elhanany**, Y. Kadmon, D. Tirosh, A. Gabovitch, D. Barak, "Software for Airborne Radiation Monitoring Systems," in Proceedings of the *IRPA 2nd Regional Mediterranean Congress on Radiation Protection*, pp. 141-146, Tel-Aviv, Israel, Nov. 1997.
- [C1] **I. Elhanany**, Y. Kadmon, A. Gabovitch, M. Sheinfeld, D. Tirosh, D. Barak, "Radiation Plume Contouring Algorithm Using Two-Dimensional Biharmonic Spline Interpolation," in Proceedings of the *IRPA 2nd Regional Mediterranean Congress on Radiation Protection*, pp. 253-258, Tel-Aviv, Israel, Nov. 1997.

#### **BRIEF ARTICLES AND OTHER PUBLICATIONS** (*in reverse chronological order*)

- [T5] **I. Elhanany**, D. Sadot, "Random Number Generator Has a Predefined Distribution," *Electronic Design*, pp. 132-134, Vol. 49, No. 1, Jan. 8, 2001.
- [T4] **I. Elhanany**, "Concurrent Processing Produces Fast Priority Selector," *Electronic Design News (EDN) Magazine*, pp. 200, April 13, 2000.
- [T3] **I. Elhanany**, O. Beerli, "The GLIMPS™ Terabit Packet Switching Engine," *TeraCross Whitepaper*, Feb. 2002.
- [T2] **I. Elhanany**, "A Comparative View of the GLIMPS™ Scheduling Algorithm," *TeraCross Whitepaper*, Oct. 2002.
- [T1] **I. Elhanany**, "NPF Fabric Benchmarks: Traffic Models," *Network Processing Forum (NPF) Fabric Benchmarking Standard* (publically available at: [www.npforum.org](http://www.npforum.org)).

#### **INVITED TALKS AND PRESENTATIONS** (*in reverse chronological order*)

- [TT30] "Deep Reinforcement Learning for Artificial General Intelligence," Invited talk at IBM Almaden Research Center, San Jose, CA, April 2015.
- [TT29] "Arcade Learning Environment (ALE) as a Platform for Experimenting with Scalable Reinforcement Learning," Invited talk at the Stanford University Reinforcement Learning Research Group, March 2015.
- [TT28] "Deep Reinforcement Learning as Foundation for Machine Intelligence," Invited talk at the Stanford University Computer Vision Group, November 2014.
- [TT27] "Scalable Power-efficient Multi-target Tracking using Hybrid Analog Computations," Invited talk at the 2014 Neuro-Inspired Computational Elements Workshop, Albuquerque, NM, February 2014.
- [TT26] "Deep Reinforcement Learning as a New Frontier for Large-scale Decision Making Systems," Invited talk at Drexel University, Philadelphia, PA, May 2012.
- [TT25] "Deep Reinforcement Learning as a New Frontier for Large-scale Decision Making Systems," Invited talk at the City College of New York, New York, April 2012.
- [TT24] "Framing Scalable Visual Attention as a Reinforcement Learning Problem," The 2<sup>nd</sup> International Biologically Inspired Cognitive Architectures (BICA) Conference, Washington DC, November, 2011.
- [TT23] "Reward Driven Learning and the Risk of an Adversarial Artificial General Intelligence," The 4<sup>th</sup> Conference on Artificial General Intelligence (AGI), Menlo Park, CA, August 2011.
- [TT22] "Deep Machine Learning and its Applications to Speech Processing," SRI International, Palo Alto, CA, March 2011.
- [TT21] "Grand Challenges for the Biologically Inspired Cognitive Architectures (BICA) Society," BICA Society Inaugural Meeting, Arlington, VA, November 2010.
- [TT20] "Advances in Deep Machine Learning for Artificial General Intelligence," George Washington University, Washington, DC, November 2010.
- [TT19] "Advances in Deep Machine Learning for Artificial General Intelligence," Georgetown University, Washington, DC, November 2010.
- [TT18] "Deep Machine Learning – A New Research Direction in Machine Intelligence," Krasnow Institute, George Mason University, Fairfax, VA, September 2010.



