

Melanie E. Moses

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Education

1989-1993 Stanford University, B.S. Symbolic Systems
2000-2005 University of New Mexico, Ph.D Biology with distinction, advisor Bruce Milne
2005-2006 University of New Mexico, Postdoc, Departments of Biology & Computer Science

Professional Positions

2007 to present, Assistant Professor, Computer Science, University of New Mexico
2010 to present, joint appointment to the Department of Biology, University of New Mexico
2012 to present, External Faculty, Santa Fe Institute

Selected Awards

2012 UNM School of Engineering Junior Faculty Research Excellence Award
2011 Best Paper Award, IEEE Conference on Artificial Life
2011 UNM Outstanding New Teacher of the Year
2010 UNM Faculty of Color Research Award
2008 New Mexico Academy of Science Annual Distinguished Lecturer
2008 Microsoft New Faculty Fellowship Finalist
2004 - 2005 Ford Foundation Dissertation Diversity Fellow

10 recent Publications

34 publications in the last 5 years, include 18 journal papers, 13 peer reviewed conference and workshop papers, 2 book chapters and 1 invited essay to *Nature*.

* indicates advisees

Letendre K.* & Moses M.E. Synergy in ant foraging strategies: memory and communication alone and in combination. In Proceedings of the 2013 Genetic and Evolutionary Computation Conference (GECCO) (accepted).

Hecker, J. P.*, K. Letendre*, K. Stolles*, D. Washington* and **M. E. Moses**. "Formica ex Machina: Ant Swarm Foraging From Physical to Virtual and Back Again." *Proceedings of the Eighth International Conference on Swarm Intelligence*, Brussels in Lecture Notes in Computer Science: 7461 (2012).

Holtschulte, N. J.* and **M. E. Moses**. "Diversity and Resistance in a Model Network with Adaptive Software." *Security Informatics*, Biologically Inspired Approaches Special Issue: 1:19-30 (2012).

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

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

Banerjee S.*, & M. E. **Moses**, "Scale Invariance of Immune System Response Rates and Times: Perspectives on Immune System Architecture and Implications for Artificial Immune Systems" *Swarm Intelligence* 4(4): 301-308 (2010).

Moses, M. E. "Engineering: World Wide Ebb." *Nature* 457: 660-661 (2009).

Arora, T.* & **Moses**, M.E. "Ant Colony Optimization for Power Efficient Routing in Manhattan and Non-Manhattan VLSI Architectures" *Proceedings of the IEEE Swarm Intelligence Symposium*:137-134 (2009).

Moses, M.E., S. Forrest, A.L. Davis, M. Loder & J.H. Brown "Scaling Theory for Information Networks" *Journal of the Royal Society's Interface* 5(29):1469-1480 (2008).

Hou, C., W. Zuo, M. E. **Moses**, J.H. Brown and G. B. West. "Energy Uptake and Allocation During Ontogeny." *Science* 332(5902):736-739 (2008).

Students

Direct advisees have co-authored 18 papers with 4 more in review or accepted pending revision. Service on 21 thesis and dissertation committees has resulted in authorship on 8 additional student-led publications.

Soumya Banerjee, CS Ph.D., graduated Spring 2013
Chris Miles, CS MS thesis student, graduated December 2012
Mark Flynn, CS Masters thesis student, graduated May 2011
Kenneth Letendre, CS Masters thesis student, graduated December 2010
Tamanna Arora, CS Masters thesis student, graduated Fall 2009
Dr. Horacio Samaniego, postdoc 2007–2008, now Assistant Prof, U. Austral de Chile
Josh Hecker, CS Ph.D. student, 2008 – present
Kimberly Kanigel-Winner, Biology Ph.D. student, 2008 – present
Tatiana Paz Flanagan, CS Masters & Biology Ph.D student, 2009 – present
Neal Holtschulte, CS Ph.D. student, 2011-present
Martha Perez-Arriaga, CS Ph.D. student, 2011-present
Karl Stoleis, CS MS thesis student, 2012 – present
Sheldon Jordon, postdoc CS and Biology, 2012 - present
Francois Asperti Brousin, postdoc CS and UNM School of Medicine, 2012 - present

Current Funding (\$550,000 as PI, \$5,700,000 as Co-PI or consultant)

PI, NSF Advancing Theory in Biology EF 1038682 (\$500K) Collaborative Research: Search, Signal and Information Exchange in Distributed Biological Systems. 09/2010–8/2013.

Co-PI, DARPA CRASH P-1070-113237 (\$3,200,000) Scalable Robust Adaptive Decentralized search with Automated Response (RADAR), PI: S. Forrest. 10/2010–09/2015.

PI, Microsoft Research (\$50 K) Distributed Computation in Ant Pheromone Networks. 2008–2015.

Co-PI NSF DUE 1068182 (\$2,500,000) STEPs in the Right Direction: Transforming Engineering/Computer Science Education at the University of New Mexico. PI: T. Aziz, 8/2011–7/2016.

Consultant, NIH R01AI097202-01A1 (\$5,000 annually to UNM CS) The role of PKC θ in T cell and T-ALL migration. PI: J. Cannon. 5/2012–4/2017.

Service

2008 to present Collaboration with **Project GUTS (Growing Up Thinking Scientifically) and GUTS-y-Girls, Santa Fe Institute** programs to train New Mexico middle school teachers and students (particularly middle school girls) in computational science, agent based modeling and complex systems analysis. Led GUTS workshops and guest lectures, involved pre-college students in field studies, computer modeling, and presentations to their peers; mentoring students to develop New Mexico Supercomputing Challenge Projects, one winning the NAACP regional Scientific Olympics.

2007 to present Dozens of **presentations, seminars and workshops to promote interdisciplinary education and diversity** including a Science Café at the NM Museum of Natural History, Central New Mexico Community College (CNM), local high schools, the Science Education Institute of the Southwest summer program for K-12 teachers, the New Mexico Celebration of Women in Computing, the Project for New Mexico Graduates of Color, UNM Black Graduate and Professional Student Association.

2012 **Co-Chair, Gordon Research Conference** on the Metabolic Basis of Ecology (100 attendees) and Mentor, for 30 graduate students and postdocs at the associated Gordon Research Seminar

2010-present **Advisory Board Member, UNM Program in Interdisciplinary Biological and Biomedical Sciences**. Select graduate student fellows, arrange seminars, advise students, and advise scientific and educational structure and focus of the program. Will co-direct the program beginning in 2014.

2011-present **Co-PI and CS faculty advisor for the NSF funded STEPs in the Right Direction: Transforming Engineering/Computer Science Education at the University of New Mexico**. The program provides internships, mentoring in University Families and conference participation for 60 -70 School of Engineering undergraduates each year.

2012-present **Advisory Board, Pre-College Science and Math Program (PSMP)** a UNM program to educate and promote interest in pursuing STEM careers among African American pre-college students.

2007-present Service on 8 Faculty Search Committees, including chairing the 2013 CS search committee

2010-present **Faculty Advisor to the CS Graduate Student Association** & student led conference

2010-present **Board member of the Social Logical Institute**, a research institute in collective intelligence.