

Radhika Nagpal

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RESEARCH INTERESTS

Self-organizing Systems and Bio-inspired Multi-agent Systems: algorithms and theory; applications to modular robotics, robot swarms, and distributed sensor networks; global-to-local compilation and theory; computational models of multi-cellular biological systems.

EDUCATION

Ph.D. in Electrical Engineering and Computer Science, June 2001

Massachusetts Institute of Technology (MIT), Cambridge, MA

Thesis: Programmable Self-Assembly using Biologically-Inspired Local Interactions

Advisors: Prof. Gerald J. Sussman, Prof. Harold Abelson

S.M. and S.B. in Electrical Engineering and Computer Science, June 1994

Massachusetts Institute of Technology (MIT), Cambridge, MA

Thesis: Implementing Single-cycle Store Instructions in Pipelined Microprocessors

Advisors: Dr Rae McLellan (Bell Labs), Prof. Anant Agarwal (MIT)

PROFESSIONAL APPOINTMENTS

- Sept 2009- THOMAS D. CABOT ASSOCIATE PROFESSOR OF COMPUTER SCIENCE
School of Engineering and Applied Sciences, Harvard University.
CORE FACULTY, Wyss Institute for Biologically-inspired Engineering (2008-present).
AFFILIATED FACULTY, Department of Systems Biology, Harvard Medical School (2004-present).
- 2004-2009 ASSISTANT PROFESSOR OF COMPUTER SCIENCE
School of Engineering and Applied Sciences, Harvard University.
- 2003-2004 RESEARCH FELLOW,
Department of Systems Biology, Harvard Medical School.
- 2001-2003 POSTDOCTORAL LECTURER,
Department of EECS, Massachusetts Institute of Technology.
- 1994-1995 MEMBER OF TECHNICAL STAFF,
Bell Laboratories, Murray Hill, NJ.

AWARDS

- BORG EARLY CAREER AWARD (BECA), June 2010.
THOMAS D. CABOT ASSOCIATE CHAIR, June 2009.
NSF CAREER AWARD, June 2007.
MICROSOFT NEW FACULTY FELLOWSHIP AWARD, May 2005.
BELL LABS GRADUATE RESEARCH FELLOWSHIP AWARD for Women (GRPW), 1995-2001.
NATIONAL TALENT SEARCH SCHOLARSHIP AWARD, India, 1987.

Selected Publications

- Yong-Lae Park, Bor-rong Chen, Diana Young, Leia Stirling, Robert Wood, Eugene Goldfield, Radhika Nagpal, *Bio-inspired Active Soft Orthotic Device for Ankle Foot Pathologies*, IEEE Conf. on Intelligent Robots and Systems (IROS), Sept 2011.
- Kirstin Petersen, Radhika Nagpal, Justin Werfel, *TERMES: An Autonomous Robotic System for Three-Dimensional Collective Construction*, Robotics: Science and Systems Conference (RSS), June 2011.
- William Tyler Gibson, J. Veldhuis, B. Rubinstein, H. Cartwright, N. Perrimon, W. Brodland, R. Nagpal, and M. Gibson, *Control of the Mitotic Cleavage Plane by Local Epithelial Topology*, *Cell*, Volume 144, Issue 3, 414-426, 4 Feb 2011.
- Chih-Han Yu, Radhika Nagpal, *A Self-Adaptive Framework for Modular Robots in Dynamic Environment: Theory and Applications*, International Journal of Robotics Research (IJRR), Oct 2010.
- Chih-Han Yu, Justin Werfel, Radhika Nagpal, *Collective Decision-Making in Multi-Agent Systems by Implicit Leadership*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), 2010.
- Ankit Patel, William Tyler Gibson, Matthew Gibson, Radhika Nagpal, *Modeling and Inferring Cleavage Patterns in Proliferating Epithelia*, PLoS Computational Biology 5(6):e1000412, June 2009.
- Justin Werfel, Radhika Nagpal, *Three-dimensional Construction With Mobile Robots And Modular Blocks*, Intl. Journal of Robotics Research (IJRR), 27 (3-4): 463-479, March 2008.
- Daniel Yamins, Radhika Nagpal, *Automated Global-to-Local Programming in 1-D Spatial Multi-Agent Systems*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), May 2008.
- Julius Degeys, Ian Rose, Ankit Patel, Radhika Nagpal, *DESYNC: Self-Organizing Desynchronization and TDMA on Wireless Sensor Networks*, Intl. Conf. on Information Processing in Sensor Networks (IPSN), April 2007.
- Justin Werfel, Yaneer Bar-Yam, Daniela Rus, Radhika Nagpal, *Distributed Construction by Mobile Robots with Enhanced Building Blocks*, IEEE Intl. Conf. on Robotics Automation (ICRA), May 2006.
- Matthew Gibson, Ankit Patel, Radhika Nagpal, Norbert Perrimon, *The Emergence of Geometric Order in Proliferating Metazoan Epithelia*, **Nature**, 442(7106):1038-41, Aug 31, 2006.
- Geoff Werner-Allen, Geetika Tewari, Ankit Patel, Matt Welsh, Radhika Nagpal, *Firefly-Inspired Sensor Network Synchronicity with Realistic Radio Effects*, ACM Conf. on Embedded Networked Sensor Systems (SENSYS), Nov 2005.
- Jiming Cheng, Winston Cheng, Radhika Nagpal, *Robust and Self-repairing Formation Control For Swarms Of Mobile Agents*, National Conf. on Artificial Intelligence (AAAI), July 2005.
- Kasper Stoy, Radhika Nagpal, *Self-repair and Scale-independent Self-reconfiguration*, IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2004.
- Radhika Nagpal, *Programmable Self-Assembly Using Biologically-Inspired Multiagent Control*, Intl. Joint Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), July 2002.
- H. Abelson, D. Allen, D. Coore, C. Hanson, G. Homsy, T. Knight, R. Nagpal, E. Rauch, G. Sussman, and R. Weiss, *Amorphous Computing*, Communications of the ACM, Volume 43, Number 5, May 2000.

