John A. Rieffel

CONTACT INFORMATION

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EDUCATION

Brandeis University, Waltham, Massachusetts **2001 - 2006**

- Ph.D., Computer Science, May 2006
- M.A., Computer Science, May 2004

Dissertation Topic: *Evolutionary Fabrication: The Co-Evolution of Form and Formation*
Advisor: Jordan Pollack, DEMO Lab

Swarthmore College, Swarthmore, Pennsylvania **1995 - 1999**

- B.S., Engineering, May 1999
- B.A., Computer Science, May 1999

Ringling Brothers and Barnum and Bailey Clown College, Baraboo, Wisconsin **1994**

- B.F.A. (Bachelor of Funny Arts), October 1994

TEACHING

Union College, Schenectady, NY

- *Assistant Professor*, Computer Science Department **Since September, 2009**

CSC 497: Junior Capstone Design Seminar	**[S12]**
CSC 333: Parallel Programming	**[S12]**
CSC 325: Robotics	**[S11]**
CSC 320: Artificial Intelligence	**[F11,F10]**
CSC 109: Matlab Programming for Engineers	**[F11, F10, S10]**
CSC 270: Computer Organization	**[W12,W11,W10]**
CSC 104: Robots Rule!	**[S10,S11]**

Senior Projects Supervised:

Timothy Kuehn: *Evolutionary Fabrication*	**2012**
Ben Humphreys: *Evolutionary Locomotion*	**2012**
Davis Knox *Scalable Co-Evolution of Soft Robot Properties and Gaits*	**2011**
Ben Lynch *Crowd Control: Harnessing the Wisdom of the Crowd to Trade*	**2011**
Paul Tunison: *Evolution of Flow in Games*	**2011**
Dave Sayles: *EvoFabber: Evolutionary Fabrication*	**2010**

Tufts University, Medford, MA

- *Instructor*, CompSci150: Stochastic Search and Evolutionary Computation. **Spring 2009**
  Creating and taught this elective course
  in collaboration with Professor Soha Hassoun.
- *Undergraduate and graduate mentorship and research collaboration. (see publications)*

Cornell University, Ithaca, NY

- *Guest Lecturer* MAE750/CS650: Evolutionary Computation. **November 2008**
- *Graduate Teaching Development Workshop* **Fall 2007**
  Attended workshop on curriculum development and teaching methods.
- *Undergraduate and graduate mentorship and research collaboration (see publications)*

Brandeis University, Waltham, Massachusetts

- *Head Teaching Assistant*
  - CS35a: Artificial Intelligence **Spring 2006**
  - CS120a: Performance Analysis of Storage Systems **Fall 2005**
  - CS21B: Structure and Interpretation of Computer Programs. **Spring 2002 - 2005**
    Additional responsibilities included leading a weekly recitation.

Swarthmore College, Swarthmore, Pennsylvania

- *Teaching and Laboratory Assistant* **1997 - 1999**
  - E58: Control Theory • CS63: Artificial Intelligence • E21: Digital Logic Design
  - E72: Electronic Circuit Applications

Research Experience

Postdoctoral Associate, Tufts University **February 2008 - July 2009**

Biomimetic Devices Laboratory: Engaged in a multidisciplinary effort to understand and model the biomechanics of the tobacco hornworm (*Manduca sexta*) caterpillar in order to create a completely soft-bodied robot.

Postdoctoral Associate, Cornell University **June 2006 - December 2007**

Cornell Computational Synthesis Laboratory: My research focused on modeling and controlling tensegrity-based robots. This led to insights into the phenomenon of "mechanism as mind", in which complex control tasks are out-sourced into the mechanics of both biological and mechanical systems.

Professional Experience

Biology Department, Brandeis University, Waltham, MA **2002 - 2006**

Software and Systems Consultant. Lead Developer for LifeSongX, behavioral and acoustical analysis software, used primarily to study *drosophila* courtship. LifesongX is currently deployed at Behavioral Genetics Laboratories at Brandeis University, Stanford University, and Dartmouth College.

