Jitendra Prasad, Ph.D.

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School of Mechanical, Materials & Energy Engineering,
Indian Institute of Technology Ropar,
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EDUCATION

06/2007– 04/2011 **Postdoctoral Fellowship** in **Orthopaedics and Sports Medicine**

University of Washington, Seattle, Washington, USA

Advisor: Prof. Ted Gross

08/2003– 06/2007 **Doctor of Philosophy** in **Mechanical Engineering**

Michigan State University, East Lansing, Michigan, USA

June 2007, **GPA: 4.0/4.0**

Dissertation Title: "**Design of materials with special dynamic properties using negative stiffness components**"

Advisor: Prof. Alejandro Diaz

07/2001– 07/2003 **Master of Engineering (by Research)** in **Mechanical & Aerospace Engineering**

Nanyang Technological University, Singapore

July 2003

Thesis Title: "**Design of compliant mechanisms by evolutionary optimization of topology and shape**"

Advisor: Prof. Kang Tai

07/1993– 06/1997 **Bachelor of Technology (Honours)** in **Ocean Engineering & Naval Architecture**

Indian Institute of Technology, Kharagpur, India

June 1997, GPA 8.02/10.0

Thesis Title: "**Analysis of ship structures by using three dimensional finite element method**"

Advisor: Prof. Madhujit Mukhopadhyay

RESEARCH EXPERIENCE

06/2007– 04/2011 **Senior Fellow**

Orthopaedic Science Laboratories, Department of Orthopaedics and

Sports Medicine, University of Washington, Seattle

The work involves

- Research on the role of mechanical environment in bone fracture healing
- Research on how bone perceives and responds to mechanical stimuli
- Agent-Based Modeling (ABM) of bone mechanotransduction
- Stochastic optimization (Simulated Annealing and Genetic Algorithm)
- High performance computing (including multi-core / multi-processing programming) using C++ and Message Passing Interface (MPI)
- Experiments with mice and micro-CT scanning
- GUI programming using Visual Basic to process micro-CT images and build finite element model
- Finite element modeling and analysis of bones and muscles using CAD/CAE softwares CalculiX and MSC Patran / Nastran
- System administration of Windows and Macintosh workstations at Orthopaedic Science Laboratories

05/2004 – 05/2007 Research Assistant

Computational Design & Manufacturing Lab, Mechanical Engineering Department, Michigan State University

- Research on the synthesis of smart materials that soften at high forcing frequencies
- Research was funded by Toyota Motor Corporation
- Involved hyperelastic / viscoelastic / ferroelastic material modeling & simulation, design and use of novel bistable periodic materials, numerical homogenization, knowledge of MEMS design and fabrication, structural and multidisciplinary design optimization, nonlinear finite element analysis, dynamics and vibration analysis.
- Involved programming using MATLAB and Mathematica; and finite element analysis using CAD/CAE softwares such as ABAQUS, ANSYS, Unigraphics NX, Hypermesh, LS-DYNA, CoventerWare etc.

07/2001 – 07/2003 Research Assistant

Center for Advanced Numerical Engineering Simulations, School of

Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

- Research on Structural and multidisciplinary design optimization, Design of compliant mechanisms for application in MEMS, and Genetic algorithms
- Involved nonlinear finite element formulation and analysis using C/C++ (in UNIX environment).
- Involved use of commercial finite element softwares such as ABAQUS (Standard and CAE)

TEACHING EXPERIENCE

April 2011 – Present – **Assistant Professor**

Taught the following undergraduate courses:

- Materials Science & Engineering
- Biomechanics

Taught the following postgraduate courses:

- Biology for Engineers
- Molecular, Cellular and Tissue Biomechanics
- Bone Biology
- Orthopaedic Biomechanics

Winter 2009 (01/2009 – 03/2009) – **Instructor**

ME599 Computational Methods in Biomechanics, Department of Mechanical Engineering, University of Washington, Seattle

- Taught Finite Element Methods (FEM) to the graduate students
- Covered both linear and nonlinear FEM in the context of multi-scale biomechanical modeling
- Taught both static and transient analysis
- Covered 1D, 2D and 3D elements

Taught how to do FE analysis using ANSYS, MATLAB and Mathematica

08/2003 – 08/2004 **Teaching Assistant**

Mechanical Engineering, Michigan State University

- Taught Control Systems to the undergrads

07/2001 - 07/2003 **Teaching Assistant**

Mechanical & Aerospace Engineering, Nanyang Technological University, Singapore

- Taught Engineering mechanics and Machine design

PROFESSIONAL EXPERIENCE

07/1997 - 06/2001 **Assistant Ship Surveyor**

Research & Development Center, Indian Register of Shipping, Head Office, Mumbai (India)

The work involved

- Ship structure design appraisal (plan approval)
- Structural design evaluation using CAD/CAE tools (such as I-DEAS, ANSYS etc.)
- Software development (using C/C++, Visual C++, Visual Basic, ActiveX, Visual Basic for Microsoft Office, HTML, VBScript, RDBMS, SQL etc.)
- Appraisal of ship-related softwares

