

Melanie E. Moses
Department of Computer Science
University of New Mexico, Albuquerque, NM 87131-0001
melaniem@unm.edu, (505) 277-3112
moseslab.cs.unm.edu

(a) Professional Preparation

Stanford University	Palo Alto	Symbolic Systems	B.S. 1993
University of New Mexico	Albuquerque	Biology	Ph.D. 2005
University of New Mexico	Albuquerque	Biology & Computer Science	Postdoc 2006

(b) Appointments

University of New Mexico	Professor, Department of Computer Science	7/2018 to present
University of New Mexico	Associate Professor, Department of Computer Science	7/2013 to 6/2018
UCLA	Visiting Associate Professor	1/2014 to 6/2014
Universitat Pompeu Fabra	Visiting Associate Professor	7/2013 to 12/2013
Santa Fe Institute	External Faculty	7/2012 to present
University of New Mexico	Assistant Professor, Department of Computer Science	1/2007 to 6/2013
University of New Mexico	Joint Appointment - Department of Biology	8/2010 to present

(c) Publications (5 most relevant)

* indicates Student advisees

*Lu, Q., J. P. *Hecker, and M. E. Moses (2018) "Multiple-place swarm foraging with dynamic depots," *Autonomous Robots* 42(4): 909-926.

*Lu, Q, J.P. *Hecker, *T. P. Flanagan, M. E. Moses (2016) Multiple-Place Foraging Algorithm: A Distributed Foraging Model for Evolutionary Swarm Robotics. *Proceedings of the 2016 IEEE/RSJ International Conference on Intelligent Robots and Systems* 3815-3821.

*Fricke, G.M., *Hecker, J.P., Cannon, J.L. and Moses, M.E. (2016). Immune-inspired search strategies for robot swarms. *Robotica* 34(8):1791-1810.

*Fricke, G. M., *K. A. Letendre, M. E. Moses, and J. L. Cannon (2016). "Persistence and adaptation in immunity: T cells balance the extent and thoroughness of search." *PLoS Computational Biology* 10.1371.

*Hecker, J. P., and M. E. Moses. (2015). "Beyond pheromones: evolving error-tolerant, flexible, and scalable ant-inspired robot swarms." *Swarm Intelligence* 9(1): 43-70.

Publications (5 additional)

Mrass, P., S. Oruganti, *G. M. Fricke, *J. Tafoya, J. Byrum, L. Yang, S. Hamilton, M. Miller, M. Moses, and J. Cannon. ROCK regulates the intermittent mode of interstitial T cell migration in inflamed lungs. *Nature Communications* 8(1):1010, 2017.

*Flanagan, T. P, *K. Letendre, *W. Burnside, *M. Fricke & M. E. Moses. (2011). How ants turn information into food. *Proc. of the 2011 IEEE Conf on Artificial Life*: 178-185. **Best Paper Award.**

DeLong, J.P., J.G. Okie, M.E. Moses, R.M. Sibly, and J.H. Brown. (2010). Shifts in metabolic scaling, production, and efficiency across major evolutionary transitions of life. *Proceedings of the National Academy of Sciences* 107(29): 12941-12945.

Banavar, J.R., M.E. Moses, J.H. Brown, J. Damuth, A. Rinaldo, R.M. Sibly and A. Maritan. (2010). A general basis for quarter power scaling in biology." *Proceedings of the National Academy of Sciences* 107(36): 15816-158120.

H. Samaniego* and M. E. Moses, "Cities as organisms: Allometric scaling of urban road networks," *Journal of Transport and Land use*, vol. 1, no. 1, 2008.

