Elizabeth Bradley

Department of Computer Science
University of Colorado
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Research Interests

Nonlinear dynamics and chaos; control theory; artificial intelligence; fluid dynamics.

Degrees Awarded

Ph.D. Electrical Engineering and Computer Science

Massachusetts Institute of Technology September 1992

Thesis research, under Professors G. J. Sussman and H. Abelson, combining ideas from nonlinear dynamics, artificial intelligence, and control theory in order to exploit chaotic behavior. Minor in mathematical physics: general relativity, galactic dynamics, etc.

S.M. Computer Science

Massachusetts Institute of Technology June 1986

Thesis research, under Professor R. H. Halstead, on multiprocessor applications. Advanced training in digital signal processing, VLSI, network theory and circuit design, and simulation.

S.B. Electrical Engineering

Massachusetts Institute of Technology December 1983

Broad curriculum in electrical engineering, with emphasis on analog and digital circuit design. Secondary focuses on ancient history and a variety of foreign languages.

Professional History

Professor

University of Colorado

Chair	May 2003 to February 2006
Associate Professor	May 1999 to May 2004
Assistant Professor	January 1993 to May 1999

Department of Computer Science and Department of Electrical and Computer Engineering. Faculty affiliate with the Departments of Applied Mathematics and Mechanical Engineering. Currently supervising or co-supervising five Ph.D. theses, one B.S. thesis, and two undergraduate research students.

Visiting Scholar

Harvard University Spring 1997

Division of Engineering and Applied Sciences AY1999-2000

Doctoral Candidate/Research Assistant

Massachusetts Institute of Technology 1986 to 1992

Researched and implemented computer control algorithms that exploit chaos. Designed and built physical devices to demonstrate these tools.

Consultant

Various 1986 to present

Designed and built analog and digital circuits, software, and electromechanical devices for a variety of projects and companies (Bolt Beranek & Newman, Barnard and Thompson, Anchor Engineering, MAST, etc.) Assisted in BB&N's development of tools that integrate advanced mathematical physics into the high school curriculum.

Design Engineer

Bradley Telcom Corp.   Summers 1976-78, 1980-85

Progressed from PC board assembler to project design engineer and supervisor of a four-person team.

Intern

IBM/T. J. Watson Lab   Summer 1979

Debugged microcomputer software and a variety of electronic equipment.

Honors

Radcliffe Fellow	2006-2007
John & Mercedes Peebles Innovation in Teaching Award	1999
	(The yearly student-voted College of Engineering award)
Subaru CU Educator Spotlight Award	2002
Member of the External Faculty, Santa Fe Institute	1999-2005, 2006-2012
Packard Fellowship in Science and Engineering	1995-2000
NSF National Young Investigator Award	1993-1998
AAUW Dissertation Fellowship	1991/92 Academic Year
IEEE	Senior Member
1988 Olympic Games	5th Place, Rowing, Women's Four With Coxswain

Publications

I. Journal Papers

- R. Stolle, A. Hogan, and E. Bradley, "Agenda Control for Heterogeneous Reasoners," *Journal of Logic and Algebraic Programming* **62**:41-69 (2005)

- D. Gorman, P. Gruenwald, P. Hanlon, I. Mezic, L. Waller, C. Castilla-Chavez, E. Bradley, and J. Mezic, "Implications of Systems Dynamic Models and Control Theory for Environmental Approaches to the Prevention of Alcohol- and Other Drug-Related Problems," *Substance Use and Misuse* **39**:1713–1750 (2004)

- V. Robins, J. Abernethy, N. Rooney, and E. Bradley, "Topology and Intelligent Data Analysis," *Intelligent Data Analysis* **8**:505-515 (2004)

- T. Peacock, J. Hertzberg, Y-C. Lee, and E. Bradley, "Forcing a Planar Jet Flow with MEMS," *Experiments in Fluids* **37**:22-28 (2004)

- V. Robins, N. Rooney, and E. Bradley, "Topology-Based Signal Separation," *Chaos* **14**:305-316 (2004)

