

Eric R. Eaton

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RESEARCH INTERESTS

My primary research interests are in statistical machine learning and artificial intelligence, focusing on lifelong learning, knowledge transfer, multi-task learning, representation discovery, and interactive AI. I am also interested in data mining and large-scale learning using massive quantities of data over extended time frames. My research applies these techniques to problems in service robotics, precision medicine, and computational sustainability.

EDUCATION

- May 2009 **Ph.D. in computer science**, University of Maryland, Baltimore County
Thesis: *Selective Knowledge Transfer for Machine Learning*
Advisor: Marie desJardins
Committee: Tim Finin, Terran Lane, Tim Oates, and Yun Peng.
- Dec. 2005 **M.S. in computer science**, University of Maryland, Baltimore County
Thesis: *Clustering with Propagated Constraints*
Advisor: Marie desJardins
Committee: Tim Finin and Tim Oates.
- May 2003 **B.S. *summa cum laude* in computer science**, University of Maryland, Baltimore County
Certificate of General Honors. Minor: psychology.

PROFESSIONAL APPOINTMENTS

University of Pennsylvania

- 2013 – present *Lecturer*, Computer and Information Science Department
2013 – present *Faculty Member*, General Robotics, Automation, Sensing & Perception (GRASP) lab

Bryn Mawr College

- 2013 – 2016 *Research Associate*, Computer Science Department
2010 – 2013 *Visiting Assistant Professor*, Computer Science Department

Lockheed Martin Advanced Technology Labs, Cherry Hill, NJ

- 2008 – 2010 *Senior Research Scientist*, Artificial Intelligence Group

Swarthmore College

- 2009 – 2010 *Visiting Assistant Professor (Part-time)*, Computer Science Department

University of Maryland, Baltimore County

- 2003 – 2008 *Research Assistant* with Dr. Marie desJardins, Computer Science and Electrical Engr. Dept.
2005 – 2008 *Instructor (Part-time)*, Computer Science and Electrical Engineering Department

FUNDING

Grants and Contracts Awarded

- [G1] Eric Eaton (PI). *Doctoral Mentoring Consortium at the 25th International Joint Conference on Artificial Intelligence (IJCAI 2016)*. National Science Foundation, Grant #1631562. **\$15,000** total. Duration: April 2016 – March 2017.
- [G2] Matthew Taylor (PI), Eric Eaton (Co-PI), and Paul Ruvolo (Co-PI). *Lifelong Transfer Learning for Heterogenous Teams of Agents in Sequential Decision Processes*. Air Force Office of Scientific Research / Air Force Research Lab, Grant #FA8750-14-1-0069. **\$606,361** total (my group's portion: \$310,918).

Subcontract from Washington State University. Duration: March 2014 – Feb. 2016.

- [G3] Eric Eaton (PI) and Paul Ruvolo (Co-PI). *Interactive Transfer for Continuous Lifelong Learning*. Office of Naval Research, Grant #N00014-11-1-0139. **\$349,534** total (my group’s portion: \$310,800). Duration: Oct. 2013 – Sept. 2015.
- [G4] Eric Eaton (PI). *Temporal Modeling and Prediction using Multi-Task Deep Learning* – Student project funding. Jacobs Levy Equity Management Center for Quantitative Financial Research. **\$5,000**. Duration: Sept. 2014 – June 2015.
- [G5] Eric Eaton (PI) and Terran Lane (Co-PI). *Interactive Transfer for Continuous Lifelong Learning*. Office of Naval Research, Grant #N00014-11-1-0139. **\$575,091** total (my group’s portion: \$365,337). Duration: Jan. 2011 – Sept. 2013.
- [G6] Eric Eaton (PI). *Analysis of Complex Data Using Heterogeneous Relational Models*. Office of Naval Research, Contract #N00014-10-C-0192. **\$300,000** total (my group’s portion: \$185,857). Subcontract from Lockheed Martin. Duration: Apr. 2010 – Mar. 2013.

PUBLICATIONS

[Names in *italics* are students or postdocs whose work I supervised.]

Edited Volumes

- [V1] Matteo Leonetti, chair; Eric Eaton and Pooyan Fazli, co-chairs. (2014). *Knowledge, Skill, and Behavior Transfer in Autonomous Robots: Proceedings of the 2014 AAAI Fall Symposium*. AAAI Technical Report FS-14-04, ISBN 978-1-57735-694-3, AAAI Press.
- [V2] Eric Eaton, Carla Gomes, and Brian Williams, editors. (2014). *Special issue of AI Magazine on Computational Sustainability*. Volume 35, numbers 2–3 (Summer 2014 and Fall 2014), AAAI Press.
- [V3] Eric Eaton, chair. (2013). *Lifelong Machine Learning: Proceedings of the 2013 AAAI Spring Symposium*. AAAI Technical Report SS-13-05, ISBN 978-1-57735-602-8, AAAI Press.

