

Eric Schweikardt Curriculum Vitae

Cornell Computational Synthesis Lab
Department of Mechanical and Aerospace Engineering

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Research Interests

My current research is focused on explaining, representing and improving the design of robotic systems. I use my background in design and computation, combined with knowledge of robotics and rapid prototyping methods, to explore the space of robot design by building real, physical systems. I attempt to understand how different representations and languages can support or constrain designs and the intent behind them. I'm also interested in how people interact with robots once they've been built – particularly in how modular robots can be used as effective models for other complex systems.

Education

Ph.D, Computational Design 2008

Carnegie Mellon University, Pittsburgh, PA, USA

Thesis: Designing Modular Robotics

GPA: 4.0/4.0

Advisory Committee:

Mark D. Gross, Architecture

Illah Nourbakhsh, CREATE Lab, Robotics Institute

Metin Sitti, NanoRobotics Laboratory, Robotics Institute

Bachelor of Environmental Design, Special Honors, 1998

University of Colorado, College of Architecture and Planning, Boulder, CO, USA

Major: Design Studies

Minor: Computer Science

Professional Experience

Visiting Scientist September 2008 – present

Cornell Computational Synthesis Lab, Cornell University, NY, USA

Founder, Designer 2007 – present

roBlocks LLC, Pittsburgh, PA, USA

Started a small business to bring roBlocks, one of my research projects, to market.

Received a grant from the Heinz endowments for user testing projects and business

development. Worked with Carnegie Mellon Office of Technology Transfer to refine the business strategy. Applied for a Small Business Innovation Research Grant from the US Department of Education.

Research Assistant 2005 - 2008

Computational Design Lab, Carnegie Mellon University, Pittsburgh, PA, USA

roBlocks is a robotic construction kit created to scaffold children's understanding of math and science concepts. By snapping together the plastic modules, kids can create interesting, dynamic systems that encourage them to think about real-world complexity. I designed and built the system, tested with children and supervised project assistants.

StickyBricks is a modular robotic system I am designing to act as a physical substrate on which children can explore the relationships between local interaction and global behavior. The modules are 20cm square, reconfigure on a tabletop, and connect using dry adhesion and magnets. With Metin Sitti.

The **Egklet** is a hardware/software system designed to encourage musicians to experiment with sensor fusion concepts. It's modular design lets musicians plug in several sensors and easily send MIDI commands. With Tina Blaine.

Sporto is a little expanding robot designed to encourage users to meet their exercise goals. With Vincent Crossley and Min Kyung Lee.

Triboingus is an inexpensive, robust three-wheeled robot base intended for remote exploration and land mine detection.

Flexy is a computationally enhanced hub and spoke construction kit with real-time graphic feedback. With Michael Weller.

Director of Web Development 1999 - 2005

Allegory Design Group, Boulder, CO, USA

I formed the Allegory Design Group to design, build, and maintain small and medium sized corporate web sites. I designed innovative graphics and animation while also incorporating commerce and database applications. Oversaw project teams up to 10 people, and worked directly on most projects completed by the company.

Designer 2003 - 2004

Tavel Weise Architects, Denver, CO, USA

Worked on Solar Village, a mixed-use sustainable city block in Prospect, a new town outside of Longmont, CO. Created accurate digital models, renderings and AutoCAD drawings to assist in the design process and present our work.

Instructor 2003 - 2004

College of Architecture, University of Colorado, Boulder, CO, USA

Developed a digital modeling applications class for undergraduate architecture students. The course focused on creating professional-level models, animations, and renderings for use in design reviews and presentations. I taught and refined the course for four semesters and consistently rated in the 95th percentile in student evaluations.

Research Assistant 1996 - 1998

Sundance Laboratory for Computing in Design and Planning, University of Colorado, Boulder, CO, USA

At the Sundance Lab, I designed and built Digital Clay, a 3D sketch recognition application. Written in Lisp and Quickdraw3D, it used the Huffman-Clowes algorithm to extract depth information from a designer's isometric sketches.