- Z. Ma, E. Bradley, T. Peacock, J. Hertzberg, and Y-C. Lee, "Solder-Assembled Large MEMS Flaps for Fluid Mixing," *IEEE Transactions on Advanced Packaging* **26**:268-276 (2003)

- E. Bradley and R. Mantilla, "Recurrence Plots and Unstable Periodic Orbits," *Chaos* **12**:596-600 (2002)

- E. Bradley, M. Easley, and R. Stolle, "Reasoning About Nonlinear System Identification," *Artificial Intelligence* **133**:139-188 (2001)

- V. Robins, J. Meiss, and E. Bradley, "Computing Connectedness: Disconnectedness and Discreteness," *Physica D* **139**:276-300 (2000)

- E. Bradley, A. O'Gallagher, and J. Rogers, "Global Solutions for Nonlinear Systems using Qualitative Reasoning," *Annals of Mathematics and Artificial Intelligence*, **23**:211-228 (1998)

- J. Iwanski and E. Bradley, "Recurrence Plot Analysis: To Embed or not to Embed?," *Chaos*, **8**:861-871 (1998)

- E. Bradley and J. Stuart, "Using Chaos to Generate Variations on Movement Sequences," *Chaos*, **8**:800-807 (1998)

- V. Robins, J. Meiss, and E. Bradley, "Computing Connectedness: an Exercise in Computational Topology," *Nonlinearity*, **11**:913-922 (1998)

- E. Bradley and M. Easley, "Reasoning About Sensor Data for Automated System Identification," *Intelligent Data Analysis* **2**:123-138 (1998)

- J. Dixon, E. Bradley, and Z. Popović, "Nonlinear Time-Domain Analysis of Injection-Locked Microwave MESFET Oscillators," *IEEE Transactions on Microwave Theory and Technique*, **45:**1050-1057 (1997)

- E. Bradley and R. Stolle, "Automatic Construction of Accurate Models of Physical Systems," *Annals of Mathematics and Artificial Intelligence*, **17**:1-28 (1996)

- E. Bradley and D. Straub, "Using Chaos to Improve the Capture Range of a Phase-Locked Loop: Experimental Verification," *IEEE Transactions on Circuits and Systems*, **43**:914-922 (1996)

- E. Bradley, "Autonomous Exploration and Control of Chaotic Systems," *Cybernetics and Systems*, **26**:299-319 (1995)

- E. Bradley, "Causes and Effects of Chaos," *Computers and Graphics*, **19**:755-778 (1995)

- E. Bradley, "Using Chaos to Improve the Capture Range of a Phase-Locked Loop," *IEEE Transactions on Circuits and Systems*, **40**:808-818 (1993)

- E. Bradley and F. Zhao, "Phase Space Control System Design," *IEEE Control Systems Magazine*, **13**:39-46 (1993)

- E. Bradley and R. Halstead, "Simulating Logic Circuits: A Multiprocessor Application," *International Journal of Parallel Programming*, **16**:305-338 (1987)

II. Books, Book Chapters, and Theses

- R. Stolle and E. Bradley, "Communicable Knowledge in Automated System Identification," in *The Computational Discovery of Communicable Knowledge*, L. Todorovski and S. Dzeroski, eds., Springer 2004. *[28 pages]*

- M. Easley and E. Bradley, "Incorporating Engineering Formalisms into Automated Model Builders," in *The Computational Discovery of Communicable Knowledge*, L. Todorovski and S. Dzeroski, eds. Springer, 2004. *[20 pages]*

- E. Bradley, "Kirchhoff's Laws," in A. Scott, editor, *Encyclopedia of Nonlinear Science*, Routledge, 2004. *[4 pages]* (ISBN: 1-57958-385-7)

- M. Berthold, H.-J. Lenz, E. Bradley, and R. Kruse, eds., *Advances in Intelligent Data Analysis*, Springer-Verlag, Berlin, 2003 *[624 pages]*

- R. Stolle, M. Easley, and E. Bradley, "Reasoning about Models of Nonlinear Systems," in *Logical and Computational Aspects of Model-Based Reasoning*, L. Magnani *et al.*, eds. Kluwer, 2002 *[24 pages]*

