

Katie Byl

Room 5115, Harold Frank Hall
Dept. of Electrical & Computer Engineering
University of California
Santa Barbara, CA 93106

katiebyl@ece.ucsb.edu
<http://robotics.ece.ucsb.edu>
Phone: (805) 893-4924
Fax: (805) 893-3262

Areas of Research and Teaching Expertise

Dynamics and control of robotic systems, particularly for locomotion. Improving design and planning for robots to become more robust, agile and efficient involves many challenges. My work focuses on control methods and motion planning algorithms for uncertain, stochastic environments, with particular emphasis on supervised autonomy. Example applications include agile legged locomotion, exoskeleton control, and dexterous, multi-limb mobility.

Academic Positions and Education

University of California Associate Professor, Dept. of Electrical and Computer Eng. (ECE), and courtesy (0%) appointment, Dept. of Mechanical Eng. (ME)	Santa Barbara, CA 2015–present
University of California Assistant Professor, ECE and ME Depts.	Santa Barbara, CA 2010–2015
Harvard University Postdoctoral Fellow, Dept. of Electrical Engineering Prof. Robert Wood (Adviser), Harvard Microrobotics Lab	Cambridge, MA 2008–2009
MIT Ph.D. in Mechanical Engineering Prof. Russ Tedrake (Adviser), Robot Locomotion Group - CSAIL Prof. Neville Hogan (Chair), Dept. of Mechanical Engineering, and Dept. of Brain and Cognitive Sciences	Cambridge, MA 2008
MIT S.M. in Mechanical Engineering Prof. David Trumper (Adviser), Precision Motion Control Lab - LMP	Cambridge, MA 2003
MIT S.B. in Mechanical Engineering	Cambridge, MA 1999

Awards and Honors

- Member 5th place teams (JPL/UCSB/Caltech) in each of these 3 separate events: DARPA Virtual Robotics Challenge (2013), DARPA Robotics Challenge (DRC) trials (2013), and DRC finals (2015).
- NSF CAREER Award, 2013.
- Hellman Junior Faculty Fellowship, 2012.
- Sloan Research Fellow: *Neuroscience*, 2011.
- University of California Regents' Junior Faculty Fellowship, 2011.
- MIT student awards: IFRR Student Fellowship Award: *paper/presentation at ISER 2008 conference*. Meredith Kamm Award: *Excellence in graduate studies*, ME Dept., MIT. Departmental Service Award: *Departmental teaching award*, ME Dept. Goodwin medal nominee: *Institute-wide teaching award*. Whitelaw Award: *Mechanical engineering design award*.
- Research Science Institute (RSI) alumna, Center for Excellence in Education (CEE).

Ph.D. Dissertation

Metastable Legged-Robot Locomotion. (Prof. Russell Tedrake, advisor; CS and AI Lab)
Legged robots in real-world environments are inherently subject to significant stochasticity and underactuation. This work focuses on the problems of evaluation and optimization of control algorithms to produce fast, dynamic motions which are highly reliable. “Metastability” (literally, “beyond stability”) refers to the fact that absolute guarantees of stability (continuous walking, forever) are instead replaced with mathematically-derived estimates of reliability (e.g., the expected distance traveled before falling) and of the regions most frequently visited in state space. Methods developed are applicable more generally to a broader class of highly dynamic robotic and mechatronic systems.

Research Experience

Postdoctoral Fellow 2008–2009
Rob Wood (Harvard, EECS) Harvard Microrobotics Laboratory
• Dynamic characterization of and control development for a flapping-wing MAV (micro air vehicle).
• Design of automation techniques for fabrication of micro-scale robotics.

Doctoral Research 2005–2008
Russ Tedrake (MIT, CSAIL) MIT, Comp. Sci. and Artif. Int. Lab.
• Motion planning and code development for an autonomous quadruped on rough terrain. (DARPA Learning Locomotion project.)
• Approximate optimal control solutions for (compass gait) biped simulations on rough terrain.
• Development of statistical tools for analyzing metastable (long-living) walking gaits.