Journal Articles

- [J1] Eric Eaton. (2016). “Teaching integrated AI through interdisciplinary project-driven courses.” To appear in *AI Magazine*.
- [J2] Eric Eaton, Carla Gomes, and Brian Williams. (2014). “Computational sustainability.” *AI Magazine* 35 (2): 3–7.
- [J3] Eric Eaton, Marie desJardins, and Sara Jacob. (2014) “Multi-view constrained clustering with an incomplete mapping between views.” *Knowledge and Information Systems* 38(1): 231–257. DOI 10.1007/s10115-012-0577-7. Published online November 21, 2012.
- [J4] Kiri Wagstaff, Marie desJardins, and Eric Eaton. (2010). “Modeling and learning user preferences over sets.” *Journal of Experimental & Theoretical Artificial Intelligence* 22(3): 237–268.

Highly Refereed Conference Papers

- [C1] David Isele, Mohammad Rostami, and Eric Eaton. (2016). “Using task features for zero-shot knowledge transfer in lifelong learning.” To appear in *Proceedings of the 2016 International Joint Conference on Artificial Intelligence (IJCAI-16)*. [oral presentation; acceptance rate: 25.0%. **Awarded “IJCAI-16 Distinguished Student Paper”.**]
- [C2] Haitham Bou Ammar, Rasul Tutunov, and Eric Eaton. (2015). “Safe policy search for lifelong reinforcement learning with sub-linear regret”. In *Proceedings of the 2015 International Conference on Machine Learning (ICML-15)*. [oral presentation; acceptance rate: 26.0%]
- [C3] Haitham Bou Ammar, Eric Eaton, José Marcio Luna, and Paul Ruvolo. (2015). “Autonomous cross-domain knowledge transfer in lifelong policy gradient reinforcement learning”. In *Proceedings of the 2015 International Joint Conference on Artificial Intelligence (IJCAI-15)*. [long oral presentation; acceptance rate: 28.8%. **Nominated for Distinguished Paper award.**]
- [C4] Haitham Bou Ammar, Eric Eaton, Matthew Taylor, and Paul Ruvolo. (2015). “Unsupervised cross-domain transfer in policy gradient reinforcement learning via manifold alignment.” In *Proceedings of the 29th AAAI Conference on Artificial Intelligence (AAAI-15)*, Jan. 25–29, Austin, TX, AAAI Press. [acceptance rate: 26.67%]

- [C5] *Paul Ruvolo* and Eric Eaton. (2014). “Online multi-task learning using sparse dictionary optimization.” In *Proceedings of the 28th AAAI Conference on Artificial Intelligence (AAAI-14)*, July 27–31, Québec City, Canada, AAAI Press. [oral presentation; acceptance rate: 28%]
- [C6] *Haitham Bou Ammar*, Eric Eaton, Paul Ruvolo, and Matthew Taylor. (2014). “Online multi-task learning for policy gradient methods.” In *Proceedings of the 2014 International Conference on Machine Learning (ICML-14)*, JMLR W&CP 32 (1) : 1206–1214, June 21–26, Beijing, China. [oral presentation; acceptance rate for cycle II: 22.3%, overall acceptance rate: 25%]
- [C7] *Paul Ruvolo* and Eric Eaton. (2013). “Active task selection for lifelong machine learning.” In *Proceedings of the 27th AAAI Conference on Artificial Intelligence (AAAI-13)*, pp. 862–868, July 14–18, Bellevue, WA, AAAI Press. [oral presentation; acceptance rate: 29%]
- [C8] *Paul Ruvolo* and Eric Eaton. (2013). “ELLA: an efficient lifelong learning algorithm.” In *Proceedings of the 2013 International Conference on Machine Learning (ICML-13)*, Journal of Machine Learning Research - Proceedings Track 28(1): 507–515, June 16–21, Atlanta, GA. [acceptance rate for cycle I: 17.5%, overall acceptance rate: 26%]
- [C9] Eric Eaton and *Rachael Mansbach*. (2012) “A spin-glass model for semi-supervised community detection.” In *Proceedings of the 26th AAAI Conference on Artificial Intelligence (AAAI-12)*, pp. 900–906, Toronto, Canada, AAAI Press. [acceptance rate: 26%]
- [C10] Douglas Fisher, Bistra Dilkina, Eric Eaton, and Carla Gomes. (2012) “Incorporating computational sustainability into AI education through a freely-available, collectively-composed supplementary lab text.” In the 3rd International Conference on Computational Sustainability (CompSust-12), July 5–6, Copenhagen, Denmark. [oral presentation]
- [C11] Eric Eaton and Marie desJardins. (2011). “Selective transfer between learning tasks using task-based boosting.” In *Proceedings of the 25th AAAI Conference on Artificial Intelligence (AAAI-11)*, pp. 337–342, August 7–11, San Francisco, CA, AAAI Press. [oral presentation; acceptance rate: 24.8%]
- [C12] Eric Eaton, Marie desJardins, and Sara Jacob. (2010). “Multi-view clustering with constraint propagation for learning with an incomplete mapping between views.” In *Proceedings of the 2010 Conference on Information and Knowledge Management (CIKM-10)*, pp. 389–398, October 26–30, Toronto, Canada, ACM Press. [oral presentation; acceptance rate: 13.4%]
- [C13] Eric Eaton, Gary Holness, and Daniel McFarlane. (2010). “Interactive learning using manifold geometry.” In *Proceedings of the 24th AAAI Conference on Artificial Intelligence (AAAI-10)*, pp. 437–443, July 11–15, Atlanta, GA, AAAI Press. [oral presentation; acceptance rate: 26.9%]
- [C14] Eric Eaton, Marie desJardins, and Terran Lane. (2008). “Modeling transfer relationships between learning tasks for improved inductive transfer.” In *Proc. of the 2008 European Conference on Machine Learning (ECML-08)*, pp. 317–332, September 15–19, Antwerp, Belgium, Springer-Verlag. [oral presentation; acceptance rate: 20%]
- [C15] Marie desJardins, Eric Eaton, and Kiri Wagstaff. (2006). “Learning user preferences for sets of objects.” In *Proceedings of the 23rd International Conference on Machine Learning (ICML-06)*, June 25–29, Pittsburgh, PA, ACM Press. [oral presentation; acceptance rate: 20%; awarded recognition as a NASA Tech Brief in 2008.]