GRANTS

Borg Early Career Award June 2010.

Thomas D. Cabot Associate Chair Award June 2009-2013.

NSF Expeditions Grant *RoboBees: A Convergence of Body, Brain and Colony*, Robert Wood(PI) *et al*, Radhika Nagpal (co-PI), NSF Expeditions Program, Sept 2009-14.

NSF CPS Grant *Programmable Second Skin to Re-educate Injured Nervous Systems*, Eugene Goldfield(PI) *et al*, Radhika Nagpal (co-PI), NSF Cyber-physical Systems Program, Sept 2009-12.

NSF EMT Grant *Programmable Self-Adaptation: A Bio-inspired Approach to Multi-agent Robotic Systems*, Radhika Nagpal (PI), NSF Emerging Models and Technologies for Computation Program (CCF-EMT), Sept 2008-11.

NSF Robust Intelligence Grant *Autonomous Microrobotic Swarms*, Robert Wood (PI), Radhika Nagpal (co-PI), NSF Robust Intelligence Program (CISE-IIS), Sept 2008-11.

Harvard HIBIE Seed Grant *Biomimetic Robotic Self-Assembly*, Radhika Nagpal, Robert Wood, Eugene Goldfield (Harvard Medical School), Harvard Institute for Biologically-inspired Engineering, Sept 2008-09.

BBN Grant *Collaborative Technology Alliance for Communications and Networking*, Radhika Nagpal, Sponsor: BBN Technologies Corporation, Jan-Sept 2008.

NSF Career Grant *Self-Organizing Systems: Engineering and Understanding Robust Collective Behavior*, Radhika Nagpal (PI), June 2007-12.

Intel Research Gift Jan 2007.

Harvard Clark Grant *Collective Construction by Groups of Mobile Robots*, Feb 2006.

Microsoft New Faculty Fellowship Award May 2005.

NSF EMT Grant *Programmable Myriads: Self-assembling Cellular Robots Inspired by Tissue Morphogenesis*, Radhika Nagpal (PI), Donald Ingber (co-PI), NSF Emerging Models and Technologies for Computation Program (CCF-EMT), Sept 2005-08.

NSF QuBIC Grant (at MIT) *Robust Engineering Using Biologically-Inspired Models of Cell Differentiation and Morphogenesis*, Radhika Nagpal (postdoc at MIT), Gerald J. Sussman (PI), NSF Grant on Quantum and Biologically-Inspired Computing (QuBIC), Sept 2001-05.

PATENTS AND LICENSING

- HU-3067, "Environmentally-Adaptive Shapes on a Multi-Agent System", Radhika Nagpal, Chih-Han Yu, patent pending, Oct 2008.
- HU-3548, "Actively Controlled Orthotic Devices", Eugene C. Goldfield, Radhika Nagpal, Dava Newman, Elliot Saltzman, Leia A. Stirling, Robert J. Wood, Chih-Han Yu, patent pending, July 2010.
- Licensing Agreement with K-TEAM: Kilobot robot platform to be released in both open-source non-commercial form and commercially exclusively distributed through K-team corporation which specializes in educational robotics (term sheet signed July 2011).

