

Benjamin Vigoda, Ph.D.

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EDUCATION

MIT Media Laboratory, Cambridge, MA.

Ph.D. Analog Logic: Continuous-Time Analog Circuits for Statistical Signal Processing. *August 2003.*

M.Sc. A Nonlinear Dynamic System for Spread-Spectrum Code Acquisition. *August 1999.*

Swarthmore College, Swarthmore, PA.

B.A. in Physics. *June 1996.*

RESEARCH EXPERIENCE

Visiting Scientist, Mitsubishi Electronic Research Lab (MERL), Director Joe Marks. *March 2004 to present.*

Principle investigator leading joint MERL/MIT team on project to develop RF Analog Logic circuits. Developed proposal for and received government (DARPA) funding for the project. Wrote Java-based CAD tools for simulating Belief Propagation on multiple graph topologies.

Visiting Scientist, MIT Center for Bits and Atoms. *August 2003 to present.*

- **Computation in Physical Systems.** Contracted with Cambridge University Press to write textbook with co-author, Yael Maguire, PhD. Developed course content and co-taught the class at MIT, Spring 2005.
- Co-founded the Experimental Musical Instrument Workshop at MIT (EMiatMIT). Built “magneto-acoustic” sustain guitar. Obtained \$12k grant from the MIT Office of the Arts to host composer John Zorn and Oscar winning composer Tan Dun to interact with the experimental instruments and their student creators. Co-hosted campus-wide colloquia with these visiting artists and Evan Ziporyn, Chair of the MIT Music Department. Developed DVD documentary of the workshop for presentation to Public Television.
- Invited talks: Gordon Conference on Nonlinear Science, MIT Center for Bits and Atoms Conference on Avagadro Scale Engineering, University of Maryland Applied Dynamics Seminar, Intel Northeast Lecture Series, and the Santa Fe Institute Learning Dynamics Meeting.

Intel Student Fellow, MIT Media Lab, Physics and Media Group, Advisor Professor Neil Gershenfeld. *September 1997 to August 2003.*

- Low-Complexity LFSR Synchronization by Forward-Only Message Passing. Benjamin Vigoda, Justin Dauwels, and Hans-Andrea Loeliger. To appear in *IEEE Transactions on Information Theory*.
- First place winner of the Harvard Business School entrepreneurship competition and second place winner in the MIT \$50K entrepreneurship competition with Ph.D. research.
- Three patents filed on thesis research.
- **ThinkCycle.org and Design That Matters Seminar.**

Co-founded www.thinkcycle.org, a web database that connects engineers with non-governmental organizations across the world to identify and solve real-world challenges posed by under-served communities.

Helped develop a syllabus for and co-taught Design That Matters, a seminar that engages MIT students with ThinkCycle challenges. The syllabus has been adapted for sister classes taught in Kenya, Brazil, Portugal, and India. http://www.designthatmatters.org/programs_courses.html

Design That Matters student projects have won several young innovator's awards, generated significant licensing revenue, and seeded a startup company. We have now created an independent not-for-profit organization to support these activities.

- **TouchTags.**

Invented rFID tagreader for electrostatic coupling via the body. Patent US 6,642,837 B1. Published A System for Storing and Retrieving Information in Physical Objects via Touch. *Proceedings of ACM SIGCHI Conference on Human Factors in Computing 1999.*

- **Virtual Shadow Juggling.**

Built a stage system which has survived three years of hard touring as part of the Flying Karamazov Brother's well-known technological musical vaudeville juggling show. Assembled the hardware that includes a video camera, 2000 Watt digital projector, and a rack-mounted C++/OpenGL workstation with video capture. Wrote software to perform alignment, find the jugglers' shadows, and compute the physics to animate orbiting planets that can be juggled.

Hewlett Packard Laboratories, External Research Group, Supervisor Steven Rosenberg.
September 1996 to June 1997.

Evaluated new technologies for transfer from academic research labs into HP. Worked in four-person team to develop software architecture for creating web pages from scanned documents. Helped transfer electrostatic sensing technology from the MIT Media Lab for use in sensing toner level in printers. The sensor was incorporated into the HP Color LaserJet.

Swarthmore College, Computer Science Department, Supervisor Professor Lisa Meeden.
Summer 1996.

Worked on neural-network controllers for mobile robot navigation. Wrote robot simulation environment to determine whether recurrent neural networks could learn optimum path planning given by differential game theory. Developed robot sensors that were used in undergraduate CS classes at Swarthmore.

Santa Fe Institute, Computational Mechanics Group, Supervisor Professor Jim Crutchfield.
Summer 1995.

Characterized pattern dynamics in nonlinear and pseudo-linear cellular automata using computational grammars.

Swarthmore College, Physics Department, Supervisor Professor Peter Collings, Chair.
Summer 1993.

Built apparatus and performed experiments to study electric-field induced phase transitions in liquid crystals.

Boston University, Center for Adaptive Systems, Supervisor Professor Stephen Grossberg.
Summers 1990, 1991.

Studied the effects of different basis functions on neural network models of learning and categorization.

Stanford University, Psychology Department, Supervisor Professor Mark Gluck. *Summer 1989.*

Helped write C code for neural network models of associative learning. Compared simulation results to Rescorla-Wagner model of animal learning. Simulations contributed to: Gluck, M. A. & Bower, G. H., & Hee, M. (1989). A configural-cue network model of animal and human associative learning. *Proceedings of the 11th Annual Conference of the Cognitive Science Society*, Ann Arbor, MI. 323-332.

OTHER INTERESTS/ACTIVITIES

Games For Song: A Collection of Recipes for Musical Improvisation in Groups.

Developed a book of exercises to teach musical interaction and improvisation in groups. The book has been used extensively in the MIT Music Department class, Introduction to Musical Composition (21M.065). I have given Games for Song workshops to groups of young children, music conservatory students, touring rock bands, and colleagues at MIT.

The Mustn't Grumble.

I founded, compose the music for, and lead The Mustn't Grumble, a chamber folk gypsy jazz ensemble with recent performances headlining at the Cape Cod Folk Festival and on the NPR station WAMC. I play my magneto-acoustic infinite sustain gypsy jazz guitar in the group. www.themustntgrumble.com