Editorials

- [E1] Eric Eaton, Tom Dietterich, Maria Gini, Barbara J. Grosz, Charles L. Isbell, Subbarao Kambhampati, Michael Littman, Francesca Rossi, Stuart Russell, Peter Stone, Toby Walsh, and Michael Wooldridge. “Who speaks for AI?” *AI Matters* 2(2): 4–14. <http://doi.acm.org/10.1145/2847557.2847559>.

Preprints

- [U1] Rasul Tutunov, *Haitham Bou Ammar*, Ali Jadbabaie, and Eric Eaton. (2014). “On the degree distribution of Pólya urn graph processes.” <http://arxiv.org/abs/1410.8515>.

Refereed Workshops, Symposia, and Less-Selective Conferences

- [W1] David Isele, José Marcio Luna, Eric Eaton, Gabriel V. de la Cruz, James Irwin, Brandon Kallahaer, and Matthew E. Taylor. “Lifelong Learning for Disturbance Rejection on Mobile Robots.” To appear in the *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2016.

- [W2] David Isele, José Marcio Luna, Eric Eaton, Gabriel V. de la Cruz, James Irwin, Brandon Kallaher, and Matthew E. Taylor. (2016). “Work in Progress: Lifelong Learning for Disturbance Rejection on Mobile Robots.” In the *AAMAS-16 Adaptive Learning Agents workshop*, May.
- [W3] Eric Eaton, Haitham Bou Ammar, Paul Ruvolo, José Marcio Luna, and Matthew E. Taylor. (2015). “Lifelong machine learning for robotic control and coordination.” [Poster Presentation] In the Northeast Robotics Colloquium, November.
- [W4] Haitham Bou Ammar, Eric Eaton, Matthew E. Taylor, Decebal Mocanu, Kurt Driessens, Gerhard Weiss, Karl Tuyls. (2014). “An automated measure of MDP similarity for transfer in reinforcement learning.” In *Proceedings of the AAAI 2014 Workshop on Machine Learning for Interactive Systems: Bridging the Gap between Perception, Action and Communication*, July 27–28.
- [W5] Vishnu Purushothaman Sreenivasan, Haitham Bou Ammar, and Eric Eaton. (2014) “Online multi-task gradient temporal-difference learning.” [Student Abstract]. In *Proceedings of the 28th AAAI Conference on Artificial Intelligence (AAAI-14)*, July 27–31.
- [W6] Paul Ruvolo and Eric Eaton. (2013). “Online multi-task learning based on K-SVD.” In *Proceedings of the ICML 2013 Workshop on Theoretically Grounded Transfer Learning*, Atlanta, GA, June.
- [W7] Paul Ruvolo and Eric Eaton. (2013). “Scalable lifelong learning with active task selection.” In *Proceedings of the AAAI 2013 Spring Symposium on Lifelong Machine Learning*, pp. 33–39, Stanford, CA, March 25–27, AAAI Press.
- [W8] Douglas Fisher, Bistra Dilkina, Eric Eaton, and Carla Gomes. (2012) “Incorporating computational sustainability into AI education through a freely-available, collectively-composed supplementary lab text.” In *Proceedings of the Third AAAI Symposium on Educational Advances in Artificial Intelligence (EAAI-12)*, Toronto, Canada, July.
- [W9] Diane Oyen, Eric Eaton, and Terran Lane. (2012) “Inferring tasks for improved network structure discovery.” [Poster Presentation] In the *Snowbird Learning Workshop*, Snowbird, Utah, April 3–6.
- [W10] Eric Eaton and Terran Lane. (2011). “The importance of selective knowledge transfer for lifelong learning.” In *Working Notes of the AAAI-11 Workshop on Lifelong Learning from Sensorimotor Experience*.
- [W11] Samantha Wood, Michelle Mills Strout, David G. Wonnacott, and Eric Eaton. (2011) “SMOReS: Sparse Matrix Omens of Reordering Success.” [Poster Presentation] In *Proceedings of the 32nd ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI-11)*, June 4–8, San Jose, CA, ACM Press. [Awarded 1st place in the PLDI Student Research Competition, Undergraduate Category.]
- [W12] Eric Eaton and Marie desJardins. (2009). “Set-based boosting for instance-level transfer.” In *Proceedings of the IEEE International Conference on Data Mining Workshop on Transfer Mining*, December 6, Miami, FL, IEEE Press.
- [W13] Eric Eaton, Gary Holness, and Daniel McFarlane. (2009). “Interactive learning using manifold geometry.” In *Proceedings of the AAAI Fall Symposium on Manifold Learning and Its Applications*, November 5–7, Arlington, VA. AAAI Technical Report FS-09-04, AAAI Press.
- [W14] Eric Eaton. (2008). “Gridworld search and rescue: A project framework for a course in artificial intelligence.” In *Proceedings of the AAAI-08 AI Education workshop*, pp. 34–39, July 13–14, Chicago, IL, AAAI Press.
- [W15] Eric Eaton, Marie desJardins, and Terran Lane. (2008). “Using functions on a model graph for inductive transfer.” In the *Northeast Student Colloquium on Artificial Intelligence (NESCAI-08)*, May 2–4, Ithaca, NY.
- [W16] Eric Eaton, Marie desJardins, and John Stevenson. (2007). “Using multiresolution learning for transfer in image classification.” [Student Abstract] In *Proceedings of the 22nd AAAI Conference on Artificial Intelligence (AAAI-07)*, July 22–26, Vancouver, British Columbia, Canada, AAAI Press.
- [W17] Eric Eaton. (2006). “Multi-resolution learning for knowledge transfer.” In *Proceedings of the 21st AAAI Conference on Artificial Intelligence (AAAI-06)* [Doctoral Consortium], July 16–20, Boston, MA, AAAI Press.
- [W18] Eric Eaton and Marie desJardins. (2006). “Knowledge transfer with a multiresolution ensemble of classifiers.” In *Proceedings of the ICML-06 Workshop on Structural Knowledge Transfer for Machine Learning*, June 29, Pittsburgh, PA.
- [W19] Marie desJardins, Eric Eaton, and Kiri Wagstaff. (2005). “A context-sensitive and user-centric approach