TEACHING

Harvard CS 182 Intelligent Machines (Introduction to Artificial Intelligence)

Fall 2009, 2010, 2011, Lecturer, Undergraduate Course.

Harvard CS 189r Autonomous Multi-Robot Systems

Spring 2011, Spring 2009 (as CS199r), Undergraduate Course.
Lecturer, Developed a project-based course around robot soccer.

Harvard CS 266 Biologically-inspired Distributed and Multi-agent Systems

Fall 2004, 2006, 2007, 2008, Spring 2010, Graduate Course
Lecturer, Developed new course based on general research area.

Harvard CS 51 Introduction to Computer Science II (Abstraction and Design)

Spring 2005, 2006, 2007, 2008. Undergraduate Course
Lecturer, co-lectured with Prof. M. Seltzer for spring 2005 and 2006.
Redesigned course to focus on Abstraction and Design, developed substantial new material.

Harvard SB 301 Special Topics in Systems Biology

Fall 2005, Graduate Course, Co-lecturer with other biology faculty.
Developed and taught a two-week module on multicellular models

Undergraduate Activities and Outreach

STEM Outreach Our lab has developed several hands-on activities (robot demonstrations kits) and presentations for outreach. Selected Events: Cambridge Science Festival (Bots that Mimic Bugs Workshop, May 2011), Museum of Science (National Robotics Week April 2010), Museum of Natural History (Insect Day, April 2011), Women's Technology Program at MIT for High-School Girls (robotics lecture and workshop, June 2008, 2010); LeadAmerica high-school program (June 2010, 2011), IBM EXCITE Program (2006), Harvard RET (Research Experience for Teachers) Program.

Harvard-MIT RoboCup Soccer Team 2005-present.

Faculty advisor, Harvard College Undergraduate Engineering Society (HCES) and RFC Cambridge.
Hosted the U.S Open Small-size Robot Soccer Competition at Harvard, May 2009.

Harvard iGEM Intercollegiate Genetically-Engineered Machines Competition Summer 2005, 2006.

Faculty advisor, Summer course and competition in synthetic biology.

Teaching (at MIT as a postdoctoral lecturer)

MIT 6.042 Mathematics for Computer Scientists Fall 2001, Spring 2002, Fall 2002.

Undergraduate Course, Co-lecturer with Prof. A. Meyer, redesigned course in interactive lecture style.

MIT 6.978 Biologically-motivated Programming Technology for Robust Systems Fall 2002.

Graduate Course, Co-lecturer with Prof. H. Abelson and Prof. G. Sussman.

MIT 6.033 Computer Systems Spring 2003.

Undergraduate Course, Recitation Instructor

RESEARCH GROUP

Current Students: William Tyler Gibson, Kirstin Petersen

Current Postdocs: Michael Rubenstein, Spring Berman, Nils Napp,

Postdocs co-advised with Prof. Wood and Prof. Goldfield: Yong-lae Park, Bor-rong Chen

Past Masters Students: Julius Degeysys, Jimming Cheng, Winston Cheng, Francois-Xavier Williems

Past Undergraduates: Peter Bailis (CRA Outstanding Undergraduate Award), Rebecca Belisle (Fulbright Scholar, Olin College), Neena Kamath, Fiona Wood, Svilen Kanev, Siddarth Chandrasekhran, David Robinson, Amelia Sagoff, Jason Miller, Kristina Haller, Andrea Munteanu, Crystal Schuil, Matthew Valente.

Supervised PhD Dissertations

Nicholas Hoff, PhD Thesis, Harvard University, May 2011.

Multi-Robot Foraging for Swarms of Simple Robots

Advisors: Robert Wood and Radhika Nagpal

Committee: David Parkes

Chih-Han Yu, PhD Thesis, Harvard University, May 2011.

Bio-inspired Control for Self-Adaptive Multiagent Systems

Advisor: Radhika Nagpal

Committee: R. Wood, D. Parkes (Harvard); M. Veloso (CMU)

Current Position: CEO and Founder, Plaxie Incorporated

RUNNER-UP PRIZE, IFAAMAS 2010 VICTOR LESSER DISTINGUISHED DISSERTATION AWARD

Ankit Patel, PhD Thesis, Applied Math, Harvard University, Nov 2008.