- M. Easley and E. Bradley, "Information Granulation in Automated Modeling," in W. Pedrycz, editor, *Granular Computing: An Emerging Paradigm*, Physica-Verlag, 2001 *[17 pages]*

- E. Bradley, "Time-Series Analysis," in M. Berthold and D. Hand, editors, *Intelligent Data Analysis: An Introduction*, Springer Verlag, 2000; second edition, 2003 *[27 pages]*

- E. Bradley, *Taming Chaotic Circuits.* Ph.D. Dissertation, 1992

- E. Bradley, *Logic Simulation on a Multiprocessor*, S.M. Dissertation, 1986

III. Refereed Conference Papers

- J. Abernethy, E. Bradley, and R. Sharman, "Qualitative Reasoning About Small-Scale Turbulence in an Operational Setting," *QR-06 (20th International Workshop on Qualitative Reasoning about Physical Systems)*, Hanover NH; July 2006

- N. Ross, E. Bradley, and J. Hertzberg, "Dynamics-Informed Data Assimilation in a Qualitative Fluids Model," *QR-06 (20th International Workshop on Qualitative Reasoning about Physical Systems)*, Hanover NH; July 2006

- V. Robins, J. Abernethy, N. Rooney, and E. Bradley, "Topology and Intelligent Data Analysis," *IDA-03 (International Symposium on Intelligent Data Analysis)*, Berlin; August 2003 *[9% acceptance rate; 11 pages]*

- Z. Ma, T. Peacock, E. Bradley, and Y.C. Lee, "Solder-assembled MEMS flaps to enhance fluid mixing," *ASME IMECE (International Mechanical Engineering Congress and Exposition)*, New York; November 2001 *[7 pages; acceptance rate unknown]*

- E. Bradley, N. Collins, and W. Kegelmeyer, "Feature Characterization in Scientific Data," *IDA-01 (International Symposium on Intelligent Data Analysis)*, Lisbon; September 2001 *[16% acceptance rate; 12 pages]*

- M. Easley and E. Bradley, "Intelligent Sensor Analysis and Actuator Control," *IDA-01 (International Symposium on Intelligent Data Analysis)*, Lisbon; September 2001 *[16% acceptance rate; 10 pages]*

- M. Easley and E. Bradley, "Meta-domains for Automated System Identification," *ANNIE-00 (Smart Engineering System Design)*, St. Louis; November 2000 *[7 pages; acceptance rate unknown]*

- M. Easley and E. Bradley, "Generalized Physical Networks for Automated Model Building," *IJCAI-99 (International Joint Conference on Artificial Intelligence)*, Stockholm; August 1999 *[25% acceptance rate; 6 pages]*

- M. Easley and E. Bradley, "Reasoning About Input-Output Modeling of Dynamical Systems," *IDA-99 (International Symposium on Intelligent Data Analysis)*, Amsterdam; August 1999 *[18% acceptance rate; 13 pages]*

- M. Easley and E. Bradley, "Hybrid phase-portrait analysis in automated system identification," *AAAI Spring Symposium on Hybrid Systems in AI*, Stanford; March 1999 *[6 pages; acceptance rate unknown]*

- E. Bradley, D. Capps, and A. Rubin, "Can Computers Learn to Dance?," *IDAT-99 (International Dance and Technology)*, Tempe AZ; February 1999 *[5 pages; acceptance rate unknown]*

- R. Stolle and E. Bradley, "Multimodal Reasoning for Automatic Model Construction," *AAAI-98 (National Conference on Artificial Intelligence)*, Madison WI; July 1998 *[30% acceptance rate; 8 pages]*

- J. Stuart and E. Bradley, "Learning the Grammar of Dance," *ICML-98 (International Conference on Machine Learning)*, Madison WI; July 1998 *[30% acceptance rate; 9 pages]*

- R. Stolle and E. Bradley, "Multimodal Reasoning about Physical Systems," *AAAI Spring Symposium on Multimodal Reasoning*; Stanford CA; March 1998. AAAI Technical Report SS-98-04 *[6 pages; acceptance rate unknown]*