to developing personal assistants.” In *Proceedings of the AAAI Spring Symposium on Persistent Assistants*, March 21–23, Stanford, CA, AAAI Press.

Magazine Reports

- [M1] Vita Markman, Georgi Stojanov, Bipin Indurkha, Takashi Kido, Keiki Takadama, George Konidaris, Eric Eaton, Naohiro Matsumura, Renate Fruchter, Don Sofge, William F. Lawless, Omid Madani, and Rahul Sukthankar. (2013). “Reports of the 2013 AAAI Spring Symposium Series.” In *AI Magazine* 34(3): 93–98.

Technical Reports and Non-Refereed Publications

- [R1] Katherine Guo and Eric Eaton. (2013) “Multi-agent, cooperative, lifelong transfer learning for target classification.” Lockheed Martin ATL Technical Report, 6 pages, October.
- [R2] Karen Heigh, Fusun Yaman, and Eric Eaton. (2012). “Self-improving automatic machine learning.” Raytheon/ BBN Technologies Technical Report #W12006-BBN, 9 pages, January.
- [R3] Martin Hofmann, Honglak Lee, Eric Eaton, Brian Kettler, Katherine Guo, and Sergey Malinchik. (2012). “An automatic interactive machine learning tool.” Lockheed Martin ATL Technical Report #DS-105-421-1798RFI, 10 pages, January.
- [R4] Eric Eaton, Dan McFarlane, and Martin Hofmann. (2009). “Analysis of complex data using heterogeneous relational models.” Lockheed Martin ATL Technical Report #DS-104-421-1610WP, 6 pages, March.
- [R5] Eric Eaton, Gary Holness, and Dan McFarlane. (2009). “Situational awareness through interactive learning.” Lockheed Martin ATL Technical Report #DS-104-421-1607WP, 4 pages, March.
- [R6] Meghann Lomas, Daniel McFarlane, Eric Eaton, Robert Szczerba, and Jerry Franke. (2009). “Dynamic ensemble planning for tactical hierarchies.” Lockheed Martin ATL Technical Report #DS-104-421-1604WP, 4 pages, March.
- [R7] Eric Eaton, Katherine Guo, and Martin Hofmann. (2009). “Predicting and verifying effects of cyber operations from indirect observations.” Lockheed Martin ATL Technical Report #DS-105-421-1598WP, 5 pages, January.
- [R8] Eric Eaton, Katherine Guo, and Martin Hofmann. (2008). “Multimodal and temporal learning using relational networks.” Lockheed Martin ATL Technical Report #DS-105-421-1583RFI, 7 pages, November.