Modelling Cleavage Patterns on Proliferating Epithelia

Advisor: Radhika Nagpal

Committee: M. Brenner, L. Mahadevan, D. Parkes, M. Mitzenmacher

Current Position: Quantitative Trader, Global Electronic Trading Co.

Daniel Yamins, PhD Thesis, Applied Math, Harvard University, Feb 2008.

A Theory of Local-to-Global Algorithms for One-Dimensional Spatial Multi-Agent Systems

Advisors: Radhika Nagpal (Harvard), Walter Fontana (Harvard Medical School)

Committee: M. Rabin (Harvard), G. Sussman (MIT)

Current Position: Postdoctoral Fellow, MIT Brain and Cognitive Sciences Institute

Justin Werfel, PhD Thesis, Massachusetts Institute of Technology, May 2006.

Anthills Built to Order: Automating Construction with Artificial Swarms

Advisors: Radhika Nagpal (Harvard), Sebastian Seung (MIT)

Committee: D. Rus (MIT), Y. Bar-Yam (NECSI), G. Sussman (MIT)

Current Position: Research Scientist, Wyss Institute, Harvard

Supervised Undergraduate Theses

- Andrea Munteanu (Harvard, CS) Senior Thesis, April 2008
Measures for the Emergence of Order in Multi-Agent Systems
- Kristina Haller (MIT, Mechanical Engineering) Senior Thesis, April 2008
A Self-deformable Modular Robot Design
- Crystal Schuil (Harvard, ES) Senior Design Project, May 2007
Collision Detection for Lego Robots

FULL PUBLICATIONS LIST

Underlined names are supervised postdocs, graduate, undergraduate students.

In preparation

1. Michael Rubenstein, **Radhika Nagpal**, *Kilobot: A Low Cost Scalable Robot Swarm for Collective Behaviors*.

Invited Articles

1. **Radhika Nagpal**, Ankit Patel, Matthew Gibson, *Epithelial topology. Problems and Paradigms*, *BioEssays* 30(3):260-266, March 2008.
2. **Radhika Nagpal**, *Self-Organizing Shape and Pattern: From Cells to Robots*, *IEEE Intelligent Systems* 21(2), April 2006.
3. **Radhika Nagpal**, Marco Mamei, *Engineering Amorphous Computing Systems*, book chapter in *Methodologies and Software Engineering for Agent Systems*, Kluwer Academic Publishing, 2003.

Journals (refereed)

1. William Tyler Gibson, J. Veldhuis, B. Rubinstein, H. Cartwright, N. Perrimon, W. Brodland, **Radhika Nagpal**, and Matthew C. Gibson, *Control of the Mitotic Cleavage Plane by Local Epithelial Topology*, *Cell*, Volume 144, Issue 3, 414-426, 4 Feb 2011.
2. Leia Stirling, Chih-Han Yu, Jason Miller, Eliot Hawkes, Rob Wood, Eugene Goldfield, **Radhika Nagpal**, *Applicability of Shape Memory Alloy Wire for an Active Soft Orthotic*, *Journal of Materials Engineering and Performance*, Feb 2011.
3. Chih-Han Yu, **Radhika Nagpal**, *A Self-Adaptive Framework for Modular Robots in Dynamic Environment: Theory and Applications*, *International Journal of Robotics Research (IJRR)*, Oct 2010.
4. Ankit Patel, William Tyler Gibson, Matthew Gibson, **Radhika Nagpal**, *Modeling and Inferring Cleavage Patterns in Proliferating Epithelia*, *PLoS Computational Biology* 5(6):e1000412, June 2009.
5. Justin Werfel, **Radhika Nagpal**, *Three-dimensional Construction With Mobile Robots And Modular Blocks*, *Intl. Journal of Robotics Research (IJRR)*, 27 (3-4): 463-479, March 2008.
6. Matthew Gibson*, Ankit Patel*, **Radhika Nagpal**+, Norbert Perrimon+, *The Emergence of Geometric Order in Proliferating Metazoan Epithelia*, **Nature**, 442(7106):1038-41, Aug 31, 2006. (* co-first authors, + co-senior authors).
7. Justin Werfel, **Radhika Nagpal**, *Extended Stigmergy in Collective Construction*, *IEEE Intelligent Systems*, Volume 21, Number 2, April 2006.
8. Jonathan Bachrach, **Radhika Nagpal**, Micheal Salib, Howard Shrobe, *Experimental Results and Theoretical Analysis of a Self-Organizing Global Coordinate System for Ad Hoc Sensor Networks*, *Telecommunications Systems Journal*, Special Issue on Wireless System Networks, 2003.
9. Harold Abelson, Don Allen, Daniel Coore, Chris Hanson, George Homsy, Thomas Knight, **Radhika Nagpal**, Erik Rauch, Gerald Sussman, and Ron Weiss, *Amorphous Computing*, *Communications of the ACM*, Volume 43, Number 5, May 2000.