Research Consultant 2004-2005
Markus Zahn (MIT, EECS) GE Global Research
• Analytic and numeric (FEM) models to relate magnetic flux leakage (MFL) field signatures to corresponding spheroidal defects in a pipeline wall.

Research Assistant 2002-2003
Rich Mittleman (MIT) MIT, Kavli Inst. for Astr. & Space Research
• Modal analyses and vibration isolation work for the Laser Interferometer Gravitational-Wave Observatory (LIGO).

Masters Thesis 2001-2002
David Trumper (MIT, ME) MIT, Lab. for Manuf. and Prod.
• Design and control of a mobile inverted pendulum robot, similar to DEKA’s Segway.
• Design and construction of modular laboratory equipment for the sophomore-level class Modeling Dynamics and Control I. Hardware are used to demonstrate near-ideal first- and second- and fourth-order dynamics, and to implement feedback control of a second-order system.

Research Consultant 1999
David Trumper (MIT, ME) Anorad
• Implementation and debugging of a control system for a magnetic bearing stage. Prototyped an initial controller for both single- and five-degree-of-freedom magnetic bearing systems with capacitive position sensing using the dSPACE (graphical block-diagram) environment and implemented a working design in assembly language.

- Undergraduate Thesis 1999
David Trumper (MIT, ME) MIT, Dept. of Mech. Eng.
• Software implementation (low-level code and GUI) for a Dynamic Signal Analyzer (DSA) to run in Simulink/MATLAB. This software has been used throughout the last decade both in courses (Mechatronics, Dynamic Modeling and Control) and for in-lab research to obtain the empirical transfer function of a dynamic system within the dSPACE real-time controller board environment.
- Undergraduate Research (UROP) 1997-1999
Michael Fripp and Nesbitt Hagood (MIT, AA) MIT, Active Materials and Structures Lab
• Developed FEM models in ANSYS for strutted aircraft bodies to calculate their acoustic modes and the corresponding stress distribution within the shells of these structures. The aim of the project was to determine the best placement for piezoelectric (PZT) actuators on the surface of an airframe body, for implementation of active control of the dominant acoustic modes.
- Undergraduate Research (UROP) 1988
Robert Kelly (Harvard Dental School) MIT, Ceramics Processing Research Laboratory
• Manufactured and tested new ceramics for machineable (CAD/CAM) dental prosthetics. Materials testing (hardness, etc.), scanning electron micrographs (SEM) to document crystal structures.

Teaching Experience (✓ indicates new course development)

- ✓ Robot Dynamics and Control, *ECE/ME 179D* *UCSB*
Senior-level lecture and lab course on robot dynamics and control.
- Nonlinear Phenomena, *ECE183/ME169/PH106* *UCSB*
Senior-level course on nonlinear dynamics and chaos.
- ✓ Robot Locomotion, *ECE 594D* *UCSB*
Graduate course on modeling and nonlinear control of robots.
- Digital Control Systems, *ECE 147B* *UCSB*
Senior-level lecture and lab course on classical and modern methods of digital control.
- Advanced Control Design Lab, *ECE 238* *UCSB*
A project-based graduate course in digital control.
- ✓ Kalman and Adaptive Filtering, *ECE 248* *UCSB*
Applied Kalman filtering, with focus on random processes and linear system theory.
- Numerical Marine Hydrodynamics, *2.29/13.024* *MIT*, Spring 2005
with Prof. Jerry Milgram. Lecture TA.
- Feedback Control Systems, *2.14* *MIT*, Fall 2004
with Prof. Dave Hardt. Lecture TA and laboratory instructor.
- Modeling Dynamics and Control I, *2.003* *MIT*, Fall 2003
with Prof. David Trumper. Recitation instructor, lab instructor, head TA.
- Mechanical Engineering Tools, *2.670* *MIT*, IAP (January) 2002
with Prof. Doug Hart. MATLAB laboratory instructor.
- Modeling Dynamics and Control I, *2.003* *MIT*, Fall 2001
with Prof. David Trumper. Lab instructor, head TA.