Theses

- [T1] Eric Eaton. (2009). *Selective Knowledge Transfer for Machine Learning*. Ph.D. dissertation, University of Maryland, Baltimore County.
- [T2] Eric Eaton. (2005). *Clustering with Propagated Constraints*. Master’s Thesis, University of Maryland, Baltimore County.

Online Educational Materials

- [O1] Douglas H. Fisher, Eric Eaton, Bistra Dilkina, and Carla Gomes (eds.) *Artificial Intelligence for Computational Sustainability: A Lab Companion*. Available online at http://en.wikibooks.org/wiki/Artificial_Intelligence_for_Computational_Sustainability:_A_Lab_Companion. [This is an ongoing experiment in crowd-sourced creation of open educational materials. The wikibook is designed to supplement an existing AI course with sustainability-related exercises, and was featured at EAAI-12 and CompSust-12.]

Software

- [S1] Eric Eaton. (2008). *Gridworld search and rescue: A project framework for a course in artificial intelligence*. [This educational software allows students to develop an intelligent agent for a Search and Rescue application in a partially observable gridworld. It allows students to focus on high-level AI issues for solving the problem rather than low-level robotic navigation. It was used as the AI semester project at UMBC (CMSC 471, Fall 2007) and Swarthmore College (CPSC 063, Fall 2009), and has since been used at several other universities. The simulation framework is freely available for educational and not-for-profit research purposes at <http://seas.upenn.edu/~eeaton/searchandrescue/>.]
- [S2] Eric Eaton, Marie desJardins, and Kiri Wagstaff. (2006). *DDPref: Learning preferences for sets of objects*. [A Java implementation of the DDPref language for expressing preferences over sets of objects, and an algorithm for learning those preferences from example sets. The DDPref language and learning

algorithm are described in the ICML-06 paper “Learning user preferences for sets of objects.” The library is available under the GPL at <http://seas.upenn.edu/~eeaton/software/DDPref.zip>.]

INVITED PRESENTATIONS / DISCUSSION PANELS

[Excludes conference presentations]

- *Efficient Lifelong Machine Learning*. Presented at Olin College, November 2015.
- *Efficient Lifelong Machine Learning*. Presented at Worcester Polytechnic Institute, April 2015.
- *Advances in Machine Learning: Toward Big Data and Lifelong Learning*. Presented at the University of Pennsylvania, April 2015.
- *Efficient Lifelong Machine Learning*. Presented at Google DeepMind, March 2015.
- *Efficient Lifelong Machine Learning*. Presented at the College of William & Mary, February 2015.
- *Efficient Lifelong Machine Learning*. Presented at Georgia Tech, February 2015.
- *Launching and Managing Your Career* discussion panelist, AAAI-15 Doctoral Consortium, January 2015.
- *Efficient Lifelong Machine Learning*. Presented at the Naval Research Lab, AI Seminar Series, January 2015.
- *Launching and Managing Your Career* discussion panelist, AAAI-14 Doctoral Consortium, July 2014.
- *Efficient Lifelong Machine Learning*. Presented at the University of Pittsburgh, March 2014.
- *Efficient Lifelong Machine Learning*. Presented at Lockheed Martin Advanced Technology Labs, July 2013.
- *Efficient Lifelong Machine Learning*. Presented at Wesleyan University, March 2013.
- *AI and Sustainability* discussion panelist, Educational Advances in Artificial Intelligence (EAAI-12) Symposium at AAAI-12, July 2012.
- *Continual Learning Agents: From transfer learning to lifelong machine learning*. Presented at the Naval Research Lab, Artificial Intelligence Seminar Series (Host: David Aha), March 2012.
- *Continual Learning Agents: From transfer learning to lifelong machine learning*. Presented at the University of Massachusetts, Lowell, February 2012.
- *Teaching challenges in the classroom* discussion panelist, Educational Advances in Artificial Intelligence (EAAI) Symposium at AAAI-11, August 2011.
- *Continual Learning Agents: From transfer learning to lifelong machine learning*. Presented at Towson University, March 2011.
- *Spectral clustering: Identifying groups in relational networks*. Presented at Bryn Mawr College, July 2010.
- *Interactive learning using manifold geometry*. Presented at Villanova University, April 2010.
- *Improving machine learning through knowledge transfer*. Presented at Rutgers University, CS Colloquium Series (Host: Michael Littman), February 2009.
- *Improving machine learning through knowledge transfer*. Presented at Lockheed Martin ATL, April 2008.

STUDENT RESEARCH ADVISING

Postdoctoral Fellows

The list below includes postdocs who have worked in my research group. In all cases, I served as each postdoc’s sole research advisor and they were supported entirely by my grants.

- José Marcio Luna Castaneda, Ph.D. (2014–2016 at Penn): robotic applications of lifelong learning
- Haitham Bou Ammar, Ph.D. (2013–2015 at Penn): lifelong learning
 - Now completing a second postdoc at Princeton University.
- Paul Ruvolo, Ph.D. (2012–2013 at Bryn Mawr College): lifelong learning, community detection
 - Now an assistant professor at Olin College.
- Steven Gutstein, Ph.D. (2011–2012 at Bryn Mawr College): lifelong learning
 - Continued on to work at JPMorgan.

