

MICHAEL S. HORN

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APPOINTMENTS

2010 – **Assistant Professor, Northwestern University**
Learning Sciences, School of Education and Social Policy
Computer Science, McCormick School of Engineering and Applied Science

EDUCATION

2003 – 2009 **Tufts University** Medford, MA
Ph.D. Computer Science Advisor: Robert J.K. Jacob

1993 – 1997 **Brown University** Providence, RI
Bachelor of Science in Computer Science

RESEARCH & PROFESSIONAL EXPERIENCE

2011 – **Research Associate, Field Museum of Natural History** Chicago, IL
Department of Zoology, division of Fishes

2003 – 2009 **Tufts University, Department of Computer Science** Medford, MA
Research Assistant
RA for the NSF-funded Tangible Kindergarten project. Created the Tern tangible programming language.

2008 – 2009 **Harvard University, Initiative in Innovative Computing** Cambridge, MA
Fellow
Created multi-touch tabletop applications for science learning including an exhibit for the Harvard Museum of Natural History.

2007 – 2009 **Museum of Science, Boston** Boston, MA
Exhibit Development Intern
Created a tangible programming and robotics exhibit based on research at Tufts University.

2006 & 2007 **iRobot Corporation** Bedford, MA
Software Engineer
Developed behavior and control systems for prototype commercial robots.

1998 – 2003 **Classroom Connect** Brisbane, CA
Senior Software Engineer & Project Lead
Developed web-based K-12 curriculum products including a multi-media library.

1997 – 1998 **Actioneer, Inc.** San Francisco, CA
Software Engineer
Developed productivity applications for handheld devices using Visual Basic, C++, and Java

Journal Articles

- Davis, P., Horn, M.S., & Sherin, B.L. (to appear). The right kind of wrong: A knowledge-in-pieces approach to science learning in museums. *Curator*.
- Block, F., Horn, M.S., Phillips, B.C., Diamond, J., Evans, E.M., & Shen, C. (2012). The DeepTree Exhibit: Visualizing the tree of life to facilitate informal learning. *IEEE Transaction on Visualization and Computer Graphics*, 18(12), 2789-2798.
- Horn, M.S., Crouser, R.J., Bers, M.U. (2011). Tangible interaction and learning: The case for a hybrid approach, *Personal and Ubiquitous Computing*, 16(4), 379-389.
- Shaer, O., Horn, M.S., & Jacob, R.J.K. (2009). Tangible user interface laboratory: Teaching tangible interaction design in practice, *Artificial Intel. for Engineering Design, Analysis, and Manufacturing*, 23, 251-261.

Full-Length Archival Conference Papers*

- Horn, M.S. (2013). Cultural forms as a foundation for intuitive tangible interaction: The role of transitional forms. To appear in *Tangible, Embedded, and Embodied Interaction TEI'13*. ACM Press.
- Block, F., Wigdor, D., Phillips, B. C., Horn, M. S., & Shen, C. (2012). FlowBlocks: A multi-touch UI for crowd interaction. In *Proc. User Interface Software and Technology UIST'12*. ACM Press.
- Beheshti, E., Van Devender, A., & Horn, M.S. (2012). Touch, click, navigate: Comparing tabletop and desktop interaction for map navigation tasks. In *Proc. Interactive Tabletops and Surfaces ITS'12*. ACM Press.
- Horn, M.S., Leong, Z.A., Block, F., Diamond, J., Evans, E.M., Phillips, B., & Shen, C. (2012). Of BATs and APEs: An interactive tabletop game for natural history museums. In *Proc. Human Factors in Computing Systems CHI'12*, ACM Press, 2059-2068.
- Bao, P., Hecht, B., Carton, S., Quaderi, M., Horn, M.S., & Gergle, D. (2012). Omnipedia: Bridging the Wikipedia language gap. In *Proc. Human Factors in Computing Systems CHI'12*, ACM, 1075-1084.
- Olson, I.C., Leong, Z.A., and Horn, M.S. (2011). "It's just a toolbar!" Using tangibles to help children manage conflict around a multi-touch tabletop. In *Proc. Tangible, Embedded, and Embodied Interaction TEI'11*, ACM Press, 29-36.
- Horn, M.S., Solovey, E.T., Crouser, J.R., and Jacob, R.J.K. (2009). Comparing tangible and graphical programming interfaces for use in informal science education. In *Proc. ACM Conference on Human Factors in Computing Systems CHI'09*, ACM Press, 975-984.
- Horn, M.S., Solovey, E.T., and Jacob, R.J.K. (2008). Tangible programming and informal science learning: making TUIs work for museums. In *Proc. Interaction Design and Children IDC'08*, ACM, 194-201.
- Jacob, R.J.K., Girouard, A., Hirshfield, L.M., Horn, M.S., Shaer, O., Treacy, E.S., and Zigelbaum, J. (2008). Reality-Based Interaction: A Framework for post-WIMP interfaces. In *Proc. ACM Conference on Human Factors in Computing Systems CHI'08*, ACM Press, 201-210.