- Modeling Dynamics and Control III, 2.010 MIT, Spring 2001
with Prof. Steve Dubowsky. Lecture TA.
- Mechanical Engineering Tools, 2.670 MIT, IAP 2001
with Prof. Sanjay Sarma. MATLAB tutorial development; laboratory TA.
- Modeling Dynamics and Control III, 2.010 MIT, Fall 2000
with Prof. Neville Hogan. Lecture TA.
- √ How Things Work The Windsor School, January, 2000
Organized and taught a short, high school course where we took apart household appliances to reverse engineer how they work – and sometimes to fix them.
- Lego/LOGO Robotics Boston Museum of Science, 1990-91
with Fred Martin. Taught weekend classes where elementary students built and controlled their own Lego/LOGO robots. Similar to, but pre-dating, the MindStorms controllers for Lego.

Publications and Presentations for Katie Byl (nee Lilienkamp)

• Journal, Magazine, and Book Chapter Publications

1. Karumanchi, Sisir, Kyle Edelberg, Ian Baldwin, Jeremy Nash, Jason Reid, Charles Bergh, John Leichty, Kalind Carpenter, Matthew Shekels, Matthew Gildner, David Newill-Smith, Jason Carlton, John Koehler, Tatyana Dobрева, Matthew Frost, Paul Hebert, James Borders, Jeremy Ma, Bertrand Douillard, Paul Backes, Brett Kennedy, Brian Satzinger, Chelsea Lau, Katie Byl, Krishna Shankar, and Joel Burdick. Team RoboSimian: Semi-autonomous Mobile Manipulation at the 2015 DARPA Robotics Challenge Finals. Submitted to *Journal of Field Robotics (JFR), Special Issue on the DRC*, 2016.
2. Piovan, Giulia and Katie Byl. Approximation and Control of the SLIP Model Dynamics Via Partial Feedback Linearization and Two-Element Leg Actuation Strategy. Accepted for *IEEE Trans. on Robotics*, 2016.
3. Hebert, Paul, Max Bajracharya, Jeremy Ma, Nicolas Hudson, Alper Aydemir, Jason Reid, Charles Bergh, James Borders, Matt hew Frost, Michael Hagman, John Leichty, Paul Backes, Brett Kennedy Paul Karplus, Katie Byl, Brian Satzinger, Krishna Shankar, and Joel Burdick. Mobile Manipulation and Mobility as Manipulation - Design and Algorithms of RoboSimian. *Journal of Field Robotics (JFR), Special Issue on the DRC*, vol.32, no.2, pp.255-274, 2015.
4. Satzinger Brian W., Chelsea Lau, Marten Byl, and Katie Byl. Tractable Locomotion Planning for RoboSimian. *International Journal of Robotics Research*, 2015.
5. Piovan, Giulia and Katie Byl. Reachability-based Control for the Active SLIP Model. *International Journal of Robotics Research*, 2014.
6. Mahjoubi, Hosein and Katie Byl. Efficient Flight Control via Mechanical Impedance Manipulation: Energy Analyses for Hummingbird-Inspired MAVs. *Journal of Intelligent & Robotic Systems*. Springer, 2013.
7. Byl K, D Umphred, M Byl, B Stockhart, C Clayton, S Sovero and N Byl. “Integrating Technology into the Clinical Practice,” In D Umphred (Ed.) *Neurological Rehabilitation* (6th ed.), 2013.
8. Mahjoubi, Hosein and Katie Byl. Modeling synchronous muscle function in insect flight: a bio-inspired approach to force control in flapping-wing MAVs. *Journal of Intelligent & Robotic Systems*. Springer Netherlands, 2012.
9. Byl, K and R Tedrake. Metastable walking machines. *International Journal of Robotics Research*, Aug 2009.
10. Lundberg K H, K A Lilienkamp and G Marsden. Low-cost magnetic levitation project kits. *IEEE Control Systems Magazine* 24(5): 65–69 Oct 2004.
11. Abbott, R, et al. Seismic isolation enhancements for initial and advanced LIGO. *Classical and Quantum Gravity* 21(5): 515–5921 Sp. Iss. SI Mar 7 2004.