Conference Proceedings (refereed)

1. Yong-Lae Park, Bor-rong Chen, Diana Young, Leia Stirling, Robert Wood, Eugene Goldfield, **Radhika Nagpal**, *Bio-inspired Active Soft Orthotic Device for Ankle Foot Pathologies*, (to appear) IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2011.
2. Spring Berman, **Radhika Nagpal**, Adam Halasz, *Optimization of Stochastic Strategies for Spatially Inhomogeneous Robot Swarms: A Case Study in Commercial Pollination*, (to appear) IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2011.
3. Nicholas Hoff, Robert Wood, **Radhika Nagpal**, *Effect of Sensor and Actuator Quality on Robot Swarm Algorithm Performance*, (to appear) IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2011.
4. Kirstin Petersen, **Radhika Nagpal**, Justin Werfel, *TERMES: An Autonomous Robotic System for Three-Dimensional Collective Construction*, Robotics: Science and Systems Conference (RSS), 2011.
5. Spring Berman, Vijay Kumar, and **Radhika Nagpal**, *Design of Control Policies for Spatially Inhomogeneous Robot Swarms with Application to Commercial Pollination*, IEEE International Conference on Robotics and Automation (ICRA), May 2011.
6. Nicholas Hoff, Robert Wood, **Radhika Nagpal**, *Distributed Colony-Level Algorithm Switching for Robot Swarm Foraging*, Intl. Symposium on Distributed Autonomous Robotic Systems (DARS), 2010.
7. Nicholas Hoff, Amelia Sagoff, Robert J. Wood, **Radhika Nagpal**, *Two Foraging Algorithms for Robot Swarms Using Only Local Communication*, IEEE International Conference on Robotics and Biomimetics (ROBIO), Dec 2010.
8. Peter Bailis, **Radhika Nagpal**, Justin Werfel, *Positional Communication and Private Information in Honeybee Foraging Models*, Intl. Conference on Swarm Intelligence (ANTs), 2010. **Best Student Paper Award**.
9. Chih-Han Yu, **Radhika Nagpal**, *Biologically-Inspired Control for Multi-Agent Self-Adaptive Tasks*, Twenty-Fourth AAAI Conference on Artificial Intelligence (AAAI), New scientific and technical advances in research (Nectar) Track, July 2010.
10. Chih-Han Yu, Justin Werfel, **Radhika Nagpal**, *Collective Decision-Making in Multi-Agent Systems by Implicit Leadership*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), 2010.
11. Chih-Han Yu, Justin Werfel, **Radhika Nagpal**, *Coordinating Collective Locomotion in an Amorphous Modular Robot*, IEEE International Conference on Robotics and Automation (ICRA), May 2010.
12. Chih-Han Yu, **Radhika Nagpal**, *Self-Adapting Modular Robotics: A Generalized Distributed Consensus Framework* IEEE Intl. Conf. on Robotics and Automation (ICRA), May 2009.
13. Julius DegeSys, **Radhika Nagpal**, *Towards Desynchronization of Multi-hop Topologies*, IEEE Intl. Conf. on Self-Organising Systems (SASO), Oct 2008.
14. Chih-Han Yu, Kristina Haller, Donald Ingber, **Radhika Nagpal**, *Morpho: A Self-deformable Modular Robot Inspired by Cellular Structure*, IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), 2008.
15. Daniel Yamins, **Radhika Nagpal**, *Automated Global-to-Local Programming in 1-D Spatial Multi-Agent Systems*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), May 2008.
16. Chih-Han Yu, **Radhika Nagpal**, *Sensing-based Shape Formation Tasks on Modular Multi-Robot Systems: A Theoretical Study*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), May 2008. **Best Student Paper Finalist**.

