

Radhika Nagpal
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RESEARCH AREAs: Robotics, Artificial Intelligence, Systems Biology

PROFESSIONAL APPOINTMENTS

2021-present Norman R. Augustine '57*59 Professor in Engineering,
Mechanical-Aerospace Engineering and Computer Science, Princeton University
2020-2021 Amazon Scholar, Amazon Robotics, MA.
2017-2019 Co-Founder and Scientific Advisor, Root Robotics Inc. (acquired by iRobot)
2012-2021 Fred Kavli Professor of Computer Science,
Paulson School of Engineering and Applied Sciences, Harvard University
2008-current Founding Faculty, Wyss Institute for Biologically-inspired Engineering
2012-2013 Radcliffe Institute Fellow, Harvard University
2004-2012 Affiliated Faculty, Dept. of Systems Biology, Harvard Medical School
2009-2012 Thomas D. Cabot Associate Professor of Computer Science
2004-2009 Assistant Professor of Computer Science
School of Engineering and Applied Sciences, Harvard University.
2003-2004 Research Fellow, Dept. of Systems Biology, Harvard Medical School.
2001-2003 Postdoctoral Lecturer, Dept. of EECS, Massachusetts Institute of Technology.
1994-1995 Member of Technical Staff, Bell Laboratories, Murray Hill, NJ.

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

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

Massachusetts Institute of Technology (MIT), Cambridge, MA

Thesis: Implementing Single-cycle Store Instructions in Pipelined Microprocessors

AWARDS AND HONORS

- *America's 50 Greatest Disruptors*, Newsweek, Dec 2021.
- *ACM Fellow* (2020)
- *AAAI Fellow* (2020)
- *TED Speaker*, Annual TED Conference, Vancouver, Apr 2017.
- *Nature 10 Award*: Top ten scientists and engineers who mattered, *Nature*, Dec 2014.
- *Science Top 10 Breakthroughs*, *Science*, Dec 2014.
- *McDonald Award for Excellence in Mentoring and Advising*, 2015.
- *Radcliffe Institute Fellowship Award*, Sept 2012.
- *Anita Borg Early Career Award* (BECA), June 2010.
- *NSF Career Award*, June 2007.
- *Microsoft New Faculty Fellowship Award*, May 2005.
- *AT&T Bell Labs Graduate Fellowship Award for Women* (GRPW), 1995-2001.
- *National Talent Search Scholarship Award*, India, 1987.

¹ Update Date 3/1/2022

SELECTED PUBLICATIONS

Robotics and AI

1. Justin Werfel, Kirstin Petersen, Radhika Nagpal. 2014. “Designing Collective Behavior in a Termite-Inspired Robot Construction Team.” *Science*, 343, 6172. +*
2. Michael Rubenstein, Alejandro Cornejo, Radhika Nagpal. 2014. “Programmable self-assembly in a thousand-robot swarm.” *Science*, 345, 6198. *
3. Florian Berlinger, Gauci, Nagpal. 2021. “Implicit coordination for 3D underwater collective behaviors in a fish-inspired robot swarm.” *Science Robotics*, 6, 50. +
4. Robert Wood, Radhika Nagpal, Gu-Yeon Wei. 2013. “Flight of the Robobees.” *Scientific American*.
5. Melinda Malley, Bahar Haghghat, Lucie Houel, and Radhika Nagpal. 2020. “*Eciton robotica*: Design and Algorithms for an Adaptive Self-Assembling Soft Robot Collective”, Intl. Conf. on Robotics and Automation (ICRA).
6. Chih-Han Yu, Radhika Nagpal. 2010. “A Self-Adaptive Framework for Modular Robots in Dynamic Environment: Theory and Applications”, Intl. Journal of Robotics Research (IJRR). (*IFAAMAS V. Lesser Distinguished Dissertation Award, 2nd place*)
7. Y. Park, B. Chen, N. Presez-Arancibia, D. Young, L. Stirling, R. Wood, E. Goldfield, R. Nagpal. 2014. “Design and Control of a Bio-inspired Soft Wearable Robotic Device for Ankle-Foot Rehabilitation.” *Bioinspiration & Biomimetics*, 9, 1.
8. Geoff Werner-Allen, Geetika Tewari, Ankit Patel, Matt Welsh, Radhika Nagpal, 2005. “Firefly-Inspired Sensor Network Synchronicity with Realistic Radio Effects”, ACM Conf. on Embedded Networked Sensor Systems (SENSYS).
9. Radhika Nagpal. 2002. “Programmable Self-Assembly Using Biologically-Inspired Multiagent Control”, Intl. Conf. Autonomous Agents Multi-Agent Systems (AAMAS).
10. Harold Abelson, Don Allen, Daniel Coore, Chris Hanson, George Homsy, Thomas Knight, Radhika Nagpal, Erik Rauch, Gerald Sussman, and Ron Weiss. 2000. “Amorphous Computing”, *Communications of the ACM*, Volume 43, Number 5.