• Peer-Reviewed Conference Publications

1. Paris, Virgile, Tom Stizic, Jason Pusey and Katie Byl. Tools for the Design of Stable yet Nonsteady Bounding Control. Submitted to *2016 American Control Conference (ACC)*, 2016.
2. Terry, Pat and Katie Byl. CoM Control for Underactuated 2D Hopping Robots with Series-Elastic Actuation via Higher Order Partial Feedback Linearization. In press for *Proc. IEEE Conf. on Decision and Control (CDC)*, 2015.
3. Saglam, Cenk Oguz and Katie Byl. Quantifying and Optimizing Robustness of Bipedal Walking Gaits on Rough Terrain. In press for *Proc. International Symposium on Robotics Research (ISRR)*, 2015.
4. Sovero, Sebastian E., Cenk Oguz Saglam and Katie Byl. Passive Frontal Plane Stabilization in 3D Walking. In press for *Proc. IEEE Int. Conf. on Intelligent Robots and Systems(IROS)*, 2015.
5. Saglam, Cenk Oguz and Katie Byl. Meshing Hybrid Zero Dynamics for Rough Terrain Walking. In press for *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2015.
6. Lau, Chelsea and Katie Byl. Smooth RRT-Connect: An Extension of RRT-Connect for Practical Use in Robots. In *Proc. IEEE Int. Conf. on Technologies for Practical Robot Applications (TePRA)*, 2015.
7. Byl, Marten and Katie Byl. Design of Fast Walking with One- Versus Two-at-a-Time Swing Leg Motions for RoboSimian. In *Proc. IEEE Int. Conf. on Technologies for Practical Robot Applications (TePRA)*, 2015.
8. Saglam, Cenk Oguz and Katie Byl. Metastable legged locomotion: methods to quantify and optimize reliability. (Invited Paper.) in *Proc. SPIE 9467, Micro- and Nanotechnology Sensors, Systems, and Applications VII*, 94671T, 2015.
9. Byl, Katie, Brian Satzinger, Tom Strizic, Pat Terry and Jason Pusey. Toward agile control of a flexible-spine model for quadruped bounding. in *Proc. SPIE 9468, Unmanned Systems Technology XVII*, 94680C, 2015.
10. Terry, Pat and Katie Byl. A Higher Order Partial Feedback Linearization Based Method for Controlling an Underactuated Hopping Robot with a Compliant Leg. In *Proc. IEEE Conf. on Decision and Control (CDC)*, 2014.
11. Saglam, Cenk Oguz and Katie Byl. Metastable Markov Chains Explained. In *Proc. IEEE Conf. on Decision and Control (CDC)*, 2014.
12. Saglam, Cenk Oguz, Andrew R. Teel and Katie Byl. Lyapunov-based versus Poincare Map Analysis of the Rimless Wheel. In *Proc. IEEE Conf. on Decision and Control (CDC)*, 2014.
13. Saglam, Cenk Oguz and Katie Byl. Robust Policies via Meshing for Metastable Rough Terrain Walking. In *Proc. Robotics: Science and Systems (RSS)*, 2014.
14. Satzinger, Brian, Chelsea Lau, Marten Byl, and Katie Byl. Experimental Results for Dexterous Quadruped Locomotion Planning with RoboSimian. In *Proc. Int. Symposium on Experimental Robotics (ISER)*, 2014.
15. Satzinger, Brian, Jason I. Reid, Max Bajracharya, Paul Hebert and Katie Byl. More Solutions Means More Problems: Resolving Kinematic Redundancy in Robot Locomotion on Complex Terrain. In *Proc. IEEE Int. Conf. on Intelligent Robots and Systems(IROS)*, 2014.
16. Saglam, Cenk Oguz and Katie Byl. Quantifying the Trade-Offs Between Stability versus Energy Use for Underactuated Biped Walking. In *Proc. IEEE Int. Conf. on Intelligent Robots and Systems (IROS)*, 2014.
17. Mahjoubi, Hosein and Katie Byl. Dynamics of Insect-Inspired Flapping-Wing MAVs: Multibody Modeling and Flight Control Simulations. In *Proc. American Control Conference (ACC)*, 2014.
18. Saglam, Cenk Oguz and Katie Byl. Switching Policies for Metastable Walking. In *Proc. IEEE Conference on Decision and Control (CDC)*, 2013.