17. Chih-Han Yu, FX Williems, Donald Ingber, **Radhika Nagpal**, *Self-organizing Environmentally-adaptive Shapes on a Modular Robot*, IEEE Conf. on Intelligent Robots and Systems (IROS), Oct 2007 .
18. Justin Werfel, Donald Ingber, **Radhika Nagpal**, *Collective Construction of Environmentally-adaptive Structures*, IEEE Conf. on Intelligent Robots and Systems (IROS), Oct 2007.
19. Ankit Patel, Julius Degeysys, **Radhika Nagpal**, *Desynchronization: theory of Self-Organizing Algorithms for Round-Robin Scheduling*, IEEE Conf. on Self-Adaptive and Self-Organizing Systems (SASO), July 2007.
20. Julius Degeysys, Ian Rose, Ankit Patel, **Radhika Nagpal**, *DESYNC: Self-Organizing Desynchronization and TDMA on Wireless Sensor Networks*, Intl. Conf. on Information Processing in Sensor Networks (IPSN), April 2007.
21. Marco Mamei, **Radhika Nagpal**, *Macro Programming through Bayesian Networks: Distributed Inference and Anomaly Detection*, IEEE Intl. Conf. on Pervasive Computing and Communication (PERCOM), 2007.
22. Justin Werfel, Yaneer Bar-Yam, Daniela Rus, **Radhika Nagpal**, *Distributed Construction by Mobile Robots with Enhanced Building Blocks*, IEEE Intl. Conf. on Robotics and Automation (ICRA), May 2006.
23. Geoff Werner-Allen, Geetika Tewari, Ankit Patel, Matt Welsh, **Radhika Nagpal**, *Firefly-Inspired Sensor Network Synchronicity with Realistic Radio Effects*, ACM Conf. on Embedded Networked Sensor Systems (SENSYS), Nov 2005.
24. Justin Werfel, Yaneer Bar-Yam, **Radhika Nagpal**, *Building Patterned Structures with Robot Swarms*, Intl. Joint Conf. on Artificial Intelligence (IJCAI), August 2005.
25. Jimming Cheng, Winston Cheng, **Radhika Nagpal**, *Robust and Self-repairing Formation Control For Swarms Of Mobile Agents*, National Conf. on Artificial Intelligence (AAAI), July 2005.
26. Kasper Stoy, **Radhika Nagpal**, *Self-repair and Scale-independent Self-reconfiguration (for Modular Robots)*, IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2004.
27. Kasper Stoy, **Radhika Nagpal**, *Self-reconfiguration Using Directed Growth (for Modular Robots)*, Intl. Symposium on Distributed Autonomous Robotic Systems (DARs), June 2004.
28. **Radhika Nagpal**, Howard Shrobe, Jonathan Bachrach, *Organizing a Global Coordinate System from Local Information on an Ad Hoc Sensor Network*, Intl. Conf. on Information Processing in Sensor Networks (IPSN), April 2003.
29. **Radhika Nagpal**, *Programmable Self-Assembly Using Biologically-Inspired Multiagent Control*, Intl. Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS), July 2002.
30. **Radhika Nagpal**, *Programmable Pattern-Formation and Scale-Independence*, Intl. Conf. on Complex Systems (ICCS), June 2002.
31. **Radhika Nagpal**, *Self-Assembling Global Shape, using Ideas from Biology and Origami*, Intl. Meeting of Origami Science, Mathematics and Technology (3OSME), March 2001. Reprinted in Origami3, A.K. Peters, ed. Thomas Hull, 2002.
32. **Radhika Nagpal**, Daniel Coore, *An Algorithm for Group Formation in an Amorphous Computer*, Intl. Conf. on Parallel and Distributed Computing Systems (PDCS), Oct 1998.

Workshops and Technical Reports (selected)