Systems Biology

1. Helen McCreery, Georgina Gemayal, Ana Pais, Simon Garnier, and Radhika Nagpal. 2022. “Hysteresis stabilizes dynamic control of self-assembled army ant constructions.” *Nature Communications*, 13, 1660.
2. Matt Gibson, Ankit Patel, Radhika Nagpal, Norbert Perrimon. 2006. “The Emergence of Geometric Order in Proliferating Metazoan Epithelia”, *Nature*, 442, 7106.
3. Sabine Hauert, Spring Berman, Radhika Nagpal, and Sangeeta Bhatia. 2013. “A computational framework for identifying design guidelines to increase the penetration of targeted nanoparticles into tumors.” *Nano Today*, Volume 8, Issue 6.
4. Helen F. McCreery, Zachary A. Dix, Michael D. Breed, Radhika Nagpal. 2016. “Collective strategy for obstacle navigation during cooperative transport by ants.” *Journal of Experimental Biology*, 219, 21, Pp. 3366-3375.
5. Mira Radeva, Hsin-Hao Su, Radhika Nagpal, Anna Dornhaus, Nancy Lynch. 2017. “Costs of task allocation with local feedback: Effects of colony size and extra workers in social insects and other multi-agent systems.” *PLoS computational biology*, 13, 12.

+ cover article * selected for Science Top 10 breakthroughs (2014)

CAREER HIGHLIGHTS

- *Awards:* Recipient of the Nature 10 Award for work on decentralized cooperation and robotics (“Top ten scientists and engineers who mattered this year”, *Nature*, Dec 2014). Invited TED speaker (2017), Radcliffe Fellow (2012), Anita Borg Early Career Award (2010), AAAI and ACM Fellow (2020).
- *Research:* Internationally known for interdisciplinary research and leadership in the emerging field of Collective Intelligence, with research that spans computer science and AI, robotics, and biology. High-impact papers in both robotics and biology, in journals and conferences including *Science*, *Nature*, *Cell*, RSS, ICRA, AAAI, AAMAS, etc. Nagpal lab’s work has been selected for *Science* “Top 10 breakthroughs”, multiple *news perspectives in Science and Nature*, and covered by press channels such as National Geographic, the Atlantic, Wired, etc. The lab successfully spans basic and applied research, robotics technology transfer (startups and licensing), and biology field studies (e.g. Namibia & Panama).
- *Wyss Institute:* Core Founding Faculty Member of the Wyss Institute for Biologically Inspired Engineering at Harvard, a \$250M 10+ year effort to advance bio-inspired technology transfer. Co-lead of the Bio-inspired Robotics Area (BIR), overseeing technology translation efforts and budget across 5 faculty and 10 staff engineers.
- *Grants:* Co-PI of \$10M NSF Expeditions Grant, “RoboBees: A Convergence of Body, Brain and Colony” (with R. Wood, 2009-2014); led the “Colony” research efforts on cooperation/swarm algorithms. Strong portfolio of interdisciplinary grants from diverse agencies (NSF, DARPA, NIH, industry).
- *Technology Transfer:* Co-founded Root Robotics, an educational robotics startup in Cambridge; ran a successful kickstarter, raised \$2.5M seed capital, and launched Aug 2017. Acquired by iRobot in June 2019. Licensed Kilobot robot to K-Team Corp, over 8000 robots have been sold worldwide. Multiple licensed patents, including in soft modular orthotics.
- *Diversity:* Longstanding leadership and advocacy on diversity, equity, and academic culture. Received the McDonald Mentoring Award in 2015 and Anita Borg Early Career Award in (2010). Author of highly-referenced blog article on tenure-track life (“The Awesomest 7-year Postdoc”, *Scientific American* 2013). Regular keynote speaker at national events for women in STEM/Academia. Founding advisor for Harvard Women-in-CS group (2012-2020, > 500 members); raised a \$350K donor fund to support annual undergraduate attendance at Grace Hopper and Tapia conferences; authored several university-wide reports on retention, childcare, and parental leave that led to reformed practices and new initiatives. Founding member of Black-in-Robotics, Boston Chapter (2021-present), and faculty advisor for Princeton NSBE Undergraduate Chapter (2022; National Society of Black Engineers)
- *Lab Alumni:* Former lab members include successful faculty at top research universities (Cornell, Northwestern, Stanford, MIT), teaching universities (Olin), and startup founders (Root Robotics, Appier). Strong history of alumni diversity in both gender and disciplines.