- [TT17] "Is Deep-Layered Machine Learning the Catalyst for an Artificial General Intelligence Revolution," (invited speaker), 2010 Humanity+ Summit, Harvard University, Cambridge, MA, June 2010.
- [TT16] "Deep Machine Learning using the Hierarchical Deep Recurrent Neural Network Architecture," (invited presentation) presented at the DARPA PerSEAS Industry Day, Washington DC, October 2009.
- [TT15] "On Route to Artificial General Intelligence," (invited talk) presented at the *2009 Singularity Summit*, New York City, October 2009.
- [TT14] "A Reinforcement Learning Perspective on AGI," (invited tutorial) presented at the *2<sup>nd</sup> International Conference on Artificial General Intelligence (AGI)*, Washington, DC, March 2009.
- [TT13] "Automatic Scene Detection in Resource-constrained Environments," Samsung Electronics Research Center, Tel-Aviv, Israel, June 2008.
- [TT12] "Public Key Cryptographic Methodologies for the Intel Mote 2 platform," Intel Corporation, Santa Clara, CA, April 2006.
- [TT11] "Fabric on a Reconfigurable Chip: Towards Consolidating Packet Switching Functions on FPGA," Altera, Inc., San Jose, CA, April 2006.
- [TT10] "Fabric-on-a-Chip: Towards Consolidating Packet Switching Functions on Silicon," IEEE International Workshop on High-Performance Switching and Routing (HPSR), Hong-Kong, May 2005.
- [TT9] "Trends and Challenges in Next-Generation High-Performance Packet Switching Architectures," Ben-Gurion University of the Negev, Beer-Sheva, Israel, Dec. 2004.
- [TT8] "Current Research Focus of the Networking Research Group at ECE/UTK," Oak Ridge National Lab (ORNL), September 2004.
- [TT7] "Design and Analysis of a Dynamic DWDM based Multi-Terabit/sec Packet Switching Fabrics," Department of Energy Network Research PI meeting, Chicago, September 2004.
- [TT6] "Scalable and Flexible Switch Fabric Soft IP Cores for Xilinx Virtex-II," Xilinx Inc., San Jose, CA, December 2003.
- [TT5] "Pitfalls and Triumphs in FPGA Design: A Switch Fabric Perspective," Guest Lecture in ECE-551 (Digital Systems Design I), University of Tennessee, November 2003.
- [TT4] "Robust Scheduling Algorithms for Packet-Switched Networks," *North Carolina State University (NCSU)*, Raleigh, North Carolina, February 2003.
- [TT3] "A Performance Study of a Robust Scheduling Algorithm for Terabit/sec Packet-Switched Networks," *University of Tennessee at Knoxville*, May 2003.
- [TT2] "Radiation Plume Contouring Algorithm Using Two-Dimensional Biharmonic Spline Interpolation," *IRPA 2nd Regional Mediterranean Congress on Radiation Protection*, Tel-Aviv, Israel, Nov. 1997.
- [TT1] "The CEBus++ Powerline Communication Technology," Home Automation Conference, June 1997, Dallas, TX.

#### **MEDIA INTERVIEWS** *(in reverse chronological order)*

- [M4] Interviewed for Wired magazine on the topic of "Google's AI Is Now Smart Enough to Play Atari Like the Pros" (online publication), February 2015.

- [M3] Interviewed for Wired magazine on the topic of “On the Emergence of Artificial General Intelligence (AGI) and its Vast Implications to Society.” (online publication), January 2015.
- [M2] Interviewed on the topic of “Artificial General Intelligence,” for *Next Big Future* (online publication), October 2009.
- [M1] Interviewed on the topic of “The Future of Artificial Intelligence,” for UK’s TalkSPORT radio station on the late night show with Ian Collins, May 23, 2010.