1. Justin Werfel, Kirstin Petersen, **Radhika Nagpal**, *Distributed Multi-Robot Algorithms for the TER-MES 3D Collective Construction System*, (to appear) Modular Robotics Workshop, IEEE Intl. Conf. on Intelligent Robots and Systems (IROS), Sept 2011.
2. Michael Rubenstein, Nicholas Hoff, **Radhika Nagpal**, *Kilobot: A Low Cost Scalable Robot System for Collective Behaviors*, Technical Report TR-06-11, Harvard University.
3. Mike Rubenstein, **Radhika Nagpal**, *KiloBot: A Robotic Module for Demonstrating Collective Behaviors*, Modular Robotics Workshop, IEEE Intl. Conf. on Robotics and Automation (ICRA), 2010.
4. Rebecca Belisle, Chih-Han Yu, **Radhika Nagpal**, *Mechanical Design and Locomotion of Modular-Expanding Robots*, Modular Robotics Workshop, IEEE Intl. Conf. on Robotics and Automation (ICRA), May 2010.
5. Justin Werfel , **Radhika Nagpal** *Towards a Common Comparison Framework for Global-to-Local Programming of Self-assembling Robotic Systems*, Workshop on Self-reconfigurable Robot Systems and Applications, IEEE Conf. on Intelligent Robots and Systems (IROS), Oct 2007.
6. Justin Werfel, **Radhika Nagpal**, *Three-dimensional Directed Construction*, Workshop on Reconfigurable Robots, Robotics Science and Systems (RSS), Aug 2006.
7. Crystal Schuil, Matthew Valente, Justin Werfel, **Radhika Nagpal**, *Collective Construction Using Lego Robots*, Robot Exhibition, National Conf. on Artificial Intelligence (AAAI), July 2006.
8. **Radhika Nagpal**, *Towards a Catalog of Biologically-inspired Primitives*, Workshop on Engineering Self-organising Applications, Intl. Conf. on Autonomous Agents and Multiagents Systems (AAMAS), 2003.
9. **Radhika Nagpal**, Attila Kondacs, Catherine Chang, *Programming Methodology for Biologically-Inspired Self-Assembling Systems*, AAAI Spring Symposium, March 2003.
10. Lauren Clement, **Radhika Nagpal**, *Self-Assembly and Self-Repairing Topologies*, Workshop on Adaptability in Multi-Agent Systems, RoboCup Australian Open, January 2003.
11. Ron Weiss, George Homsy, **Radhika Nagpal**, *Programming Biological Cells*, Intl. Conf. on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Wild & Crazy Ideas Session, October 1998.
12. Daniel Coore, **Radhika Nagpal**, Ron Weiss, *Paradigms for Structure in an Amorphous Computer*, MIT Artificial Intelligence Laboratory Memo 1614, Nov 1997.
13. **Radhika Nagpal**, Hemant Kanakia, *Implementing Browsing Operations in MPEG*, Intl. Workshop on Packet Video, March 1995.
14. **Radhika Nagpal**, *Implementing Single-cycle Store Instructions in Write-through, Write-back and Set-associative Caches*, AT&T Technical Memo, 1127-950117-01TM, 1994.

PhD Dissertation

1. **Radhika Nagpal**, *Programmable Self-Assembly: Constructing Global Shape Using Biologically-Inspired Local Interactions and Origami Mathematics*, PhD Thesis, MIT Artificial Intelligence Laboratory Technical Memo 2001-008, June 2001.

SELECTED INVITED TALKS

- *Keynote Lecture*, 10th International Symposium on Distributed Autonomous Robotic Systems (DARS), Lausanne, Switzerland, Nov 2010.
- *Keynote Lecture*, 5th International Conference on Bio-inspired Models of Network, Information, and Computing Systems (BIONETICS), Boston, Dec 2010.
- *Plenary Lecture*, 1st International Meeting on Synthetic Biology, Cambridge, June 2004.
- *Invited Lecture*: Mathematical Biosciences Institute, Ohio State Univ., Workshop on Insect Self-organization and Swarming, March 2011.
- *Invited Lecture*: Grace Hopper Celebration of Women in Computing, Robotics Track, Oct 2009.
- *Invited Lecture*: Foundations of NanoScience (FNANO), Principles and Theory of Self-assembly Track, April 2009.
- *Invited Lecture*: IEEE Conference on Self-Adaptive and Self-Organising Systems, Spatial Computing Workshop, Oct 2008.
- *Invited Lecture*: DARPA ISAT studies on “Realizing Programmable Matter” (2006) and “Engineering Ensembles” (2007).
- *Invited Lecture*: 5th Americas School on Agents and Multiagent Systems, July 2006.
- *Invited Lecture*: Meeting on Computational and Biological Perspectives on Intelligent Systems, Microsoft and Friday Harbor Labs Centennial Conference, June 2005.
- *Invited Lecture*: Microsoft Faculty Summit, June 2005.
- *CS Colloquium*: Michigan State University (2010), Carnegie-Mellon University (2008), Univ. of Southern California (2007), Univ. of Pennsylvania GRASP Lab Seminar Series (2007), Cornell University (2005), Broad Institute (2005), University of Michigan (2004), Stanford University (2004), MIT Media Lab (2004), Mitsubishi Electric Research Laboratory (2002), University of Virginia (2002).
- *Biology Colloquium*: Microsoft Research Center for Computational and Systems Biology in Trento, Italy (2008), Microsoft eScience (2007), Bauer Center for Genomics, Harvard (2006), Center for Engineering in Medicine, Shriner’s Hospital (2006), Broad Institute (2005).