- R. Stolle and E. Bradley, "Opportunistic modeling," *IJCAI Workshop on Engineering Problems in Qualitative Reasoning*, Nagoya Japan; August 1997 *[8 pages; acceptance rate unknown]*

- E. Bradley and M. Easley, "Reasoning About Sensor Data for Automated System Identification," *IDA-97 (International Symposium on Intelligent Data Analysis)*, London UK; August 1997 *[23% acceptance rate; 11 pages. Selected as one of five best papers.]*

- E. Bradley, A. O'Gallagher, and J. Rogers, "Global Solutions for Nonlinear Systems using Qualitative Reasoning," *QR-97 (International Workshop on Qualitative Reasoning about Physical Systems)*, Cortona Italy; May 1997 *[42% acceptance rate; 10 pages]*

- R. Stolle and E. Bradley, "A Customized Logic Paradigm for Reasoning about Models," *QR-96 (International Workshop on Qualitative Reasoning about Physical Systems)*, Stanford Sierra Camp CA; May 1996 *[10 pages; acceptance rate unknown]*

- E. Bradley, "Autonomous Exploration and Control of Chaotic Systems," *AAAI Fall Workshop on Control of the Physical World by Intelligent Agents*, New Orleans LA; November 1994 *[10 pages; acceptance rate unknown]*

- E. Bradley, "Automatic Construction of Accurate Models of Physical Systems," *QR-94 (International Workshop on Qualitative Reasoning about Physical Systems)*, Nara Japan; June 1994 *[26% acceptance rate; 11 pages]*

- E. Bradley and F. Zhao, "Phase Space Control System Design," *CACSD-92 (IEEE Symposium on Computer-Aided Control System Design)*, Napa CA; March 1992 *[8 pages; acceptance rate unknown]*

- E. Bradley, "Control Algorithms for Chaotic Systems," *the European Conference on Algebraic Computing in Control,* Paris France; March 1991. Proceedings published in *Lecture Notes in Control and Information Sciences*, volume 165, G. Jacob and F. Lamnabhi-Lagarrigue, Eds., Springer-Verlag, December 1991 *[19 pages; acceptance rate unknown]*

IV. Other Papers

- J. Giardino, J. Hertzberg, and E. Bradley, "A Stereo-Microscopic Particle Image Velocimetry System," Paper NC-001. American Physical Society, *57th Annual Meeting of the Division of Fluid Dynamics*, November 21-23, 2004 Seattle, Washington.

- M. Berthold, E. Bradley, and R, Kruse "Guest Editorial," *Intelligent Data Analysis* **8**:437-438 (2004)

- E. Bradley, *Taylor Series: Notes for CSCI3656*, Research Report on Curricula and Teaching CT005-02 (Department of Computer Science), 2002. *[5 pages]*

- E. Bradley, *Error in Numerical Methods: Notes for CSCI3656*, Research Report on Curricula and Teaching CT004-02 (Department of Computer Science), 2002. *[6 pages]*

- E. Bradley and J. Stuart, "Optimization and Human Movement," *Newsletter of the SIAM Activity Group on Optimization* **12(1)** (2001) *[5 pages]*

- E. Bradley, review of *The Computational Beauty of Nature* by Gary Flake, *AI Magazine* **21**:89-91 (Summer 2000) *[3 pages]*

- E. Bradley, *Classical Mechanics: Notes for CSCI4446/6446*, Research Report on Curricula and Teaching CT007-00 (Department of Computer Science), 1999 *[17 pages]*

- E. Bradley, *Numerical Solution of Differential Equations: Notes for CSCI3656*, Research Report on Curricula and Teaching CT003-98 (Department of Computer Science), 1998 *[20 pages]*

- E. Bradley and J. Stuart, "Using Chaos to Generate Choreographic Variations," *Fourth Experimental Chaos Conference*, Boca Raton FL; August 1997 *[6 pages]*

- E. Bradley and D. Straub, "Chaos as a Design Tactic: Broadening the Capture Range of the Phase-Locked Loop," *ISCAS (IEEE International Symposium on Circuits and Systems)*, Seattle WA; May 1995 *[4 pages]*

- E. Bradley, "Hugh Herr: Spring-Loaded Entrepreneur," *Technology Review*, May 1993 *[3 pages]*

- E. Bradley, "A Control Algorithm for Chaotic Physical Systems," *First Experimental Chaos Conference*, Washington D.C.; October 1991. Proceedings published by World Scientific *[7 pages]*

Invited Presentations

- "Nonlinear Dynamics, Modeling, and the Environmental Sciences: Ideas and Tools," UC Davis, *Advanced Modeling Concepts for Environmental Sciences* Series, December 2005.