Bluefin Robotics, Cambridge, MA. **2001**

Software Engineer. Developed and refined key components and device drivers for their QNX-based real-time software for Autonomous Underwater Vehicle (AUV) control.

Autonomous Underwater Vehicles (AUV) Lab, MIT, Cambridge, MA **1999-2001**

Research Engineer. Assisted in developing, building and piloting the lab's new class of robotic submersibles. Over 15 weeks of at-sea deployment.

Honors and Awards

- Student Developer Scholarship Award, Apple World Wide Developer Conference. June, 2005.
- Sigma Xi Honorary Research Society. Associate Member since April, 1999.
- First Place Team. 1997, 1998 and 1999 Philadelphia Regional IEEE Micromouse Competition.

Refereed Journal Papers (* indicates undergraduate co-author)

Rieffel, J., Knox, D.*, Smith, S.* and Trimmer, B (to appear) "Growing and Evolving Soft Robots", Artificial Life (accepted).

Rieffel, J., Valero-Cuevas, F. and Lipson, H. (2010) "Morphological Communication: Exploiting Coupled Dynamics in a Complex Mechanical Structure to Achieve Locomotion". J. R. Soc. Interface April 6, 2010 7:613-621

Rieffel, J., Valero-Cuevas, F. and Lipson, H. (2009) "Automated Discovery and Optimization of Large Irregular Tensegrity Structures". Computers and Structures 87 (2009) 368-379

Refereed Conference and Workshop Papers

Rieffel, J. and Smith, S.*, (2012), "Growing and Evolving Soft Robots with a Face-Encoding Tetrahedral Grammar (poster)", Proceedings of the 2012 Genetic and Evolutionary Computation Conferene (GECCO)

Kuehn, T.* and **Rieffel, J.** (2012) Automatically Designing and Printing Objects with EvoFab 0.2", Proceedings of the 13th International Conference on the Synthesis and Simulation of Living Systems (ALife XIII), pp. 372-378

Knox, D.* and **Rieffel, J.**, (2011) "Scalable Co-Evolution of Soft Robot Properties and Gaits". Proceedings of the Eleventh European Conference on the SYnthesis and Simulation of Living Systems (ECAL). MIT Press. 416-422.

Sayles, D.* and **Rieffel, J.**, (2010) "EvoFab: A Fully Embodied Evolutionary Fabricator". (2010) Proceedings of the 9th International Conference on Evolvable Hardware. Springer.

Rieffel, J. and Trimmer, S., "Body/Brain Co-Evolution in Soft Robots" (Extended Abstract) Proceedings of the 12th International Conference on the Synthesis and Simulation of Living Systems (ALIFE12). MIT Press. 257–260.

Smith, S.*, and **Rieffel**, J. (2010) "A Face-Encoding Grammar for the Generation of Tetrahedral-Mesh Soft Bodies". Proceedings of the 12th International Conference on the Synthesis and Simulation of Living Systems (ALIFE12). MIT Press. 414–420.

Saunders, F., **Rieffel, J.** and Rife, J. (2009) "A Method of Accelerating Convergence for Genetic Algorithms Evolving Morphological and Control Parameters for a Biomimetic Robot", International Conference on Autonomous Robots and Agents.

Rieffel, J., Saunders, F., Nadimpalli, S., Zhou, H., Hassoun, S., Rife, J. and Trimmer, B."Evolving Soft Robotic Locomotion in PhysX", Proceedings of the 2009 Genetic and Evolutionary Computation Conference.

Rieffel, J., Trimmer, B. and Lipson, H. (2008) "Mechanism as mind: what tensegrities and caterpillars can teach us about soft robotics." Artificial Life XI: Proceedings of the Eleventh International Conference on the Simulation and Synthesis of Living Systems.

Rieffel, J., Valero-Cuevas, F. and Lipson, H. (2007) "Growing form-filling tensegrity structures using map L-systems". Proceedings of the 2007 Genetic and Evolutionary Computation Conference.

