
Paulina Varshavskaya

MIT Center for Collective Intelligence
77 Massachusetts Ave, NE25-751
Cambridge MA 02139

617-803-6300
paulina@csail.mit.edu
<http://csail.mit.edu/~paulina>

Research Objective

Adaptive distributed and collective intelligent systems, machine learning and biologically plausible robotics.

Education

Massachusetts Institute of Technology, Cambridge MA

- 2007 Ph.D. in Computer Science, advisor: Daniela Rus
Thesis: Distributed Reinforcement Learning for Self-Reconfiguring Modular Robots
- 2002 S.M. in Computer Science, advisor: Rodney Brooks
Thesis: Early Pragmatic Language Development for an Infant Robot

University College London, London UK

- 1999 B.Sc. (First Class Honours) in Computer Science with Cognitive Science
Recipient of the UCL Open Undergraduate Scholarship 1995-1999

Appointments

- Oct 2008 – ongoing Visiting Scholar
MIT Center for Collective Intelligence, Cambridge MA
- Sep 2008 – May 2009 Visiting Lecturer
Tufts University Department of Computer Science, Medford MA
- Jan – Aug 2008 Postdoctoral Associate, Distributed Robotics Lab
MIT Computer Science and Artificial Intelligence Lab, Cambridge MA

Research Experience

- 2008 – ongoing Center for Collective Intelligence, MIT, Cambridge MA
— Computational architectures for social learning in collectives of animals and machines; artificial players in prediction markets
- 2004 – 2008 Distributed Robotics Lab, MIT CSAIL, Cambridge MA
— Automated controller design and adaptive architectures for modular robots with reinforcement learning (thesis work); application to swarm robotics
- 2004 AMOUR Project, Distributed Robotics Lab, MIT CSAIL, Cambridge MA
— Design, control and feasibility study of a prototype underwater modular robot
- 2003 Cardea Project, MIT CSAIL, Cambridge MA
— Contributed to a large-scale team project including hardware and control for a Segway RMP-based mobile manipulator robot
- 2002 Living Machines Group, MIT AI Lab, Cambridge MA
— Design and neuromorphic control of a high-DOF serpentine robot
- 1999 – 2001 Humanoid Robotics Group, MIT AI Lab, Cambridge MA
— Early pragmatic language development for the infant-like robot Kismet

Teaching Experience

- Spring 2009 Course developer, Lecturer, COMP 150-07 Intelligent Robotics
Advisor, COMP 194-14 Directed Study
Tufts University Department of Computer Science
- Fall 2008 Lecturer, COMP 131 Artificial Intelligence
Tufts University Department of Computer Science
- Spring 2003 Teaching Assistant, 6.836 Embodied Intelligence
MIT Department of Electrical Engineering and Computer Science

Publications

In Preparation

- P. Varshavskaya, Towards a Theory of Social Reinforcement Learning.

Journal Articles

- P. Varshavskaya, L.P. Kaelbling & D. Rus, Automated Design of Adaptive Controllers for Modular Robots Using Reinforcement Learning, *Int. J. of Robotics Res.* 27:3-4 (Mar-Apr 2008) pp.505-526
- R.A. Brooks, L. Aryananda, A. Edsinger, P. Fitzpatrick, C.C. Kemp, U.-M. O'Reilly, E. Torres-Jara, P. Varshavskaya & J. Weber, Sensing and manipulating built-for-human environments, *Int. J. of Humanoid Robotics* 1:1 (Mar 2004), pp.1-28
- C. Breazeal, A. Edsinger, P. Fitzpatrick, B. Scassellati & P. Varchavskaia, Social Constraints on Animate Vision, *IEEE Intelligent Sys.*, Aug 2000