- "Motion-Capture, Chaos, and Choreography," *CU Dance/Math year*, April 2005.

- "Control Theory 101 for Operating Systems People," *HotOS* workshop, Santa Fe, June 2005.

- "Adaptive Nonlinear Resource Distribution Control," *Dynamics Colloquium*, Applied Math Department; November 2004.

- "The Nonlinear Dynamics of Flow Control," *Dynamics Days*, Chapel Hill, NC, January 2004.

- "Chaos and Control," Northwestern University, *Physics Department Seminar*; October 2003

- "The Nonlinear Dynamics of Flow Control," *IMA Workshop on Bifurcations: The Use and Control of Chaos*, Southampton, U.K., July 2003.

- "Chaos and Control," University of Colorado, Sigma Xi chapter, November 2002

- "Coherent Structure Characterization in Scientific Datasets," NASA Ames, October 2002

- "Chaos and Control," DARPA/ATO; December 2001

- "Computers, Chaos, and Choreography," Tufts University, **CRA-W Distinguished Lecturer**, October 2001

- "Chaos and Control," Duke University; October 2001

- "The Nonlinear Dynamics of Flow Control," Gordon Research Conference on Nonlinear Dynamics; June 2001

- "Chaos and Control," JASON Fall Meeting; November 2000

- "Chaos and Control," Naval Research Lab; April 2000

- "Chaos and Control," Boston University, Dynamical Systems Seminar; February 2000

- "Chaos and Control," Cornell University, Department of Theoretical and Applied Mechanics; December 1999

- "Chaos, Computers, and Choreography," Microsoft Research; November 1999

- "Chaos and Control," Santa Fe Institute; February 1999

- "Chaos and Control," University of Utah, Department of Mathematics; April 1999

- "Multimodal Reasoning about Physical Systems," **Plenary address** at *ANNIE (Artificial Neural Networks in Engineering)*, St. Louis MO; November 1998

- "Using Chaos to Generate Choreographic Variations," University of Colorado, College of Engineering Alumni Reunion group; May 1998.

- "Automatic Construction of Accurate Models of Physical Systems," Northwestern University, Institute for the Learning Sciences; April 1998

- "Chaos and Control," Colorado School of Mines, Mathematical and Computer Sciences Department; February 1998

- "Chaos and Control," University of Colorado at Denver, *Optimization Seminar*; February 1998

- "Predictability, Chaos, and the Weather: The Butterfly's Wings," *Graduate School Symposium on El Niño*, University of Colorado; January 1998

- "Chaos and Control," Colorado State University, Computer Science Department; November 1997

- "Chaos and Control," Colorado State University, Math Department; October 1997

- "Chaos and Control," **CICSR (Centre for Integrated Computer Systems Research) Distinguished Lecture Series**, University of British Columbia; October 1996

- "Chaos and Control," *Annual Meeting of the Packard Fellows*, Monterey CA; September 1996

- "Using Nonlinear Dynamics to Model and Control Chaotic Systems," University of Colorado at Denver, Physics Department; April 1995

- "Automatic Construction of Accurate Models of Physical Systems," University of Texas, Computer Science Department; January 1995

- "Autonomous Exploration and Control of Chaotic Systems," *AAAI (National Conference on Artificial Intelligence) Fall Workshop on Control of the Physical World by Intelligent Agents*, New Orleans LA; November 1994

- "Automatic Construction of Accurate Models of Physical Systems," Storage Tek, Information Systems Group; May 1994

- "Chaos, Computers, and Physics," University of Colorado at Denver, Physics Department; February 1994