Book Chapters

* In the field of Computer Science, archival proceedings such as the Association for Computing Machinery's (ACM) CHI or UIST conferences are among the top publication venues. These are peer-reviewed publications, with a multi-stage revision process, and low acceptance rates (CHI's acceptance rate has ranged from 15-25%). Conference proceeding publications rival top journals in the field in their selectivity, citations, and influence. Thus, within the field of human-computer interaction, proceedings publications are considered on par with publications in a journal.

Bers, M. U. & Horn, M. S. (2009). Tangible programming in early childhood: Revisiting developmental assumptions through new technologies. In I. R. Berson & M. J. Berson (Eds.), *High-tech tots: Childhood in a digital world*. Greenwich, CT: Information Age Publishing.

Under Review and in Preparation

Wilensky, U.J., Novak, M., & Horn, M.S. (in preparation). BEAGLE: Understanding evolution as an emergent process through agent-based computer modeling.

Horn, M.S., Stevens, R., Leong, Z.A., & Greenberg, M.D. (in preparation). Kids and thermostats: The role of youth in the management of household heating and cooling systems. *International Journal of Computer-Supported Collaborative Learning*.

Evans, E.M., Phillips, B.C., Horn, M.S., Block, F., Diamond, J., & Shen, C. (under review). Active prolonged engagement: When does it become active prolonged “learning”? In Uttal, D. (chair), Developmental research outside the lab: Children’s STEM learning in museums. Symposium submitted to the *Society for Research in Child Development Biennial Meeting SRCD’13*.

Phillips, B.C., Evans, E.M., Horn, M.S., Block, F., Diamond, J., & Shen, C. (under review). How is a human like a banana? Conceptions of humans as part of the natural world. Symposium submitted to the *Society for Research in Child Development Biennial Meeting SRCD’13*.

Other Conference Papers (peer reviewed)

Brady, C., Banerjee, A., Hjorth, A., Horn, M.S., Wagh, A., Wilensky, U. (2014). Getting your drift—activity designs for grappling with evolution. Poster presented at the *International Conference of the Learning Sciences (ICLS’14)*, Boulder, Colorado.

Weintrop, D., Holbert, N., Wilensky, U., & Horn, M.S. (2012). Redefining constructionist video games: Marrying constructionism and video game design. Paper presented at *Constructionism 2012*, Athens, Greece.

Evans, M.A., Rick, J., Horn, M.S., Shen, C., Mercier, E., McNaughton, J., Higgins, S., Tissenbaum, M., Lui, M., & Slotta, J.D. (2012). Interactive surfaces and spaces: A learning sciences agenda. Interactive poster session presented at the *International Conference of the Learning Sciences ICLS’12*, Sydney, Australia.

Horn, M. S., Davis, P., Hubbard, A., Keifert, D., Leong, Z.A., & Olson, I.C. (2011). Learning Sustainability: Children, Learning, and the Next Generation Eco-Feedback Technology. In *Proc. Interaction Design and Children IDC’11*, ACM Press, 161-164.

Olson, I.C. & Horn, M. (2011). Modeling on the Table: Agent-Based Modeling in Elementary School with NetTango. In *Proc. Interaction Design and Children IDC’11*, ACM Press, 189-192.

Leong, Z.A. & Horn, M.S. (2011). Representing Equality: A Tangible Balance Beam for Early Algebra Education. In *Proc. Interaction Design and Children IDC’11*, ACM Press, 173-176.

Blikstein, P., Buechley, L., Horn, M.S., Raffle, H. (2010). A new age in tangible computational interfaces for learning. In *Proc. International Conference of the Learning Sciences ICLS’10*, Chicago, IL.

Horn, M.S., Tobiasz, M., and Shen, C. (2009). Visualizing Biodiversity with Voronoi Treemaps. In *Proc. International Symposium on Voronoi Diagrams in Science and Engineering ISVD’09*, Copenhagen, Denmark.

Horn, M.S. & Shen, C. (2009). Frogs and Toads Memory: A Voronoi Twist on the Classic Children's Game. In *Proc. Intl. Symposium on Voronoi Diagrams in Science and Engineering ISVD’09*, Copenhagen, Denmark.

Horn, M.S. and Jacob, R.J.K. (2007). Designing Tangible Programming Languages for Classroom Use. In *Proc. Tangible and Embedded Interaction TEI’07*, ACM Press, 159-162.

Zigelbaum, J., Horn, M.S., Shaer, O., and Jacob, R.J.K. (2007). The Tangible Video Editor: Collaborative Video Editing with Active Tokens. In *Proc. Tangible and Embedded Interaction TEI’07*, ACM Press, 43-46.