## STUDENTS

### POST-DOCTORAL RESEARCH ASSOCIATES

Dr. Tomer Lancewicki – January 2015 – present

Research area: Robust covariance matrix estimation methods for deep machine learning

Dr. Riheng Wu – March 1, 2008 – December 31, 2008

Research area: *Security Protocols for Heterogeneous Vehicular Infrastructure*

### CURRENT GRADUATE STUDENTS – MAJOR ADVISOR

<u>Name</u>	<u>Degree Program</u>	<u>Start Date</u>	<u>Expected Completion Date</u>
Benjamin Goodrich	Ph.D.	August 2011	Fall 2015
Andrew Davis	Ph.D.	August 2010	Spring 2016
Aaron Mishtal	Ph.D.	August 2011	Spring 2016

### FORMER GRADUATE STUDENTS – MAJOR ADVISOR

#### PhD Students

Xike Li, Ph.D., December 2006

Dissertation: “*Scheduling Algorithms for Scalable High-Performance Packet Switching Architectures*”

Brad Matthews, Ph.D., December 2007

Dissertation: “*Fabric-on-a-Chip: Toward Consolidating Packet Switching Functions on Silicon*”

Zhenzhen Liu, Ph.D., December 2007

Dissertation: “*Hardware-efficient Scalable Reinforcement Learning Systems*”

Ken Habgood, Ph.D., July 2011

Dissertation: “*A Low-Communication Condensation based Linear System Solver Utilizing Cramer’s Rule*”

Thomas Karnowski, Ph.D., March 2012

Dissertation: “*Deep Machine Learning with Spatio-Temporal Inference*”

Christopher Symons, Ph.D., November 2012

Dissertation: “*Extending Structural Learning Paradigms for High-Dimensional Machine Learning and Analysis*”

Robert Coop, Ph.D., April 2013

Dissertation: *“Mitigation of Catastrophic Interference in Neural Networks and Ensembles using a Fixed Expansion Layer”*

Derek Rose, Ph.D., July 2013

Dissertation: *“Online Multi-stage Deep Architectures for Feature Extraction and Object Recognition”*

Steven Young, Ph.D., December 2014

Dissertation: *“Scalable Hardware-efficient Deep Spatiotemporal Inference Networks”*

#### Master Students

Daniel Buddik, M.S., November 2006

Thesis: *“A Resource-Efficient Localized Recurrent Neural Network Architecture and Learning Algorithm”*

Richard Wunderlich, M.S., December 2007

Thesis: *“A Longest-Queue-First Signal Scheduling Algorithm with Quality of Service Provisioning for an Isolated Intersection”*

Vicente Mahoney, M.S., April 2008

Thesis: *“A Backpropagation Neural Network Design Using Adder-Only Arithmetic”*

Arun Nagari, M.S., July 2008

Thesis: *“A Parallel Processing Algorithm for Solving Large-Scale Linear Systems”*

Sri Sanka, M.S., October 2008

Project: *“Doubly-indexed Push-In-First-Out (PIFO) Queuing Architecture for Quality-of-Service Provisioning in Internet Routers”*

Chris Niedzwiedz, M.S., July 2009

Thesis: *“Vision-based Reinforcement Learning using a Consolidated Actor-Critic Model”*

Srinivasa Anuradha Bulusu, M.S., February 2010

Thesis: *“A Secure Data Protocol for the Trusted Truck™ System”*

Rosanne West, M.S., April 2010

Thesis: *“GPU Implementation of a Novel Approach to Cramer’s Algorithm for Solving Large-Scale Linear Systems”*

Robert Coop, M.S., July 2010

Project: *“Functional Analysis of Cellular Automata”*

Benjamin Martin, M.S., April 2012 (Course only with research advisory).