19. Giftthaler, Markus and Katie Byl. Increased Robustness of Humanoid Standing Balance in the Sagittal Plane through Adaptive Joint Torque Reduction. In *Proc. IEEE Int. Conf. on Intelligent Robots and Systems (IROS)*, 2013.
20. Mahjoubi, Hosein and Katie Byl. Improvement of Power Efficiency in Flapping-Wing MAVs through a Semi-Passive Motion Control Approach. In *Proc. International Conference on Unmanned Aircraft Systems (ICUAS)*, 2013.
21. Saglam, Cenk Oguz and Katie Byl. Stability and Gait Transition of the Five-Link Biped on Stochastically Rough Terrain Using a Discrete Set of Sliding Mode Controllers. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, Paper 437, 2013.
22. Piovan, Giulia and Katie Byl. Two-Element Control for the Active SLIP Model. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, Paper 5, 2013.
23. Mahjoubi, Hosein and Katie Byl. Trajectory Tracking in the Sagittal Plane: Decoupled Lift/Thrust Control via Tunable Impedance Approach in Flapping-Wing MAVs. In *Proc. American Control Conference (ACC)*, Paper 263, 2013.
24. Rutschmann, Martin , Brian Satzinger, Marten Byl, and Katie Byl. Nonlinear model predictive control for rough-terrain robot hopping. In *Proc. IEEE International Conf. on Intelligent Robots and Systems (IROS)*, Paper 999, 2012.
25. Filitchkin, Paul and Katie Byl. Feature-based terrain classification for LittleDog. In *Proc. IEEE International Conf. on Intelligent Robots and Systems (IROS)*, Paper 1374, 2012.
26. Mahjoubi, H and K Byl. Insect flight muscles: Inspirations for motion control in flapping-wing MAVs in *Proc. International Conference on Unmanned Aircraft Systems (ICUAS)*, 2012.
27. Chen, M-Y and K Byl. Analysis and control techniques for the compass gait with a torso walking on stochastically rough terrain. In *Proc. American Control Conference (ACC)*, 2012.
28. Mahjoubi H and K Byl. Steering and horizontal motion control in insect-inspired flapping-wing MAVs: The tunable impedance approach. In *Proc. American Control Conference (ACC)*, 2012.
29. Piovan, G and K Byl. Enforced symmetry of the stance phase for the spring-loaded inverted pendulum'. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2012.
30. Mahjoubi, H and K Byl. Tunable impedance: A semi-passive approach to practical motion control of insect-inspired MAVs. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2011.
31. Nanayakkara, T, K Byl, H Liu, X Song, and T Villabona. Dominant sources of variability in passive walking. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2012.
32. Byl K, M Byl, M Rutschmann, B Satzinger, L van Blarigan, G Piovan, and J Cortell. Series-elastic actuation prototype for rough terrain hopping. In *Proc. IEEE International Conference on Technologies for Practical Robot Applications (TePRA)*, 2012.
33. Mahjoubi H and K Byl. Analysis of a tunable impedance method for practical control of insect-inspired flapping-wing MAVs. In *Proc. 50th IEEE Conference on Decision and Control (CDC)*, 2011.
34. Byl, K. A passive dynamic approach for flapping-wing micro-aerial vehicle control. In *Proc. ASME Dynamic Systems and Control Conference (DSCC 2010)*, 2010.
35. Byl, K, A Shkolnik, S Prentice, N Roy and R Tedrake. Reliable dynamic motions for a stiff quadruped. *Proc. 11th Int. Symposium of Experimental Robotics (ISER 2008)*, Springer Tracts in Advanced Robotics (STAR), 54:319–328, 2009. **Winner of IFRR Student Fellowship Award.**
36. Byl, K and R Tedrake. Approximate optimal control of the compass gait on rough terrain. *Proc. IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 1258–1263, 2008.
37. Byl, K and R Tedrake. Metastable walking on stochastically rough terrain. In *Proc. of Robotics: Science and Systems (RSS)*, 2008.
38. Robertson, N A, et al. Seismic isolation and suspension systems for Advanced LIGO. In *Proc. SPIE Conf. on Gravitational Wave and Particle Astrophysics Detectors*, 5500(1):81–91, Sep 2004.