- Horn, M.S. and Jacob, R.J.K. (2007). Tangible Programming in the Classroom with Tern. In *Proc. Human Factors in Computing Systems (CHI'07 Trends Interactivity)*, ACM Press.
- Jacob, R.J.K., Girouard, A., Hirshfield, L.M., Horn, M.S., Shaer, O., Solovey, E.T., and Zigelbaum, J. (2007). Reality-Based Interaction: Unifying the New Generation of Interaction Styles. In *Proc. Human Factors in Computing Systems (extended abstracts) CHI'07*, ACM Press.
- Horn, M.S. & Jacob, R.J.K. (2006). Tangible Programming in the Classroom: A Practical Approach. In *Proc. Human Factors in Computing Systems Conference (extended abstracts) CHI'06*, ACM Press, 869-874.

Other Papers and Presentations

- Chua, K.C., Qin, Y., Block, F., Phillips, B., Diamond, J., Evans, E.M., Horn, M.S., Shen, C. (2012). FloTree: A multi-touch interactive simulation of evolutionary processes. Demo presented at *Interactive Tabletops and Surfaces ITS'12*, Boston, Massachusetts.
- Horn, M.S. & Wilensky, U. (2012). NetTango: A mash-up of NetLogo and Tern. In Moher, T. (chair) and Pinkard, N. (discussant), When systems collide: Challenges and opportunities in learning technology mash-ups. Symposium presented at the annual meeting of the American Education Research Association, Vancouver, British Columbia.
- Horn, M. (2012). Spinners, Dice, and Pawns: Using board games to prepare learners for agent-based modeling activities. In M. Berland (chair) and Kafai, Y. (discussant), Fiddling on the fly: thinking, learning, and designing using board games. Symposium presented at the annual meeting of the American Education Research Association, Vancouver, British Columbia.
- Boxerman, J.Z., Horn, M.S. (2011). Helping learners comprehend changes over time and space on a geological scale. Presented at the Geological Society of American Annual Meeting, Minneapolis, MN; Oct., 2011.
- Leong, Z.A. & Horn, M.S. (2010). The BEAM: a digitally enhanced balance beam for mathematics education. In *Proc. 9th International Conference on Interaction Design and Children (demo presentation)*, Barcelona, Spain, June 9-12. ACM Press.
- Bers, M.U. & Horn, M.S. (2009). Tangible Programming in Early Childhood: Revisiting Developmental Assumptions through New Technologies. Presented at the *NAEYC Annual Conference & Expo*, Washington, DC, November 20, 2009.
- Jacob, R.J.K., Girouard, A., Hirshfield, L.M., Horn, M.S., Shaer, O., Solovey, E.T., and Zigelbaum, J. (2007). "What Is the Next Generation of Human-Computer Interaction?" *Interactions*, 14(3), 53-58.
- Horn, M.S., C.G.L Cao, M.E. Kilmer, L. Baise, S. Hassoun, D.L. Souvaine. (2004). Model for mentoring and retaining engineering students from underrepresented groups. In *Proceedings of the ASEE New England Section 2004 Annual Conference*, ASEE.

GRANTS

- \$687,043. Wilensky, U.J. & Horn, M.S. Learning evolution through model-based inquiry: Supporting agent-based modeling in STEM classrooms. National Science Foundation, REESE. 2012-2015.
- \$998,711. Jona, K., Horn, M.S., Kalogera, V., Trouille, L., & Wilensky, U. *Casting a Wide Net: Applied Computational Thinking*. National Science Foundation, CE21. 2011-2014.
- \$539,799. Horn, M.S. & Stevens, R. *Augmenting Household Technologies for Learning and Whole-family participation*. National Science Foundation, Cyberlearning. 2011-2014.
- \$2,312,149. Shen, C., Diamond, J., Evans, E.M., & Horn, M.S. *Life on Earth*. National Science Foundation, Informal Science Education. 2010-2013.

- \$42,732. Horn, M.S. & Stevens, R. *Household resource consumption and learning: Design and research*. Initiative for Sustainability and Energy at Northwestern, Faculty Booster Grant. 2010-2011.