- "Up and Down Using Only Back and Forth," the annual **Alice Dickinson Lecture**, Smith College; December 1993

- "Chaos in Electronic Circuits," University of Colorado, Electrical and Computer Engineering Department; February 1993

- "Autonomous Exploration and Control of Chaotic Systems," Fields Institute, *Director's Series*, Waterloo Ontario; September 1992

- "Autonomous Exploration and Control of Chaotic Systems," University of Colorado, Computer Science Department; April 1992

- "Autonomous Exploration and Control of Chaotic Systems," University of Minnesota, Computer Science Department; March 1992

- "Autonomous Exploration and Control of Chaotic Systems," University of British Columbia, Computer Science Department; March 1992

- "Autonomous Exploration and Control of Chaotic Systems," University of California, Electrical Engineering and Computer Science Department; March 1992

- "Autonomous Exploration and Control of Chaotic Systems," University of Oregon, Computer Science Department; March 1992

- "Autonomous Exploration and Control of Chaotic Systems," Beckman Institute, University of Illinois, March 1992

- "Autonomous Exploration and Control of Chaotic Systems," *International Symposium on Artificial Intelligence and Mathematics*, Fort Lauderdale FL; January 1992

- "Autonomous Exploration and Control of Chaotic Systems," *Mathematical Sciences Institute Hybrid Systems Meeting*, Ithaca, NY; June 1991

Funding History

PI Dean's Seed Grant. $3700K; 2005.

co-PI Equipment gift from Agilent. $18K; 2005. With Jean Hertzberg.

co-PI National Science Foundation ITR contract #ATM-0325812, "ITR: Collaborative Research: Software for Interpretation of Cosmogenic Isotope Inventories – A Combination of Geology, Modeling, Software Engineering and Artificial Intelligence." $922K; 2003–2008. One co-PI; Bradley portion $461K

co-PI REU supplement to National Science Foundation ITR contract #ATM-0325812. $30K; 2003–2008. One co-PI; Bradley portion $15K

PI University of Colorado Council on Research and Creative Work Grant in Aid. "Feature Extraction from Oceanographic Datasets." $7K; 2002–2003

co-PI National Science Foundation Equipment Grant contract #CTS-0114109, "Acquisition of a Particle Image Velocimetry System." $83K; 2001–2002. Four co-PIs; Bradley portion $16K

co-PI REU supplement to National Science Foundation ITR contract #ACI-0083004. $30K; 2001–2003. One co-PI; Bradley portion $15K

lead PI National Science Foundation ITR contract #ACI-0083004, "An Interactive Experimental/Numerical Simulation System with Applications in MEMS Design." $497K; 2000–2003. Three co-PIs; Bradley portion $165K

PI Sandia National Laboratories contract # 0100.12.0033B, "Feature Extraction from Large Scientific Datasets." $167K; 2000–2002

PI Office of Naval Research contract #N00014-96-1-0720, "Automatic Construction of Accurate Models of Physical Systems." $304K; 1996–1999

PI Packard Fellowship in Science and Engineering, David and Lucile Packard Foundation. $550K; 1995–2000

PI National Science Foundation contract #MIP-9403223, "Automatic Construction of Accurate Models of Physical Systems." $65K; 1994–1995

PI National Science Foundation National Young Investigator Award #CCR-9357740, "New Approaches to Engineering Design: Controlled Chaos and Computer Automation." $287K; 1993–1998

PI National Science Foundation Research Initiation Grant #CCR-9309556, "Automatic Construction and Refinement of Dynamic Systems Models." Proposal accepted in 1993, but withdrawn because of NYI award