39. Lilienkamp K A and K H Lundberg. Low-cost magnetic levitation project kits for teaching feedback system design. In *Proc. of American Control Conference (ACC)*, 2::1308–1313, 2004.
40. Rosales, E, B Ito, K Lilienkamp and K Lundberg. An open-ended ball-balancing laboratory for undergraduates. In *Proc. of American Control Conference (ACC)*, 2:1314–1318, 2004.
41. Trumper, D L, S A Nayfeh, and K A Lilienkamp. Projects for Teaching Mechatronics at MIT. In *Proc. of the 8th Int. Conf. on Mechatronics*. Enschede, The Netherlands, 2002.
42. Fripp, M L, D Q O’Sullivan, S R Hall, N W Hagood and K Lilienkamp. Testbed design and modeling for aircraft interior acoustic control. In *Proc. SPIE Conf. on Smart Structures and Materials 1997: Smart Structures and Integrated Systems*, 3041(1):88-99, Jun 1997.

• **Unpublished: Technical Reports and Conference Presentations**

- Saglam, Cenk Oguz and Katie Byl. First Passage Value. (Technical Report, in Arxiv.) Submitted 20 Dec, 2014. <http://arxiv.org/abs/1412.6704>
- Byl, K. “Optimal Kinodynamic Planning for Compliant Mobile Manipulators.” Presented at *IEEE Int. Conf. on Robotics and Automation (ICRA)*, Anchorage, AK. May 2010. [Workshop on Mobile Manipulation.]
- Byl, K and R Tedrake. “Dynamically Diverse Legged Locomotion for Rough Terrain.” Presented at *IEEE Int. Conf. on Robotics and Automation (ICRA)*, Kobe, Japan. May 2009. [video presentation]
- Byl, K and R Tedrake. “Control of the compass gait on rough terrain.” Presented at *Dynamic Walking*, Delft, The Netherlands. May 2008.
- Byl, K and R Tedrake. “Stability of passive dynamic walking on uneven terrain.” Presented at *Dynamic Walking*, University of Michigan. May 2006.

• **Service Activities**

NSF review panelist (4 panels)	2012-present
Faculty sponsor, UCSB Robotics Club	2011-present
Assoc. Ed. IROS	2014
Assoc. Ed. IEEE ICRA	2012
Assoc. Ed. Amer. Control Conf. (ACC)	2011
Program committee Robotics: Science and Systems (RSS)	2011
Reviewer: various publications and proposals	2005-present

• Invited Talks

December 2015	Santa Barbara Science and Engineering Council
October 2015	Center for Bioengineering, UCSB
July 2015	Dynamic Walking Conference, Ohio State Univ.
June 2015	International Symposium on Adaptive Motion of Animals and Machines
April 2015	NSF Workshop on Locomotion and Manipulation
March 2015	GRASP Seminar, University of Pennsylvania
February 2015	ME 100/200 Seminar, UCSB
January 2015	Control Seminar Series, University of Michigan
September 2014	Berkeley, Dept. of Electrical Eng. and Comp. Sci.
July 2013	GRIT talk: Robot Locomotion, UCSB
June 2013	RSS Workshop on DARPA Virtual Robotics Challenge (VRC)
May 2012	Dynamic Walking Conference, Pensacola
November 2011	UCSB, Vistas in Control Workshop
October 2011	Army Robotics CTA PI Review, D.C.
October 2010	U. of Cal. at Santa Barbara, Center for Control, Dyn. Systems and Comp.
May 2009	University of Illinois at Urbana-Champaign, Dept. of Aerospace Engineering
May 2009	Stanford University, Dept. of Aeronautics and Astronautics
May 2009	Arizona State University, Dept. of Mechanical and Aerospace Engineering
April 2009	University of Massachusetts at Amherst, Dept. of Mech. and Ind. Eng.
April 2009	U. of Cal. at Santa Barbara, Center for Control, Dyn. Systems and Comp.
April 2009	San José State University, Dept. Mechanical and Aerospace Engineering
April 2009	Northeastern University, Dept. Mechanical and Industrial Engineering
April 2009	Massachusetts Institute of Technology, Dept. of Mechanical Engineering
March 2009	Worcester Polytechnic Institute, Dept. of Mechanical Engineering
March 2009	University of New Hampshire, Dept. of Mechanical Engineering
February 2009	Carnegie Mellon University, Dept. of Mechanical Engineering
October 2008	Cornell University, Dept. of Theoretical and Applied Mechanics (TAM)
August 2008	Harvard, Microrobotics Laboratory
June 2007	Boston Dynamics, Inc. (Waltham, MA)