Dissertation Committees

- Pengyuan Shen. (current). Topic: Building energy conservation optimization and modeling via machine learning. PhD Student, Department of Architecture, University of Pennsylvania.

- Boyu Wang. (2016). *Transfer and Multitask Learning Methods for Improving Brain Signal Analysis*. Ph.D. Dissertation, McGill University. (Joelle Pineau, advisor)
- Diane Oyen. (2013). *Interactive Exploration of Multitask Dependency Networks*. Ph.D. Dissertation, University of New Mexico. (Terran Lane, advisor)

PhD Students

The list below includes doctoral students who have worked in my research group. Unless otherwise noted, I served as their primary research advisor. *Italics* indicates students that were supported by my grants.

- *Mohammad Rostami*, Penn ESE (Sept. 2014–present): sparse coding and multi-task learning
- *David Isele*, Penn CIS (Sept. 2014–present): lifelong learning for control
- Chris Clingerman, Penn CIS (June 2014–present): nonparametric lifelong learning for robotics
 - Primary advisor: Daniel Lee

Visiting PhD Students

The list below includes doctoral students from other institutions who worked in my research group for short time periods. *Italics* indicates students that were supported by my grants.

- *Decebal Mocanu*, PhD student at Technische Universiteit Eindhoven. Visiting Scholar at Penn (Sept.–Dec. 2014): deep learning, robotics
- *David Cooper*, PhD student at UMass. Lockheed Martin ATL Summer Intern (May–Aug. 2009): multivariate motif discovery in time series

Independent PhD Student Studies

The list below includes doctoral students who completed independent studies in my research group. *Italics* indicates students that were supported by my grants.

- *Caio Mucchiani*, Penn MechE. (Jan.–May. 2016): design of a low-cost service robot and modular arm
 - Primary advisor: Mark Yim

Non-Thesis Master's Research

This list includes master's students who worked on research projects in my group. This research was performed for salaried or hourly pay, for independent study credit, or on a volunteer basis. For each student, I was the primary research advisor unless otherwise noted.

- Rakshita Tandon (Jan. 2016–May 2016): automatic basis dimensionality selection for ELLA
- Ishan Srivastava (Jan. 2016–May 2016): hybrid generative and experience replay for online deep learning
- Yanwei Du (Sept. 2014–April 2015): lifelong learning for quadrotor control
 - Primary advisor: Insup Lee
- Yuncai Cui (Sept.–Dec 2014): multi-task learning for control of modular robots
 - Primary advisor: Mark Yim
- Levi Cai (Sept.–Dec 2014): multi-task learning for control of modular robots
 - Primary advisor: Mark Yim
- Chenyang Zhao (Sept.–Dec 2014): multi-task learning for control of modular robots
 - Primary advisor: Mark Yim
- Neha Kakkar, Penn SE (June–Aug. 2014): object recognition via lifelong learning
- Vishnu P. Sreenivasan, Penn CIS (Sept. 2013–May 2014): online multi-task reinforcement learning
- Tyler Rush, Bryn Mawr R.A. (May–Aug. 2011): Gaussian process models for community detection

Undergraduate Theses and Senior Projects (primary advisor)

- Fangyu Panda Xiong. (2015). Topic: combining active querying with task selection in multi-task learning. Undergraduate Thesis, Haverford College.
- Hunter Schlacks. (2015). Topic: lifelong learning. Undergraduate Senior Project, University of Pennsylvania.
- Trisha Kothari, Charu Jangid, Edward Wadsworth, and Jarred Spear. (2014). Multi-task Learning of Customer Valuation Models. Undergraduate Senior Project, University of Pennsylvania.
- Caitlyn Clabaugh. (2013). *PartyBot: Learning to Create Computational Music Mashups*. Undergraduate Thesis, Bryn Mawr College.
 - Continued to PhD studies at the University of Southern California

- Rose Abernathy. (2013). *Social-Network-Based Guided Emergent Narrative*. UG Thesis, Haverford College.
- Meagan Neal. (2013). *Reproducing Kernel Hilbert Spaces in Multi-Task Machine Learning*. Undergraduate Thesis, Bryn Mawr College. (Co-advised by Leslie Cheng, Bryn Mawr Math Dept.)
- Leila Zilles. (2012). *A Framework for Improving Statistical Machine Translation Between Languages with Scarce Bilingual Resources*. Undergraduate Thesis with Honors, Bryn Mawr College.
 - Continued to PhD studies at the University of Washington
 - Awards: NSF Graduate Research Fellowship; BMC Gertrude Slaughter Fellowship
- Emily Levine. (2012). *Learning Models to Detect Early Onset Parkinson Disease*. Undergraduate Thesis with Honors, Bryn Mawr College.
- Benjamin Cutilli. (2012). *Computer Vision and its Application in Self-Driving Cars*. Undergraduate Thesis, Haverford College. (Co-advised by David Wonnacott, Haverford College.)