(d) Synergistic Activities

[1] **PI, NASA Swarmathon** (2015 – present, <http://NasaSwarmathon.com>) a swarm robotics programming challenge designed to revolutionize space exploration, funded by NASA's Minority University Research and Education Program. The Swarmathon has built 100 robots and **engaged over 1000 undergraduates from 44 Minority Serving Institutions**. After a year of coursework and development, students travel to Kennedy Space Center to have their robots compete in collaborative 'swarms' that autonomously find and collect resources. Each year the Swarmathon Workshop has been held at the Robotics Science and Systems Conference (U. Michigan and MIT) for 30 undergraduates from MSIs, culminating with an overnight robotics hackathon. 80% of students subsequently express a desire to go to graduate school, primarily in robotics. We have supported 19 summer research REU students at UNM and partner Swarmathon schools coordinated through the CRA-W DREU program. Undergraduates have mentored hundreds of high school students in a parallel simulated Swarmathon competition. The algorithms developed in this competition support NASA's Journey to Mars in which robots will collect resources to support human settlements. For press coverage see <http://swarms.cs.unm.edu/press.html>.

[2] **PI, NM-CSforAll** (2015 – present, <http://cs4all.cs.unm.edu/>) originated as an NSF program to increase the number and diversity of Computer Science students in New Mexico. **NM-CSforAll has provided professional development for 60 high school teachers who have taught 1100 high school students** in introductory programming, computational thinking and scientific modeling. High school students earn UNM dual credit, and the course is now the first Computer Science course to meet a UNM graduation requirement as a Natural Science core course.

[3] Education and Research Leadership:

Co-PI, ADVANCE at UNM (2017-present) NSF program to create sustainable changes in the UNM climate to increase success of women and minority faculty.

Chair, Research Excellence Working Group of the OVPR Research Strategic Planning Committee (2016). The Research Excellence report is available at <http://research.unm.edu/strategic-plan>.

Member, Provost's Committee on Redesigning the University, task force on academic structure and organization for interdisciplinary research and education (2018 – present)

Co-director UNM Program in Interdisciplinary Biological & Biomedical Science (PIBBS, 2013- 2015) and Advisory Board member (2011-2015)(<http://biology.unm.edu/PIBBS/Index.html>). PIBBS funded fellowships for 35 Ph.D. trainees from 7 different departments (Anthropology, Biology, Chemistry, Computer Science, Electrical and Computer Engineering, Mathematics & Statistics, and Physics & Astronomy). These 35 fellows produced >130 publications in journals with an average impact factor of 6.6 (6 times the average in science). Students are mentored by collaborative teams of faculty and earn a graduate certificate in Interdisciplinary Biology. PIBBS fellows developed and collaboratively co-taught undergraduate courses in interdisciplinary topics with a PIBBS student from another discipline, mentored by PIBBS faculty.

Co-PI & Computer Science Faculty Advisor for the UNM STEP Program (2011 – 2016) which funded summer internships for 70 undergraduates each year and quarterly mentoring family meetings to increase student retention.

Co-Chair of the Gordon Research Conference on the Metabolic Basis of Ecology (2010-2012, 2008-2010 Co-Vice Chair), a week-long conference with 100 attendees, 20 speakers and 40 graduate students.

Co-organizer of SFI working groups (2015-2017) Motility in the Immune System; Evolution & Restraint of Complex Systems; and Liquid Brains, Solid Brains.

Member, Scientific Review Committee, University of Maryland National Socio-Environmental Synthesis Center (SESYNC, 2015 – present).

Member, IEEE Task Force on Artificial Life and Complex Adaptive Systems (2017-present).

Program committee member: Biological Distributed Algorithms (BDA) Workshop 2017, 2018; Intl. Symposium on Distributed Autonomous Robotic Systems (DARS) 2016, 2018; IEEE Symposium on Artificial Life (ALIFE) 2014, 2017; International Conference on Swarm Intelligence (ANTS 2016); Artificial Immune Systems Workshop (AIS 2014).

Member, Steering Committee for the Computing Research Association Underrepresented Minority Graduate Cohort, which runs workshops to increase underrepresented groups in computing research: 2017-present.