Rieffel, J., Stuk, R. and Lipson, H. (2007) "Locomotion of a Tensegrity Robot Via Dynamically Coupled Modules". Proceedings of the 2007 International Conference on Morphological Computation.

Rieffel, J. and Pollack, J. (2006) "An Endosymbiotic Model for Modular Acquisition in Stochastic Developmental Systems". Proceedings of the Tenth International Conference on the Simulation and Synthesis of Living Systems (ALIFE X).

Rieffel, J. and Pollack, J. (2005) "Crossing the Fabrication Gap: Evolving Assembly Plans to Build 3-D Objects". 2005 IEEE Congress on Evolutionary Computation.

Rieffel, J. and Pollack, J. (2005) "Automated Assembly as Situated Development: Using Artificial Ontogenies to Evolve Buildable 3-D Objects". Proceedings of the 2005 Genetic and Evolutionary Computation Conference.

Rieffel, J. and Pollack, J. (2005). "Evolutionary Fabrication: The Emergence of Novel Assem-

bly Methods in Artificial Ontogenies". SEEDS workshop, at the 2005 Genetic and Evolutionary Computation Conference.

Rieffel, J. and Pollack, J. (2005) "Evolving Assembly Plans for Fully Automated Design and Assembly." Proceedings of the 2005 NASA/DoD Conference on Evolvable Hardware.

Rieffel, J. and Pollack, J. (2004) "Artificial Ontogenies for Real World Design and Assembly." Ninth International Conference on the Simulation and Synthesis of Living Systems (ALIFE9) Workshop: Self-Organization and Development in Artificial and Natural Systems (SODANS) 2004.

Rieffel, J. and Pollack, J. (2004) "The Emergence of Ontogenic Scaffolding in a Stochastic Development Environment". Proceedings of the 2004 Genetic and Evolutionary Computation Conference.

Rieffel, J., DiLeo, C., and Maxwell, B.A. (1999) "Evolving Optimal Histogram Parameters for Object Recognition", Proceedings, SPIE Intelligent Robots and Computer Vision XVIII.

Other Publications

Rieffel, J. (2011) "Book Review: Trent McConaghy, P. Palmers, G. Peng, Michiel Steyaert, Georges Gielen: Variation-aware analog structural synthesis: a computational intelligence approach", Genetic Programming and Evolvable Machines: Volume 12, Issue 4 (2011), Page 461-462

College Service

- Division IV Representative to the Administrative Affairs Council **2011-present**
- Representative to the Intellectual Enrichment Grant Committee **2010-present**

Professional Activities

Conferences and Workshops

- *Chair*, Session on Soft and Amorphous Robotics, ALife XI (2008)
- *Program Committee*, Multiple Tracks, GECCO 2007, GECCO 2008, GECCO 2009, GECCO 2010, ALIFE XI (2008), ALIFE XII (2010), GECCO 2001, ECAL 2011
- *Invited Participant*, Developmental Systems Workshop, AAAI Fall Symposium 2006.

Invited Talks

- *Binghamton University*, EVOS Seminar Speaker, February 2012
- *University of Vermont*, Computer Science Seminar Speaker, March 2010
- *Sarah Lawrence College*, Computer Science Speaker Series, November 2009
- *Icosystem Inc.*, "Mechanism as mind: what caterpillars and camping tents can teach us about soft robotics". Science Friday Guest Speaker Series. June, 2008 .
- *Tufts University*, "What tensegrities can teach us about caterpillar neuromechanics". Biology Department Spring Seminar Series. March, 2008.
- *Cornell University*, "Evolutionary Fabrication: the co-evolution of form and formation". Machines and Organisms Seminar Series. September, 2006.

Reviewer

- **2011**: Journal of Advanced Robotics, Robotics and Autonomous Systems, Acta Mechanica
- **2010**: IEEE Transactions on Evolutionary Computation