Undergraduate Research (in addition to undergraduate theses listed above)

- Woonki Jeon. (Penn '15). Topic: multi-task learning of object recognition.
- Kruesit Upatising. (Penn '15). Topic: multi-task learning of object recognition.
- Lisa Seung-Yeon Lee (Princeton '15; GRASP REU student): online multi-task reinforcement learning
- Fangyu Panda Xiong (Haverford '15): object recognition
- Gabriel Ryan (Swarthmore '13): lifelong learning using the Horde architecture
- Jacy Li (Bryn Mawr '14): online multitask learning
- Yinxuan Rachel Li (Bryn Mawr '14): semi-supervised community detection
- Meagan Neal (Bryn Mawr '13): interactive multi-task learning (also sr. thesis, as described above)
- David Wilikofsky (Swarthmore '12): human-agent transfer for reinforcement learning
- Leila Zilles (Bryn Mawr '12): active transfer learning (also sr. thesis, as described above)
- Kerstin Baer (Bryn Mawr '11): continual knowledge transfer using sparse coding
 - Continued to PhD studies in theoretical mathematics at Stanford
 - Awards: NSF Graduate Research Fellowship
- Samantha Wood (Bryn Mawr '11): machine learning for a priori matrix reordering algorithm selection
 - Continued to PhD studies in computer science at UC San Diego
 - Awards: NSF Graduate Research Fellowship
 - Secondary advisor for honors thesis (primary advisors: David Wonnacott, Michelle Mills Strout).
- Alexandra Lee (Bryn Mawr '11): constrained community detection
 - Continued to graduate studies in applied math at the University of Washington
- Stephanie Tran (Bryn Mawr '13): learning for search and rescue in USARsim
- Rachael Mansbach (Swarthmore '11): community discovery in relational networks
 - Continued to PhD studies in physics at the University of Illinois, Urbana Champaign
- John Stevenson (UMBC '08): multiresolution learning
- Eric Hamilton (UMBC '07): multiscale image processing
- Craig Cambias (UMBC '05): annotated constrained clustering
 - Continued to graduate studies at Georgia Tech

TEACHING

Courses Taught (* denotes new courses I developed; † denotes co-taught courses. Undergraduate courses are numbered below 499; graduate courses are numbered 500 and above.)

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| University of Pennsylvania | |
| *CIS 700 Integrated Intelligence for Robotics | Fall 2016, Fall 2015 |
| *CIS 419/519 Introduction to Machine Learning | Fall 2016, Fall 2015, Fall 2014 |
| CIS 110 Introduction to Computer Programming | Spr. 2016, Spr. 2015, Spr. 2014 [†] , Fall 2013 [†] |
| Bryn Mawr College | |
| *CMSC 380 Computational Sustainability & Assistive Computing | Fall 2010 |
| *CMSC 380 Machine Learning | Spring 2011 |
| *CMSC 380 Social Network Analysis | Spring 2013 |
| CMSC 372 Artificial Intelligence | Spring 2012 |
| CMSC 312 Computer Graphics | Fall 2010 |
| CMSC 246 Programming Paradigms in C/C++ | Spring 2013 |
| CMSC 206 Data Structures | Fall 2012, Spring 2012, Fall 2011 |
| CMSC 110 Introduction to Computing | Fall 2012 [†] , Fall 2011, Spring 2011 |
| Swarthmore College | |
| CPSC 063 Artificial Intelligence | Fall 2009 |
| University of Maryland, Baltimore County | |
| CMSC 471 Artificial Intelligence | Fall 2007 |
| CMSC 203 Discrete Mathematics | Spring 2005 |
| CMSC 121 Introduction to UNIX | Fall 2006 (2 sections), Fall 2005 |

Other Teaching and Mentoring Activities

- Honors Examiner for Artificial Intelligence, Swarthmore College (2016).
- Mentor, AAAI Doctoral Consortium (2014, 2015).
- Primary “Major Advisor” for Bryn Mawr College computer science majors (2012–2013).
- Faculty co-advisor for Bryn Mawr College RoboCup Soccer Team (2012–2013).
- Lecture on AI to middle-school students as part of the Summer Institute for the Gifted @ Bryn Mawr (2011).
- “Customer” for software development teams, CMSC 345: Software Design and Development, UMBC (Spring 2007, Spring 2006, Spring 2005, Fall 2004, Spring 2004).
- Academic adviser for incoming UMBC undergraduates and transfer students (2004–2005).
- Graduate student mentor for the UMBC CSEE Department (2004–2005).

HONORS AND AWARDS

- IJCAI-16 Distinguished Student Paper Award for “Using task features for zero-shot knowledge transfer in lifelong learning” with my two PhD advisees: David Isele and Mohammad Rostami. July 2016.
- Best paper award nominee at IJCAI’ 15 for “Autonomous cross-domain knowledge transfer in lifelong policy gradient reinforcement learning.” July 2015.
- First place in PLDI-11 Student Research Competition, Undergraduate Category for poster by Samantha Wood. June 2011.
- Lockheed Martin SPOT Awards (2): for research and proposal leadership. December 2009, May 2010.
- NASA Tech Brief Award for “Learning user preferences for sets of objects.” February 2008.
- Verizon Graduate Fellowship. Duration: August 2005 – January 2006.
- Goddard Earth Sciences and Technology Graduate Fellowship, \$60,000 plus tuition and benefits. Duration: August 2003 – August 2005.

