

Zack Butler

Curriculum Vitae

School Address:
Computer Science Dept.
Golisano College of Computing & Information Sciences
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37 Maplewood Ave.
Honeoye Falls NY 14472
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Research Interests:

Robotics, Distributed Systems and Algorithms, Modeling of Natural Systems, Sensor Networks

Education:

Carnegie Mellon University, Ph.D. in Robotics, September 2000

Thesis: "Distributed Coverage of Rectilinear Environments"

Advisor: Ralph Hollis

Alfred University, B.S. in Electrical Engineering, May 1994

Graduated summa cum laude (3.9/4.0)

Alfred University Scholar (honors degree)

Experience:

Assistant Professor, Computer Science, RIT, 2004-present

- Courses taught: CS1, CS2, CS3, Artificial Intelligence, Professional Communications, MS Seminar
- Served on Ph.D. committee for student at Univ. of Auckland, currently supervising four MS projects and two independent studies in robotics.

Research Fellow, Institute for Security Technology Studies, Dartmouth College, 2003-2004

- Developed distributed algorithms for networks of mobile sensors to allow convergence toward events with guaranteed sensor coverage.
- Served on Ph.D. thesis committee of Robert Fitch (planning for self-reconfigurable robots)

Postdoctoral Research Associate / Lecturer, Computer Science, Dartmouth College, 2000-2003

- Courses taught: Artificial Intelligence, Mobile Robot Theory and Design
- Developed several distributed algorithms for self-reconfigurable modular robots along with correctness analysis as well as distributed hardware implementations.
- Collaborated with graduate students and faculty on path planning, goal recognition and self-repair for modular robots and development of novel MEMS devices for self-assembly.
- Supervised undergraduate honors thesis on planning under uncertainty.

Graduate Research Assistant, Robotics Institute, Carnegie Mellon University, 1994-2000

- Developed a distributed coverage algorithm that produces cooperative coverage without initial information or a central controller, for robots equipped only with contact sensing.
- Principally designed (electronics and mechanical design), directed fabrication of, assembled and tested a novel position sensor for planar linear motors capable of sub-micron resolution.
- Teaching Assistant for Mathematical Foundations for Robotics (graduate course).

Refereed Publications:

- M. Schwager, D. Anderson, Z. Butler and D. Rus, “Robust Classification of Animal Tracking Data,” *Computers and Electronics in Agriculture*, to appear.
- R. Fitch and Z. Butler, “Million Module March: Scalable Locomotion Planning for Large Self-Reconfiguring Robots” (extended abstract), *Robotics: Science and Systems, Workshop on Self-Reconfigurable Robots*, 2006.
- Z. Butler, “Corridor planning for natural agents,” *Int’l Conference on Robotics and Automation (ICRA)*, 2006.
- Z. Butler, P. Corke, R. Peterson and D. Rus, “From Robots to Animals: Virtual Fences for Controlling Cattle”, *Int’l Journal of Robotics Research*, 25(5), 485-508, May-June 2006.
- Z. Butler, “Motion-Constrained Mobile Sensor Networks”, *Int’l. Conf. on Advanced Robotics*, 2005.
- Z. Butler, P. Corke, R. Peterson and D. Rus, “Dynamic Virtual Fences for Controlling Cows”, *Int’l Symposium on Experimental Robotics (ISER)*, 2004.
- Z. Butler, K. Kotay, D. Rus and K. Tomita, “Generic Decentralized Locomotion Control for Lattice-Based Self-Reconfigurable Robots,” *Int’l Journal of Robotics Research*, 23(9), 919-938, Sept. 2004.
- R. Fitch, Z. Butler and D. Rus, “In-Place Distributed Heterogeneous Reconfiguration Planning”, *Distributed Autonomous Robotic Systems (DARS) 2004*.
- Z. Butler, P. Corke, R. Peterson and D. Rus, “Virtual Fences for Controlling Cows”, *ICRA 2004*.
- Z. Butler and D. Rus, “Controlling Mobile Sensors for Monitoring Events with Coverage Constraints”, *ICRA 2004*.
- Z. Butler and D. Rus, “Event-based Control for Mobile-Sensor Networks,” *IEEE Pervasive Computing*, 2(4), 34-43, 2003.
- J. Aslam, Z. Butler, F. Constantin, V. Crespi, G. Cybenko and D. Rus, “Tracking a Moving Object with a Binary Sensor Network,” *ACM SenSys ’03*, Los Angeles, Nov. 2003.
- R. Fitch, Z. Butler and D. Rus, ”Reconfiguration Planning for Heterogeneous Self-Reconfiguring Robots”, *IROS 2003*, Oct. 2003.
- Z. Butler and D. Rus, “Distributed Motion Planning for 3-D Unit-Compressible Robots,” *Int’l Journal of Robotics Research*, 22(9), 699-716, Sep 2003.
- Z. Butler and D. Rus, “Distributed Locomotion Algorithms for Self-Reconfigurable Robots Operating on Rough Terrain,” *IEEE Symposium on Computational Intelligence in Robotics & Automation (CIRA)*, July 2003.
- Z. Butler, R. Fitch and D. Rus, “Distributed Control for Unit-Compressible Robots”, *IEEE/ASME Trans. on Mechatronics*, 7(4), 418-430, Dec 2002.
- Z. Butler, R. Fitch and D. Rus, “Experiments in Distributed Control of Modular Robots”, *Experimental Robotics VIII (Proc. of Int’l Symposium on Experimental Robotics)*, Springer-Verlag, 2003.
- Z. Butler and D. Rus, “Distributed Motion Planning for 3D Modular Robots with Unit-Compressible Modules,” *Workshop on the Algorithmic Foundations of Robotics*, 2002.