TEACHING

2009 -	Intro to Design for the Learning Sciences (graduate)	Northwestern University
2011 -	Human-Computer Interaction (undergraduate)	Northwestern University
2010	Design & Emotion (graduate)	Northwestern University
2008	Tangible User Interface Laboratory (undergraduate)	Tufts University
2006 - 2009	Problem Solving in Discrete Mathematics (professional) Developed curriculum, led activities, and mentored local K-12 mathematics teachers for a summer professional development institute on Discrete Mathematics.	Tufts University
2005 - 2007	NSF GK-12 Fellow (K-8) Worked with math and science teachers at a K-8 urban (Title I) public school to develop and implement curriculum activities in science, mathematics, and technology.	Tufts University
2005	Introduction to Computer Science (undergraduate)	Tufts University
2003 - 2005	Coordinator CSEMS Mentoring Program Coordinated an academic mentoring and enrichment program for underrepresented minority undergraduates in engineering and computer science.	Tufts University

PROFESSIONAL ACTIVITIES & COMMUNITY

Conference Chairing

- ACM Interactive Tabletops and Surfaces (ITS 2013), Program Committee Co-Chair
- ACM Interactive Tabletops and Surfaces (ITS 2012), Program Committee Co-Chair
- ACM Tangible Embodied and Embedded Interaction (TEI 2012), Studios Co-Chair
- ACM Interaction Design and Children (IDC 2011), Demos Co-Chair

Conference Committees

- ACM Tangible, Embedded, and Embodied Interaction (2011, 2013), Program Committee
- ACM Tangible, Embedded, and Embodied Interaction (2013), Doctoral Symposium Mentor Faculty
- ACM Human Factors in Computing Systems (2012), Program Committee
- ACM Interaction Design and Children (2012, 2013), Program Committee
- ACM Interactive Tabletops and Surfaces (2011), Program Committee
- ACM Human Factors in Computing Systems (2011), Work-in-Progress Program Committee

Editorial Board

- Technology, Knowledge, and Learning (Bruce Sherin, editor-in-chief)

Memberships

- Association for Computing Machinery (ACM)
- IEEE Computer Society
- American Educational Research Association (AERA)

- International Society of the Learning Sciences (ISLS)

Ad Hoc Reviewer

- Interacting with Computers (2011-2012)
- Computer Supported Collaborative Learning (2012)
- International Conference of the Learning Sciences (2010)
- ACM Conference on Human Factors in Computing Systems (2006-2012)
- Tangible, Embedded, and Embodied Interaction (2007-2013)
- Computers & Education (2010)
- International Journal of Learning Technology (2011)
- International Journal of Human-Computer Studies (2010-2011)
- Evolution Education and Outreach (2011)
- Journal of Computers for Mathematical Learning (2010)
- Journal of Personal and Ubiquitous Computing (2009)
- Journal of Artificial Intelligence for Engineering Design, Analysis, and Manufacturing (2008)
- Interactive Tabletops and Surfaces (2009)

INVITED TALKS

- École Polytechnique Fédérale de Lausanne (EPFL), October 2012.
- DePaul University, College of Computing and Digital Media, March 2012.
- Wellesley College, Computer Science, March 2012
- Purdue University, School of Engineering Education, October 2011.
- University of Illinois, Chicago, IL, October 2011.
- Design for Mobile Conference (D4M'2010), Chicago, IL, September 2010
- Boston Educational Multimedia & Web Developers Association (EMWAD), December 2008

ACADEMIC HONORS

- Tufts University Award for Outstanding Graduate Student Researcher (2009)
- Doctoral Consortium, 7th International Conference on Interaction Design and Children (2008)
- National Science Foundation GK-12 Fellow (2005-2007)
- Tufts University Award for Outstanding Contribution to Engineering Education (Spring 2005)
- William Gaston Scholarship for Academic Excellence in Computer Science (Spring 1997)

PRESS COVERAGE

- | | |
|-------------|---|
| Spring 2012 | Harvard Gazette , Touch, drag, learn
<i>http://news.harvard.edu/gazette/story/2012/06/touch-drag-learn/</i> |
| Spring 2012 | ACM TechNews , <i>Teaching Tree-Thinking Through Touch</i>
<i>http://technews.acm.org/archives.cfm?fo=2012-06-jun/jun-06-2012.html</i> |
| Spring 2012 | ScienceDaily article on the Life on Earth project and Build-a-Tree game
<i>http://www.sciencedaily.com/releases/2012/06/120604111121.htm</i> |
| Spring 2012 | NewScientist article on Omnipedia research
<i>http://bit.ly/J2OkWN</i> |
| Winter 2009 | Tufts Magazine column on my research at the Museum of Science |

<http://www.tufts.edu/alumni/magazine/winter2009/planet-tufts/blocks.html>

- October 2008 **Tufts Journal** feature on my research at the Museum of Science
<http://tuftsjournal.tufts.edu/2008/10/features/01/>
- February 2008 Podcast interview on my tangible programming research for the **Museum of Science**
http://www.mos.org/events_activities/podcasts&d=2511
- February 2008 **Computerworld** article with a discussion on Reality-Based Interaction
<http://www.cs.tufts.edu/~jacob/papers/computerworld.pdf>
- January 2008 **NECN TV** interview on my tangible programming research
<http://www.necn.com/category/9/2299>