PROFESSIONAL SERVICE

Conference and Symposium Organization

- Co-chair, EAAI Symposium on Educational Advances in Artificial Intelligence (2017).
- Co-chair, IJCAI-16 Doctoral Consortium (2016).
- Co-chair, AAAI-15 Workshop on Knowledge, Skill, and Behavior Transfer in Autonomous Robots (2015).
- Co-chair, AAAI Fall Symposium on Knowledge, Skill, and Behavior Transfer in Autonomous Robots (2014).
- Co-chair, AAAI-14 Workshops Program, the 28th AAAI Conference on Artificial Intelligence (2014).

- Organizing Committee, EAAI Symposium on Educational Advances in Artificial Intelligence (2014).
- Chair, AAAI Spring Symposium on Lifelong Machine Learning (2013).
- Co-chair, AAAI-13 Workshops Program, the 27th AAAI Conference on Artificial Intelligence (2013).
- Organizing Committee, EAAI Symposium on Educational Advances in Artificial Intelligence (2013).

Journal Editing

- Editor-in-chief, AI Matters: the ACM SIGAI Quarterly Newsletter (2015–2016).
- Guest co-editor (with Carla Gomes and Brian Williams), special issues of AI Magazine on Computational Sustainability (2014).

Journal Reviewing

- Journal of Machine Learning Research: 2014, 2016
- Machine Learning: 2012–2013
- Artificial Intelligence: 2014–2015
- Journal of Artificial Intelligence Research: 2011–2013
- Autonomous Agents and Multi-Agent Systems: 2012
- IEEE Transactions on Neural Networks and Learning Systems: 2012
- Data Mining and Knowledge Discovery: 2009
- IEEE Transactions on Knowledge and Data Engineering: 2008–2009

Senior Program Committees

- AAAI Conference on Artificial Intelligence: 2013, 2016, 2017
- International Joint Conference on Artificial Intelligence (IJCAI): 2015, 2016

Program Committees

- AAAI Conference on Artificial Intelligence:
 - Main technical program: 2012, 2014, 2015
 - Computational Sustainability track: 2011–2013, 2015
 - Integrated Intelligence track: 2010–2011
 - AI and the Web track: 2013
- EAAI Symposium on Educational Advances in Artificial Intelligence: 2012, 2016
- IJCAI International Joint Conference on Artificial Intelligence: 2011
- ICML International Conference on Machine Learning: 2009

Other Conference, Reviewing, and Outreach Activities

- NSF grant review panelist, Robust Intelligence program (2015).
- Reviewer, COLT Conference on Learning Theory (2015).
- Invited participant, DARPA ISAT Workshop on the “Training of Things” (2014).
- Judge, Indoor Aerial Robotics Competition, Drexel University (2012).
- Conference paper co-reviewer:
 - AAAI-05, the 20th Conference on Artificial Intelligence (2005).
 - ICML-05, the 22nd International Conference on Machine Learning (2005).
 - IJCAI-05, the International Joint Conference on Artificial Intelligence (2005).
 - ICML-04, the 21st International Conference on Machine Learning (2004).
- Judge, the 26th Annual UMB/UMBC Graduate Research Conference (2004).
- Registration Asst. and Session Chair, ICML-03, the 20th Int. Conf. on Machine Learning (2003).

University of Pennsylvania Service

- Coordinator of Teaching Assistants for CIS core courses (Spring 2015).
- Advisor, CIS 400 Senior Project teams (2013, 2014).

Bryn Mawr College Service

- Member, Computer Science Lecturer search committee (2013).
- Clare Boothe Luce scholarship committee (2013).
- Primary “Major Advisor” for computer science majors (2012–2013).
- Member, Computer Science System Administrator / Lab Coordinator search committee (2012).
- Coordinator of guest speakers for FLICS Fantastic Lectures in Computer Science series (2011–2012).
- Organized showcase and discussion of SIGGRAPH videos (2010).

- Bryn Mawr organizer for student research showcase at Haverford College (2010).

UMBC Service

- Revised CS Graduate Student Handbook and Progress Checklists (2007).
- Member, Provost's Student Advisory Committee (2004–2005).
- Student Member, CSEE Department Promotion and Tenure Committee (2004, 2003).
- Co-Organizer, CSEE Department "Hi-Tea" Weekly Social Forum (S'2007, F'2006, F'2004, S'2004).
- CSEE Representative, Graduate School Horizons program (Summer 2004, Summer 2003).
- Panelist, College of Engineering and Information Technology Summer Preview Days (Summer 2004).
- Sole Student Member, CSEE Department Chair Search Committee (Fall 2003).