BRIAN P. TREASE

University Address
Compliant Systems Design Laboratory
Department of Mechanical Engineering
The University of Michigan
Ann Arbor, MI 48109

Lab: 734.763.4916
Cell: 734.973.6399
Fax: 309.218.2537
www.umich.edu/~btrease
trease@asme.org

OBJECTIVE

Research position in a government or industry laboratory where I can leverage and extend my expertise in mechanical design, kinematics, compliant mechanisms, actuation, smart structures and materials, biomimicry, genetic algorithms, and optimization. Prefer environment that encourages applied and multidisciplinary research.

EDUCATION

The University of Michigan ····· Ann Arbor, MI
Ph.D. in Mechanical Engineering (expected Fall 2007) GPA: 8.50 (8=A, 9=A+)
Thesis Advisor: Dr. Sridhar Kota

M.S. in Mechanical Engineering (2002)

The University of Toledo ····· Toledo, OH
B.S. in Mechanical Engineering (1999, Honors Program, 1st in class) GPA: 3.97 / 4.0
Minor: Business Administration Summa Cum Laude

AWARDS

2002 National Science Foundation Graduate Research Fellow
2000 Tau Beta Pi Fellow *(awarded nationally to 35 college senior graduates each year)*
2000 University of Michigan Department of Mechanical Engineering First-Year Fellowship
1999 Outstanding Engineering Student Award for the State of Ohio
(awarded by The Ohio Society of Professional Engineers to one student statewide each year)
1999 Outstanding Senior Award, University of Toledo College of Engineering

RESEARCH EXPERIENCE

Graduate Research Fellow ····· 8/02–present
Compliant Systems Design Laboratory (CSDL), The University of Michigan

Thesis: "Embedded Actuators, Sensors, and Structure in Adaptive and Distributed Compliant Systems"

- Developing theory to extend field of "compliant mechanisms" to include multiple actuators and embedded actuator and sensor placement
- Surveying and modeling novel actuation technology for inclusion in optimization
- Studying musculoskeletal systems in nature for inspiration toward analogue mechanical systems
- Implemented genetic/evolutionary design algorithms and custom finite element code in Matlab
- Created fitness functions to improve efficiency, shape-morphing capability, and controllability

RESEARCH EXPERIENCE (continued)

Project: "Revolutionizing Prosthetics" (DARPA initiative) 9/05–present

- Researched as part of a multi-institute initiative to design, fabricate, and test a neurologically-controlled arm prosthesis
- Designed and modeled compliant mechanical arm structure with solid-modeling, finite element analysis, and motion simulation software
- Developed risk mitigation strategy for evaluation and selection between three separately-led alternate technology approaches in order to guarantee delivery of a final product
- Designed compliant adaptive socket technology for attachment of upper arm prosthesis to residual limb

Project: Biomimetic aquatic propulsion (in collaboration with Naval Research Labs) 5/02–7/05

- Designed and optimized biomimetic hydrofoil/fin for an Unmanned Undersea Vehicle (UUV)
- Fabricated and assembled rapid-prototyped models for demonstration and testing

Project: "cTouch," a 2-D Haptic Human User Interface (in collaboration with UM Haptix Lab) since 5/03

- Designed and fabricated compliant components for a hand-operated human-machine interface with force-feedback; enabled frictionless rendering of tactile virtual environments
- Supervised one undergraduate student for one year, providing guidance on modeling strategies and fabrication techniques

Grant and Proposal Writing

- Co-authored several proposals per year with advisor; regularly attended writing seminars

ASME Student Mechanism Design Competition, 2004

- Entered two projects, one of which was selected as a finalist, entitled "Statically-balanced Compliant Four-bar Mechanism for Gravity Compensation"
- As a finalist, presented at the annual ASME Design Engineering Technical Conference

Presenter, Graduate Student Research Symposiums, The University of Michigan (2001, 2002, and 2006)

- First Place in Mechanical Design Category in 2001

Engineering Intern ····· 6/01–8/01, 5/02–8/02
Sandia National Laboratories (Albuquerque, NM)
Microelectronics Development Laboratory, MEMS Device Design Department, Supervisor: James Allen

- Modeled electro-thermo-mechanical coupling in thermally-activated MEMS actuators
- Designed out-of-plane, thermally-activated micro-actuators for high-resolution positioning of adaptive optics; conducted physical tests to provide device characterization and model validation
- Level Q Security Clearance

Graduate Student Research Assistant ····· 9/01–5/02
NSF Engineering Research Center for Reconfigurable Machining Systems, The University of Michigan

- Performed parametric modeling using ADAMS software for multiple projects, including multi-degree-of-freedom compliant joints and a reconfigurable machine tool

RESEARCH EXPERIENCE (continued)

Engineering Intern ····· 6/00–8/00
Air Force Research Laboratory, Wright Patterson Air Force Base (Dayton, OH)
Joint research with the University of Michigan through the Air Vehicles Directorate Summer Research Program, Supervisor: Major Brian Sanders

- Analyzed a compliant, shape-adaptive wing for Unmanned Air Vehicles using Patran and Nastran for finite element modeling and analysis
- Surveyed, classified, and compared smart actuator technologies; summarized in internal report
- Created a scatter-gram-based actuator selection design tool

PUBLICATIONS

Journal Articles

Submitted: R.B. Gillespie, T. Shin, F. Huang, and B. Trease, "Compliant Mechanisms for Haptic Interaction: Design and Performance," IEEE/ASME Transactions on Mechatronics, 2007

B. Trease, Y. Moon, and S. Kota, "Design of Large-Displacement Compliant Joints," ASME Journal of Mechanical Design, 2005