Research Mentoring

- Postdocs
  - Thomas Peacock: turbulence control in micromachined systems; currently an Assistant Professor in the Mechanical Engineering Department at M.I.T.
- Ph.D. students
  - Jennifer Abernethy: feature recognition in oceanographic datasets (current)
  - Matthew Easley: automated input-output modeling of dynamical systems. Degree awarded 2000; currently a Member of the Technical Staff at Rockwell
  - James Garnett: adaptive nonlinear control of computer networks Degree awarded 2004; currently at Secure64, developing the patent that grew out of his thesis into a product
  - Kenny Gruchalla: visualization of scientific data sets (current)
  - Joseph Iwanski: recurrence-plot analysis of time series from dynamical systems. ABD. Currently head of math and computer science at Dwight-Englewood School, NJ
  - Laura Rassbach: automated hypothesis conflict checking in geochemical data analysis (current)
  - Vanessa Robins: computational topology. Degree awarded 1999; currently a postdoc at the Australian National University
  - Natalie Ross (nee Rooney): data assimilation in point-vortex models of fluid flow (current)
  - Reinhard Stolle: automated modeling of dynamical systems. Degree awarded 1998; currently leading the model-based diagnosis group at BMW
- M.S. thesis students
  - Stephanie Boyles: feature recognition in biological data (current)
  - John Giardino: 3D microPIV measurements of fluid flow around MEMS devices. Degree awarded July 2004; currently at the Tennessee Valley Infrastructure Group
- B.S. thesis students
  - Mark Eret: parallel n-body methods for planetary ring simulations (current)
  - Matt Culbreth: extracting vortices from PIV data. Degree awarded in 2005; currently in PhD program at Stanford
- Undergraduate research opportunity students:

  Meenakshy Chakravorty, Patrick Clary, Michael Conde, Apollo Hogan, Asim Khwaja (currently Assistant Professor, Kennedy School of Govt, Harvard), Sebastian Kuzminsky, Jesse Negretti, John Nord, Sven Nuesken, Susan Plummer, Jeremy Ralph, Alex Renger, Dan Santa Maria, Evan Sheehan, Eric Schell, Roscoe Schenk, Stephen Schroeder, Josh Stuart (currently Assistant Professor, UC Santa Cruz), Robert Tarrall, David Trowbridge.

Professional Service

- Editor, *Chaos* (the American Institute of Physics's interdisciplinary journal of nonlinear science), 2004–2007.

- Reviewer, NSF Graduate Fellowship Program, December 2004

- Panelist, NSF EHS ITR review, March 2003; NSF DMS panel, Feb 2006.

- Panelist, NIAAA planning workshop, Berkeley, October 2002. (DARPA-esque "future directions for the agency" event)

- Editorial Board, Santa Fe Institute, 2002–2005

- Panelist, Department of Defense IS&T TARA, Rome N.Y., March 2000. (biannual review of all DoD funding for IS&T)

- Advisory Board, *Chaos* (the American Institute of Physics's interdisciplinary journal of nonlinear science) 1998–2004

- Program Chair, *Fifth International Symposium on Intelligent Data Analysis (IDA '03)*, Berlin; August 2003

- Organizing Committee, *Smart Engineering System Design (ANNIE '99)*, St. Louis MO; November 1999

- Associate Editor of the *Annals of Mathematics of Artificial Intelligence*, special issue on "Reasoning About Functional Models," 1996

- Program committees for *AAAI (National Conference on Artificial Intelligence)* 1996 and 1997, *QR (International Workshop on Qualitative Reasoning)* 1999 and 2000

- Steering committee, *Intelligent Data Analysis*: semiannual journal and biannual symposium, 1999–2003

- Referee for *International Journal of Parallel Programming*, *IEEE Control Systems Magazine*, *Chaos*, *IEEE Transactions on Automatic Control*, *Physica D*, the *IEEE American Control Conference*, *IEEE Transactions on Circuits and Systems*, *Computers and Electrical Engineering*, *Physical Review*, *Physical Review Letters*, *Physics Letters A*, and the International (*IJCAI*) and National(*AAAI*) conferences on Artificial Intelligence, as well as the international workshops on qualitative reasoning (*QR*) and intelligent data analysis (*IDA*). Proposal reviewer for the National Science Foundation and technical reviewer for the US Geological Survey

- Athlete Mentor, US Olympic Committee, 1999–present

- Board Member and Faculty Advisor, CU Crew Team, 1999–present

- Consistently involved in research fairs, industrial liason activities, and the planning and execution of other events designed to encourage high-school, women, and minority students in their pursuit of science and engineering