SELECTED PROFESSIONAL ACTIVITIES

- **Organizer**: co-organized *Workshop on Modular Robotics: State of the Art*, IEEE Intl. Conference on Robotics and Automation (ICRA), May 2010.
- **Organizer**: co-organized *Multi-Robot Teaming Challenge and Robotics Exhibition*, Intl. Joint Conference on Artificial Intelligence (IJCAI), June 2009.
- **Organizer**: co-organized U.S Open Small-size League Robocup Competition, with the Harvard College Engineering Society, Harvard University, May 2009.
- **Organiser**: co-organized *Workshop on Engineering Self-Organising Applications*, Intl. Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), 2004.

- **Organizer:** co-organized *Workshop on Programming Myriads*, Radcliffe Institute, Harvard University June 2004.
- **Robot Exhibitions and Competitions:** “Planetary Contingency Challenge” Competition, 2nd-place winner, IEEE Intl. Conference on Robotics and Automation (ICRA), May 2010; “Engineering Self-Organising Systems”, AAMAS Robotics Exhibition, Portugal, May 2008; “Collective Construction by Mobile Robots”, AAAI Robotic Exhibition, Boston, June 2006.
- **Tutorial Chair:** IEEE Conference on Self-Adaptive and Self-Organizing Systems (SASO 2008); **Tutorial:** “Global-to-Local Programming: Design and Analysis for Amorphous Computers”, Nagpal, Yamins, IEEE Conference on Self-Adaptive and Self-Organizing Systems (SASO 2007).
- **DARPA Study Member:** ISAT study on Engineering Ensembles, (2007, 4 meetings and final general meeting at Woodshole), DARPA Computer Science Futures Study (2007, run by Potomac Institute).
- **NSF Study Member:** ”Shared Organizing Principles in Computing and Biology”, May 2010.
- **Editorial Board:** Swarm Intelligence Journal, Springer Publishing House, (2009-present), ACM Transactions on Autonomous and Adaptive Systems (2005-2010).
- **Program Committees:** Intl. Symposium on Distributed Autonomous Robotic Systems (DARS 2010), Robotics Science and Systems (RSS 2009), Autonomous Agents and Multi-Agent Systems (AAMAS 2008 and 2009, senior program committee), IEEE Self-Adaptive and Self-Organizing Systems (SASO 2007,2008,2010), International Conference on Distributed Computing Systems (ICDCS 2008), IEEE Workshop on Self-managed Networks, Systems and Services (SelfMan 2006), International Conference on Distributed Computing in Sensor Systems (DCoSS 2006), IEEE Real-time Systems Symposium (RTSS 2005), Workshop on Engineering Self-Organising Applications (ESOA 2003, 05).
- **Reviewer** for several conferences and journals, such as ACM Communications Magazine, Intl. Journal for Robotics Research (IJRR), ICRA/IROS Conferences, IEEE Trans on Sensor Networks, ACM Trans on Autonomous and Adaptive Systems, etc. Also reviewer for NSF panels and Swiss National Science Foundation grants agency.

SELECTED HARVARD ACTIVITIES

- *Core Faculty Member and co-lead for the BioRobotics Platform*, Wyss Institute for Biologically Inspired Engineering.
- *Affiliated Faculty*, Systems Biology Department at Harvard Medical School. Member of the Systems Biology PhD Graduate Program. Member of the Program Curriculum Committee (2009) and the Admissions Committee (2008 and 2007).
- *Committees:* CS Faculty Search Committee (2011), Wyss Faculty Search Committee (2011, 2010), FAS Hoopes Prize Committee (2011), SEAS Committee on Higher Degrees (CHD, 2011), CS Task Force on Curriculum (2009), SEAS Committee on Freshman/Sophomore-level Introduction to Engineering Course (Fall/Spring 2007); FAS Standing Committee on Women (2006, 2007), DEAS Committees on Higher-Degrees (CHD, 2006, 2007) and Teaching Practices (2005, 2006).
- *Other Activities:* Panelist at Session on Innovation, Annual symposium of the Committee on University Resources (COUR), 2011; Speaker, HMS Board of Fellows Meeting, Oct 2010; Speaker, Dean’s Leadership Council, Division of Engineering and Applied Sciences DEAS (Dec 2006)
- *Faculty Advisor:* Harvard College Engineering Society (HCES) 2005-present, Harvard-MIT Robot Soccer Team (RFC) 2005-present, Harvard iGEM Competition (2005,2006).