S. Kota, K-J. Lu, Z. Kreiner, B. Trease, J. Arenas, and J. Geiger, "Design and Application of Compliant Mechanisms for Surgical Tools," ASME Journal of Biomechanical Engineering, 2005 (Technical Brief)

Presented Conference Papers

B. Trease and S. Kota, 2007, "Adaptive and Controllable Compliant Systems with Embedded Actuators and Sensors," Proceedings of SPIE - Smart Structures and Materials, 2007

B. Trease and S. Kota, 2006, "Synthesis of Adaptive and Controllable Compliant Systems with Embedded Actuators and Sensors," Proceedings of ASME IDETC'06

B. Trease, K.J. Lu, and S. Kota, 2003, "Biomimetic Compliant System for Smart Actuator-Driven Aquatic Propulsion: Preliminary Results," Proceedings of ASME IMECE'03

Y. Moon, B. Trease, and S. Kota, 2002, "Design of Large-Displacement Compliant Joints," Proceedings of ASME DETC'02

TEACHING EXPERIENCE

Invited Guest Lecturer, ME350: Design and Manufacturing II ····· 1/07–2/07

- Prepared and taught four interactive 80-minute undergraduate lectures on bearing and spring design

Graduate Student Instructor, ME350: Design and Manufacturing II ····· 9/04–12/04, 1/06–4/06

- Developed course outline, website, schedule, homework, labs, projects, and exams for junior-level mechanical design course with term projects
- Taught weekly lab sessions and software instruction sessions
- Provided guidance, coaching, and review of team projects

Invited Guest Lecturer, "Introduction to ADAMS Software," UM Mechanical Engineering courses

- Analytic Product Design, Winter 2004
- Design and Manufacturing II, Fall 2003

INDUSTRY EXPERIENCE

Engineering Intern ····· 5/99–5/00
Dana Corporation - Spicer Driveshaft Division, Design Analysis Team (Holland, OH)
- Designed, developed, and tested driveshafts, steering shafts, universal joints, and spline elements

Engineering CO-OP ····· 8/98–5/99
EnVitCo, Inc. - Glass Melter/Nuclear Waste Vitrification Systems (Toledo, OH)
- Performed system sizing spreadsheet calculations; checked mechanical drawings; CAD operator
- Conducted project feasibility analysis of an Inconel resistive lid heater system

Engineering CO-OP ····· 5/96–8/98
AVCA Corp. - Engineering/Architecture Consulting Firm (Perrysburg, OH)

PROFESSIONAL SERVICE and COMMUNITY-BASED ACTIVITIES

Peer Reviewer
- *Since July 2003*, reviewed research journal articles for Mechanics Based Design of Structures and Machines (3 articles), Journal of Biomechanical Engineering (2 articles), Journal of Microelectromechanical Systems, Journal of Manufacturing Science and Engineering (2 articles), Journal of Mechanical Design, and International Journal for Numerical Methods in Engineering
- *Since February 2002*, reviewed conference papers for ASME International Design Engineering Technology Conferences (4 papers), ASME International Mechanical Engineering Congress & Exposition

Volunteer, ASME Regional Student Conference, Ann Arbor, MI, May 31, 2007
- Judge for the Old Guard Web Design Competition

Volunteer, FIRST Robotics, Great Lakes Regional Competition, Ypsilanti, MI, March 8-10, 2007
- Pit Area Administration Assistant

Member, Michigan BLUElab (Better Living Using Engineering)
- Designed, developed, and fabricated a public gallery exhibit focused on collaborative problem-solving and sustainable engineering entitled "*Mass Collaboration = Innovation*," 2006

Graduate Student Mentor for University of Michigan ME students, Summer and Fall 2005

Co-creator and Speaker, NSF Fellowship Application Seminar, The University of Toledo, 2004

Invited Panelist, "Lessons Learned: Engineering in an Overseas Environment," The University of Michigan, 2004

Invited Panelist, NSF Fellowship Application Seminar, The University of Michigan, 2002

American Society of Mechanical Engineers (ASME), University of Toledo Chapter
- **President**, 1998–99, **Vice-President**, 1997–98, Regional Student Conference Attendee, 1997–99

Volunteer, COSI (Center of Science and Industry) Toledo Hands-on Science Museum, 1998–2000

Advisor, Engineering Explorer Post, 1999–2000
- Worked weekly with high school students to encourage interest in engineering studies and careers

Eagle Scout, awarded in 1995

Exchange Student to Japan with Youth for Understanding, 1994

COMPUTER SKILLS

Genetic algorithms and evolutionary optimization, finite element analysis, Matlab, ADAMS, ANSYS, Solidworks, Simulink, Maple, Nastran, Patran, I-DEAS

SELECTED GRADUATE COURSEWORK (with PROJECTS)

Mechanism Design ..... *(Synthesis of a Torsional Dual-Axis Scanning Out-of-Plane Micromirror)*
Electromechanical Design ..... *(Chaockey - Table Hockey Against a Computer-Controlled Defender)*
Compliant Mechanisms ..... *(Compliant Statically-Balanced Gravity Compensator)*
Design Optimization ..... *(Optimization of an Inertial Grade Resonant Microaccelerometer)*
Discrete Design Optimization ..... *(Compliant Legos: A Study in Reconfigurable Compliant Mechanisms)*
Global Product Development ... *(Fuzzy Net Buddy: A Physical, Personal, Internet Voicemail Companion)*
MEMS ..... *(Design of a Cochlear Analogue MEMS Transducer)*
Smart Materials and Structures ..... *(Shape-Memory-Alloy Shape Training Tutorial)*
Sustainable Engineering..... *Audited for benefit of weekly discussions on current topics*

HOBBIES and INTERESTS

Camping and Outdoor Activities, Community Lectures and Classes, Running, Snowboarding, Travel, Backyard Astronomy, Audiobooks, Book Clubs