

JACK B. ALDRICH

Ph.D. Candidate, Systems and Control
Department of Mechanical and Aerospace Engineering
University of California, San Diego
La Jolla, CA 92093
Phone: (858)551-7627; FAX: (858)822-3107
Email: jaldrich@ucsd.edu

- Education **University of California, San Diego** La Jolla, CA
Ph.D. Candidate, Mechanical Engineering (Systems, Controls), to defend in 2004
- Thesis: “Optimal control of hyper-redundant manipulators using tensegrity networks”
 - Courses: nonlinear/adaptive control, linear/optimal control, digital signal processing, HC-11 microcontroller lab, analog/digital robot electronics, system identification, and ten courses in analysis/optimization from the Mathematics Department, 3.9 GPA
- B.S. Applied Mechanics (Structural Engineering), Cum Laude, 1991
- Massachusetts Institute of Technology** Cambridge, MA
M.S. Aeronautics and Astronautics (Smart Structures), 1993
- Thesis: “Design of passive piezoelectric damping for space structures”
 - Courses: structural dynamics, adaptive structures and smart materials, GPA: 4.6/5.0
- Research **Structural Systems and Control Laboratory** *UCSD, 1997-present*
Graduate Research Assistant with Professor Robert E. Skelton. Derived rigid-body kinematics/dynamics for hyper-redundant robots driven by tensegrity networks. Designed optimal path-planning, minimum-time control and nonlinear feedback for a new class of tendon-driven systems.
- Space Engineering Research Center** *MIT, 1991-93*
Graduate Research Assistant with Prof. Andreas von Flotow and Nesbitt W. Hagood. Analyzed large space structure dynamics with finite-element program. Designed, fabricated, and tested 6-axis piezoelectric actuator for the structure.
- Powell Earthquake Engineering Lab** *UCSD, 1990*
Research Assistant. Constructed retrofitted R/C buildings and bridges. Managed the design, instrumentation and seismic testing of a structural testbed under Professor Seible.
- Teaching **Graduate Teaching Assistantships** *UCSD, 1997-2001*
1. Partial Differential Equations, 2. Formal Systems in Logic and Language, 3. Linear Control Theory, 4. Experimental Techniques (Controls Lab)
- Industry **Trans-Science Corporation** *1994-95*
Engineer. Worked with team of engineers and professors on the dynamic analysis and manufacturing for the first 100% advanced aerospace composite cable-stayed bridge. Funded by Aerospace Technology Transfer.

- Extra** Electrical Engineering Experience *UCSD, 1998*
Coursework in digital signal processing, linear circuits, analog/digital electronics, micro-processor/microcontroller lab included two projects: 1. Assembly-language programming of HC-11 microcontroller chip onboard mobile robot including design/testing of signal conditioning circuits. 2. Subsystem analog/digital electronics testing and circuit integration onboard autonomous robot.
- Awards** Oceanids Bertha Lebus Scholarship, Future Educators Award, 2003-04
- Activities** IEEE, Automatic Control
IEEE, Robotics and Automation
SPIE, Smart Structures and Materials
SIAM, Control and Optimization
- Publications** [1] Aldrich, J.B., Skelton, R.E., "Trajectory optimization for manipulators driven by tensegrity networks", IEEE Transactions on Robotics and Automation, (In preparation).
- [2] Aldrich, J.B., Skelton, R.E., Kreutz-Delgado, K., "Control synthesis for a class of light and agile robotic tensegrity structures", Proceedings of 2003 American Control Conference, Denver, CO 2003.
- [3] Aldrich, J.B., Skelton, R.E., "Control/structure optimization approach for deployment of tensegrity structures in near-minimum time", Proceedings of SPIE Modeling, Signal Processing and Control Conference, San Diego, CA 2003.
- [4] Aldrich, J.B., Hagood, N.W., von Flotow, A., "Design of passive piezoelectric damping for space structures", Proceedings of SPIE Smart Structures and Intelligent Systems Conference, Albuquerque, NM 1993.
- Biography** Jack Aldrich began work as a construction engineer building and testing retrofitted bridge prototypes at UCSD's Powell Earthquake Engineering Lab. This work was instrumental in his receipt of a graduate research appointment at the Massachusetts Institute of Technology where he designed, built and tested a vibration-control device using piezoelectrics for a NASA-funded telescope. After graduating from M.I.T. with an S.M. degree in Aeronautics and Astronautics in 1993, he worked with a team of engineers at TransScience, Inc., in developing the first 100% advanced aerospace composite cable-stayed bridge. In 1997, he returned to U.C. San Diego to investigate a new approach to shape control of hyper-redundant robotic manipulators and is now set to graduate with a Ph.D. degree in Mechanical Engineering in 2004.
- Research Interests** Control systems, robotics and automation technologies; Nonlinear control theory for articulated multibody objects; Smart structures and mechatronics including piezoelectric mechanisms/devices; Minimum-time maneuvering for snake-like robots driven by tensegrity networks; Computer vision; Optimal control and optimization theory; Mathematical analysis

Reference

Robert E. Skelton

Director Structural Systems and Control Lab, Professor
Department of Mechanical and Aerospace Engineering
University of California, San Diego
La Jolla, California 92093
Office phone: (858) 822-1054; Fax: (858) 822-3107
Email: bobskelton@ucsd.edu