- Z. Butler, R. Fitch and D. Rus, "Experiments in Distributed Locomotion with Unit-Compressible Robots", Proc. of Int'l Conf. on Intelligent Robots and Systems (IROS), October 2002.
- Z. Butler, S. Murata and D. Rus, "Distributed Replication Algorithms for Self-Reconfiguring Modular Robots", in Distributed Autonomous Robotic Systems 5, pp. 37-48, 2002.
- Z. Butler, K. Kotay, D. Rus and K. Tomita, "Generic Decentralized Control for a Class of Self-Reconfigurable Robots", Int'l Conference on Robotics and Automation (ICRA), 2002.
- Z. Butler, R. Fitch, D. Rus and Y. Wang, "Distributed Goal Recognition Algorithms for Modular Robots", ICRA 2002.
- Z. Butler, S. Byrnes and D. Rus, "Distributed Motion Planning for Modular Robots with Unit-Compressible Modules," Proc. of Int'l Conf. on Intelligent Robots and Systems (IROS), October 2001.
- R. Fitch, Z. Butler and D. Rus, "3D Rectilinear Motion Planning with Minimum Bend Paths," Proc. of Int'l Conf. on Intelligent Robots and Systems (IROS), October 2001.
- Z. Butler, K. Kotay, D. Rus and K. Tomita, "Cellular Automata for Decentralized Control of Self-Reconfigurable Robots," ICRA 2001 Workshop on Modular Self-Reconfigurable Robots.
- Z. J. Butler, A. A. Rizzi and R. L. Hollis, "Simulation and Experimental Evaluation of Sensor-Based Coverage in Rectilinear Environments," Experimental Robotics VII, pp. 417-26, Springer-Verlag, 2001. (Proceedings of 2000 Int'l Symposium of Experimental Robotics)
- Z. J. Butler, A. A. Rizzi and R. L. Hollis, "Distributed Coverage of Rectilinear Environments," Proc. of the Workshop on the Algorithmic Foundations of Robotics, 2000.
- Z. J. Butler, A. A. Rizzi and R. L. Hollis, "Cooperative Sensor-based Coverage of Rectilinear Environments," Proc. of IEEE Int'l Conference on Robotics and Automation, San Francisco, April 2000.
- Z. J. Butler, A. A. Rizzi and R. L. Hollis, "Contact Sensor-based Coverage of Rectilinear Environments," Proc. of IEEE Int'l Symposium on Intelligent Control, Boston, Sept. 1999
- J. Gowdy and Z. J. Butler, "An Integrated Interface Tool for the Architecture for Agile Assembly," Proc. of IEEE Int'l Conference on Robotics and Automation, Detroit, May 10-15, 1999
- Z. J. Butler, A. A. Rizzi and R. L. Hollis, "Integrated Precision 3-DOF Position Sensor for Planar Linear Motors," Proc. of IEEE Int'l. Conference on Robotics and Automation, Leuven, Belgium, April 1998.
- P. J. Berkelman, Z. J. Butler and R. L. Hollis, "Design of a Hemispherical Magnetic Levitation Haptic Interface Device," 1996 ASME IMECE, Atlanta, November, 1996.
- R. L. Hollis, Z. J. Butler, A. A. Rizzi and A. E. Quaid, "Closed-Loop Planar Linear Motor with Integral Monolithic Three-Degree-of-Freedom AC-Magnetic Position/Orientation Sensor," U.S. Patent 6,175,169.

Invited Papers:

- Z. Butler and R. Fitch, "Internally Specified Heterogeneous Self-Reconfiguration," Conf. on the Foundations of Nanoscience and Self-Assembly, 2006.

Papers Under Review:

- R. Fitch and Z. Butler, "Scalable Locomotion for Large Self-Reconfiguring Robots," submitted to International Conf. on Robotics and Automation, 2007.
- R. Fitch and Z. Butler, "Million Module March: Scalable Locomotion for Large Self-Reconfiguring Robots," submitted to International Journal of Robotics Research.

Professional Activities:

Program Committee member for Int'l Conf. on Robotics and Automation 2006
Program Committee member for Robotics: Science and Systems 2005
Reviewer for Int'l Journal of Robotics Research, IEEE Trans. on Robotics, IEEE Trans. on Automation Science and Engineering, IEEE Pervasive Computing, IEEE Trans. on Mobile Computing, Ad Hoc Networks, DARS, WAFR, ICRA, IROS.
Judge for FIRST Robotics Regional Competition: Hartford, CT, 2003, Manchester, NH, 2004, Rochester, NY, 2005-2006; FIRST Lego League, Rochester, 2005-2006.
Invited demonstration at Siggraph 2002 Emerging Technologies Exposition
Invited demonstration at WIHAVE (Workshop on Intelligent Human Augmentation and Virtual Environments), 2002.

Grants/Fellowships/Awards:

NSF grant [w/ D. Rus, MIT], "Computational Tools for Controlling Herds", 2005-08, \$99K
ISTS Research Fellowship, 2003-04
NSF Graduate Research Fellowship, 1995-99
Alfred University Merit Scholarship (National Merit Scholar), 1990-94

Other Achievements:

Member, U.S. Puzzle Team, 1995-2002, 2005, 2006
Member of six World Champion U.S. teams
U.S. Puzzle Champion, 2005
Placed in top 3 at World Puzzle Championships, 1996, 1998, 1999, 2001
Crossword puzzle constructor, four puzzles published in the New York Times
All-American (honorable mention), Academic All-American (1st), USCSA Men's Ski Team, 1993
[NCAA Division III equivalent]