Professional Experience

Programming Consultant	2005
Jerry Milgram, MIT	MIT, Ocean Eng. Dept.
• Editing MATLAB code and creating stand-alone executable. Improved the user interface for and sped up (by a factor >100) MATLAB code to solve for pressure forces and resulting dynamic motions of sea vessels given a user-defined frequency spectrum of ocean waves.	
Programming Consultant	2005
Mark Brown, MIT	MIT, Academic Media Prod. Services (AMPS)
• Created a stand-alone executable application from existing MATLAB code to analyze airline passenger disruption due to flight delays. Software for an Operations Research textbook.	
Research Consultant	2003
David Trumper (MIT, ME)	Hale and Dorr LLP
• Patent/literature search relating to vibration isolation of photolithography stages. Research involved finding and documenting a wide range of electro-mechanical systems in which a reaction mass is used to reduce vibration.	

Current Students

Chelsea Lau (Ph.D candidate, ECE Dept.)
Asutay Ozmen (Ph.D. candidate, ECE Dept.)
Samantha Samuelson (Ph.D. candidate, ECE Dept.)
Brian Satzinger (Ph.D. candidate, ECE Dept.)
Sepehr Seifi (Ph.D. candidate, ME Dept.)
Sebastian Sovero (Ph.D. candidate, ME Dept.)
Tom Strizic (Ph.D. candidate, ECE Dept.)
Nihar Talele (Ph.D. candidate, ECE Dept.)
Pat Terry (Ph.D. candidate, ECE Dept.)

Past Students

Cenk Oguz Saglam (Ph.D. 2015, ECE Dept., UCSB)
Giulia Piovon (Ph.D. 2015, ME Dept., UCSB)
Hosein Mahjoubi (Ph.D. 2013, ECE Dept., UCSB)
Chris Steward (M.S., 2014, ECE Dept.)
Peter Ha (M.S., 2014, ECE Dept., UCSB)
Howard Hu (M.S., 2014, ECE Dept., UCSB)
Sebastian Altwegg (M.S., 2013, ETH-Zurich)
Markus Giffthaler (M.S., 2013, ETH-Zurich)
Martin Rutschmann (M.S., 2012, ETH-Zurich)
Gregory Ray (M.S., 2012, ECE Dept., UCSB)
Min-Yi (Milly) Chen, (M.S. 2011, ECE Dept., UCSB)
Paul Filitchkin (M.S. 2011, ECE Dept., UCSB)
George Murillo (Ph.D. candidate, ME Dept., UCSB)
Marco Rodriguez-Suarez. (M.S. 2010, ECE Dept., UCSB)

Other Experience

Professional Gambler 1992–1999
Strat. Inv. / Amphib. Inv. / Omega Inv. “MIT Blackjack Team”
• Member of several limited liability corporations, popularly called the “MIT Blackjack Team”. We invested in team play of blackjack, using card counting and other strategies (e.g., shuffle tracking) to produce average annual returns of about 100% (doubling the money invested before taxes). I wrote software to calculate such things as: look-up tables for estimating profitability, given particular playing conditions (e.g., how crowded a table is, number of decks remaining unplayed, count, etc.); derivation of basic strategy for Spanish 21; analysis of card-spacings in a typical multi-pass Las Vegas casino shuffle; and calculating the value of and optimal play for various special rules offered as casino promotions.