Teaching Experience

Teaching Assistant Spring 2006
Architectural Robotics, Carnegie Mellon University

Instructor Spring 2003, Summer 2003, Fall 2003 (two sections)
Digital Modeling, Rendering and Animation, University of Colorado at Boulder

Publications

2008 Schweikardt, E. and M. D. Gross, "Learning About Complexity With Modular Robots" DIGITEL 2008: The Second IEEE International Workshop on Digital Game and Intelligent Toy Enhanced Learning, Banff, Canada. In press.

2008 Schweikardt, E. and M. D. Gross, "The Robot is the Program: Interacting with roBlocks" TEI 2008: Second International Conference on Tangible and Embedded Interaction, Bonn, Germany, ACM Press.

2007 Schweikardt, E. and M.D. Gross, "roBlocks: Understanding Emergent Complexity from the Bottom Up" RSS 2007: Robotics Science and Systems Workshop on Research in Robots for Education, June 27-30, 2007, Atlanta, GA.

2007 Schweikardt, E., "Envisioning the Robot Design Studio" CHI 2007 Workshop: Supporting Design Studio Culture in HCI, San Jose, CA.

2007 Schweikardt, E., "Modular Robotics as Tools for Design" in *Creativity and Cognition 2007*, June 13-15, Washington, DC, ACM Press.

2007 Schweikardt, E. and M. D. Gross, "A Brief Survey of Distributed Computational Toys" DIGITEL 2007: The First IEEE International Workshop on Digital Game and Intelligent Toy Enhanced Learning, Jhongli, Taiwan.

2006 Schweikardt, E., and Gross, M.D., "roBlocks: A Robotic Construction Kit for Mathematics and Science Education," Proceedings ACM International Conference on Multimedia Interaction, Banff, Canada, Nov 2-4 2006, pp. 72-75.

2000 Schweikardt, E., and Gross, M.D., "Digital Clay: Deriving Digital Models from Freehand Sketches." *Journal of Automation in Construction* 9:107-115. (first appeared in Proceedings of ACADIA '98, Quebec City)

1998 Schweikardt, E. and M.D. Gross. Digital Clay: Deriving Digital Models from Freehand Sketches. Published in 'Digital Design Studios: Do Computers Make A Difference?', Proceedings of ACADIA '98, Quebec City, Canada, October 22-25, 1998 pp. 202-211.

Invited Talks

Thousands and Thousands of Tiny Robots October 25, 2008

Ithaca Sciencenter

Designing Modular Robots April 28, 2008
Computational Synthesis Lab, Cornell University

roBlocks April 24, 2008
Dorkbot Pittsburgh

Tips on Being a Deliberate Comprehensivist March 20, 2008
Making Things Interactive, Carnegie Mellon University

Press Coverage

At CMU, Building Fun Toys That Also Teach May 14, 2008
Pittsburgh Post-Gazette

Children Experiment with roBlocks April 7, 2008
The Tartan

roBlocks: Simple Blocks to Make Robots April 3, 2008
O'Reilly Radar

Plugged In: CMU's Robotic Toys February 28, 2008
WTAE TV: The Pittsburgh Channel

Academic Service

Studio Critic

2008 *Making Things Interactive, Carnegie Mellon University, Instructor: Mark D. Gross*

2007 *Making Interactive Furniture, Carnegie Mellon University, Instructor: Mark D. Gross*

2007 *Design Research Workshop, Carnegie Mellon University, Instructors: Gross, Herbsleb, Shaw, Finger*

2006 *Architectural Robotics, Carnegie Mellon University, Instructor: Mark D. Gross*

2004 *Design Studio IV, University of Colorado at Boulder, Instructor: Vaughn Moyer*

2003 *Sustainable Design Studio at Aspen, University of Colorado at Boulder, Instructor: Fred Andreas*

2001 *Design Studio II, University of Colorado at Boulder, Instructor: Fred Andreas*

Program Committee

Digitel 2008: 2nd IEEE Intl. Conference on Digital Game and Intelligent Toy Enhanced Learning

Workshops Organized

Architectural Robotics: Human Hive, sponsored by Robot250 and part of the *Meet the Made* exhibit at the Mattress Factory Museum, Pittsburgh, PA, USA. July 20, 2008.

Design Review Committee 2005 - 2007

Carnegie Mellon University, Pittsburgh, PA, USA