Peer-Reviewed Conference and Workshop Proceedings

- P. Varshavskaya, L.P. Kaelbling & D. Rus, Efficient Distributed Reinforcement Learning Through Agreement, 9th Int. Symp. on Distributed Autonomous Robotic Sys., Tsukuba, Japan, Nov 2008
- P. Varshavskaya, L.P. Kaelbling & D. Rus, On Scalability Issues in Reinforcement Learning for Self-Reconfiguring Modular Robots, RSS Workshop on Self-Reconf. Mod. Robots, Phil. PA, Aug 2006
- I. Vasilescu, P. Varshavskaya, K. Kotay & D. Rus, Autonomous Modular Optical Underwater Robot (AMOUR): Design, Prototype and Feasibility Study, *IEEE Int. Conf. on Robotics and Automation*, Barcelona, Spain, Apr 2005
- P. Varshavskaya, L.P. Kaelbling & D. Rus, Learning Distributed Control for Modular Robots, *IEEE/RSJ Int. Conf. on Robots and Sys.*, Sendai, Japan, Sep 2004
- J. Conradt, R.J. Douglas, P. Varshavskaya & K. Preuschoff, A CPG-driven Autonomous Robot, 17th Int. Conf. on Neural Information Proc. Sys. (demo track), Vancouver, Canada, Dec 2003
- J. Conradt & P. Varshavskaya, Distributed Central Pattern Generator Control for a Serpentine Robot, 13th Int. Conf. on Artificial Neural Networks, Supplement. Proc., Istanbul, Turkey, Jun 2003
- P. Varshavskaya (Varchavskaia), Behavior-Based Early Language Development on a Humanoid Robot, 2nd Int. Workshop on Epigenetic Robotics, Edinburgh, UK, Aug 2002
- P. Varchavskaia, P. Fitzpatrick & C. Breazeal, Characterizing and Processing Robot-Directed Speech, 2nd Int. Conf. on Humanoid Robotics, Tokyo, Japan, Nov 2001

Other

- P. Varshavskaya, L.P. Kaelbling & D. Rus, Distributed Reinforcement Learning of Group Behavior, 2nd Workshop on Swarming in Natural and Engineered Systems, Phil. PA, May 2007

Invited Talks

- December 2008 *Reinforcement Learning in Distributed Robotic Systems*
University of Zurich, AI Lab “Brown Paper Bag” Seminar
École Polytechnique Fédérale de Lausanne, Robotics Seminar
University of Edinburgh, Institute for Perception Action and Behavior Seminar
- October 2008 *Reinforcement Learning for Distributed Cooperative Control*
Tufts University, Department of Computer Science Colloquium
- April 2008 Guest lecture: *Insect-Inspired Robotics*
University of Vermont
- February 2007 *Reinforcement Learning for Self-Reconfiguring Modular Robots*
Harvard University, Self-Organizing Systems Research Group

Professional Activities and Service

- Member IEEE RAS Technical Committee on Robot Learning
- Program Committee Int. Symposium on Distributed Autonomous Robotic Systems (DARS) 2008
- Co-organizer Robotics: Science and Systems (RSS) 2007 Workshop on Algorithmic Equivalences
Between Biological and Robotic Swarms
- Reviewer Int. J. of Robotics Research (IJRR), Autonomous Robots, IEEE ICRA, NESCAI
- Junior Reviewer J. of Machine Learning Research (JMLR)
- Content developer RoboticsCourseWare.org
- Co-organizer MIT CSAIL Robotics Journal Club 2004–2007
- Workshop presenter “Career in Robotics”, Women in Science & Math Conference
Junior Women’s Club, Melican Middle School, Northborough MA

Positions of Leadership

- 2000 – 2005 President, VP, Board of Directors, Treasurer — MIT Outing Club
- 2003 Outing Chair — Sidney & Pacific Graduate Residence
- 1998 – 1999 President, Editor — Panopticon: UCL’s Undergraduate Academic Journal

References

Prof. Daniela Rus
MIT Computer Science and AI Laboratory
rus@csail.mit.edu, +1-617-258-7567
32 Vassar St, rm 32-374
Cambridge MA 02139

Prof. Leslie Pack Kaelbling
MIT Computer Science and AI Laboratory
lpk@csail.mit.edu, +1-617-258-9695
32 Vassar St, rm 32-G486
Cambridge MA 02139

Prof. Rodney A. Brooks
MIT Computer Science and AI Laboratory
brooks@mit.edu, +1-617-500-4286
32 Vassar St, rm 32-D512
Cambridge MA 02139

Prof. Diane Souvaine
Tufts University Department of Computer Science
dls@cs.tufts.edu, +1-617-627-2225
Halligan 110, 161 College Ave
Medford MA 02155