Christopher Boyd, M.S., Computer Engineering, November 2012 (Course only with research advisory).

Alexander Saites, M.S., July 2014.

Project topic: *A Self-Organizing Map Library for Topological Classification.*

#### **GRADUATE STUDENT COMMITTEE MEMBER**

<u>Name</u>	<u>Degree Program</u>	<u>Graduation Date</u>	<u>Major Advisor</u>
-------------	-----------------------	------------------------	----------------------

Yang Liu	M.S.	December 2004	H. Qi
Scott Fields	M.S.	December 2005	D. Bouldin
Cheng Qian	M.S.	May 2005	H. Qi
Raghul Gunasekaran	M.S.	May 2006	H. Qi
Carl Mallett	M.S.	July 2006	D. Bouldin
Chris Beall	M.S.	August 2006	H. Qi
Getao Liang	M.S.	July 2007	H. Qi
Pradeep Chimakurthy	M.S.	July 2007	D. Bouldin
Karthik Sundaramurthy	M.S.	July 2007	D. Bouldin
Vikas Yelagondanahalli	M.S.	July 2007	D. Bouldin
JunKyu Lee	M.S.	August 2007	G. Peterson
Brandon Rogers	M.S.	December 2007	G. Peterson
Ying Sun	M.S.	April 2008	H. Qi
Rakesh Mallem	M.S.	August 2008	S. K. Islam
Dilip Patlolla	M.S.	July 2009	G. Peterson
Akan Udoeyop	M.S.	May 2010	G. Peterso
Michael Jugan	M.S.	March 2013	G. Peterson
Yingyue Xu	Ph.D.	May 2005	H. Qi
Wei Jiang	Ph.D.	December 2006	S. Kong
Balajee Kannan	Ph.D.	May 2007	L. Parker
Saumil Merchant	Ph.D.	August 2007	G. Peterson
Jelena Pjesivac-Grbovic	Ph.D.	December 2007	J. Dongarra
Akila Gothandaraman	Ph.D.	July 2009	G. Peterson
Songwoo Moon	Ph.D.	July 2009	H. Qi
Airton Kohls	Ph.D.	April 2010	T. Urbanik
Roger Seagle	Ph.D.	Nov 2011	M. Vose
Michael Sharp	Ph.D.	July 2012	J. Wes Hines
David Jenkins	Ph.D.	August 2012	G. Peterson
JunKyu Lee	Ph.D.	June 2012	G. Peterson
Kun Zheng	Ph.D.	August 2012	H. Li
Chuanjun He	Ph.D.	May 2013	M. Vose
Junjie Liu	Ph.D.	March 2014	J. Holleman
Catherine Schuman	Ph.D.	November 2014	J. Douglas Birdwell

#### **UNDERGRADUATE STUDENTS PARTICIPATING IN RESEARCH - ADVISOR**

<u>Name</u>	<u>Period</u>	<u>Current Status</u>
Derek Rose	Summer 2006 – Summer 2008	Graduate Student at UT
Alex Haun	Summer 2006 – Spring 2007	Graduate Student at UT
Travis Goodspeed	Summer 2007 – Summer 2007	Graduate Student at Penn State
Scott Livingston	Summer 2007 – Summer 2009	Graduate Student at CalTech
Nicole Birdwell	Summer 2007	Industry

Robert Coop	Summer 2007 – Summer 2008	Graduate Student at UT (EECS)
Benjamin Martin	Summer 2008 – July 2009	Graduate Student at UT (EECS)
Steven Young	Fall 2008 – July 2010	Graduate Student at UT (EECS)
Andrew Davis	Fall 2009 – July 2010	Graduate Student at UT (EECS)
Benjamin Goodrich	Fall 2010 – Spring 2011	Graduate Student at UT (EECS)
Nicole Pennington	Summer 2011 – June 2012	Graduate Student at UT (EECS)