TRAINING

05/1996 – 07/1996 **Vocational Training / Internship**

Western India Shipyards Limited, Goa, India

- Training in ship manufacturing and repairing on floating docks

03/1996 **Sea Training**

(1 week) Aboard M. V. Harshavardhan (a passenger ship owned by Shipping Corporation of India) from Kolkata to Port Blair and back

- Training in ship operation and maintenance

07/1997 **I-DEAS** (Finite element modeling and analysis)

07/2001 **ABAQUS** (Finite element modeling and analysis)

02/2004 **LS-DYNA** (Finite element modeling and analysis)

PUBLICATIONS AND PRESENTATIONS

Book Chapter

1) **Prasad, J.**, and Diaz, A.R., 2005, "Layout of tileable multistable structures using topology optimization," Solid Mechanics and Its Applications Series Vol. 137, IUTAM Symposium on Topological Design Optimization of Structures, Machines and Materials Status and Perspectives, Springer, ISBN: 978-1-4020-4729-9. doi: http://dx.doi.org/10.1007/1-4020-4752-5_12 .

Journal Papers

1) Moustafa, A., Sugiyama, T., **Prasad, J.**, Zaman, G., Gross, T. S., Lanyon, L. E. and Price, J. S., 2011, "Mechanical loading-related changes in osteocyte sclerostin expression in mice are more closely associated with the subsequent osteogenic response than the peak strains engendered," Osteoporosis International, Online First, 15 May 2011, http://dx.doi.org/10.1007/s00198-011-1656-4 .
2) Srinivasan, S., Ausk, B.J., **Prasad, J.**, Threet, D., Bain, S.D., Richardson, T.S. and Gross, T.S., 2010, "Rescuing loading induced bone formation at senescence," PLoS Computational Biology, Vol. 6 (9), e1000924. doi: http://dx.doi.org/10.1371/journal.pcbi.1000924 .
3) **Prasad, J.**, Wiater, B.P., Nork, S.E., Bain, S.D. and Gross, T.S., 2010, "Characterizing gait induced normal strains in a murine tibia cortical bone defect model," Journal of Biomechanics, Vol. 43 (14), pp. 2765-2770. doi: http://dx.doi.org/10.1016/j.jbiomech.2010.06.030 .
4) Gross, T.S., Poliachik, S.L., **Prasad, J.**, and Bain, S.D., 2010, "The effect of muscle dysfunction on bone mass and morphology," Journal of Musculoskeletal and Neuronal Interactions, Vol. 10, No. 1, pp. 25-34. http://www.ismni.org/jmni/pdf/39/04GROSS.pdf .
5) **Prasad, J.** and Diaz, A.R., 2009, "Viscoelastic material design with negative stiffness components using topology optimization," Structural and Multidisciplinary Optimization, Vol. 38(6), pp. 583-597. doi: http://dx.doi.org/10.1007/s00158-008-0308-6 .
6) **Prasad, J.** and Diaz, A.R., 2008, "A concept for a material that softens with frequency," Journal of Mechanical Design, Vol. 130, No. 9, pp. 1298-1306. doi: http://dx.doi.org/10.1115/1.2965596 .
7) Tai, K. and **Prasad, J.**, 2007, "Target-matching test problem for multiobjective topology optimization using genetic algorithms", Structural and Multidisciplinary Optimization, Vol.34, No.4, pp.333-345. doi: http://dx.doi.org/10.1007/s00158-006-0082-2 .
8) **Prasad, J.** and Diaz, A.R., 2006, "Synthesis of bistable periodic structures using topology optimization and a genetic algorithm," Journal of Mechanical Design, Vol. 128, pp. 1298-1306. doi: http://dx.doi.org/10.1115/1.2338576 .

Conference Presentations

1) **Prasad, J.**, Huber, P., Bain, S.D., and Gross, T.S., 2011, "Diminished Mechanical Stimuli Following Transient Muscle Paralysis Are Not Associated with Acute Trabecular Bone Loss," 33rd annual meeting of the American Society for Bone and Mineral Research (ASBMR), September 16-20, 2011, San Diego, California, USA.
2) Bain, S.D., **Prasad, J.**, Poliachik, S.L., Threet, D., Srinivasan, S. and Gross, T.S., 2010, "Trabecular bone homeostasis is modulated by neuromuscular proprioception," 32nd annual meeting of the American Society for Bone and Mineral Research (ASBMR), October 15 - 19, 2010, Toronto, Canada.
3) Srinivasan, S., Threet, D., **Prasad, J.**, Ausk, B.J., Bain, S.D., and Gross, T.S., 2010, "Timing skeletal loading to enhance bone formation," 32nd annual meeting of the American Society for Bone and Mineral Research (ASBMR), October 15 - 19, 2010, Toronto, Canada.
4) **Prasad, J.**, Wiater, B.P., Huber, P., Nork, S.E., Bain, S.D. and Gross, T.S., 2009, "The osteogenic response to skeletal injury is enhanced by strain deprivation," Journal of Bone and Mineral Research, Vol. 24 (Suppl. 1). Presented at ASBMR 31st annual meeting, September 11 - 15, 2009, Denver, Colorado.
5) Bain, S.D., **Prasad, J.**, Wiater, B.P., Huber, P., Nork, S.E. and Gross, T.S., 2009, "Transient muscle paralysis blocks the osteogenic response to skeletal injury," Journal of Bone and Mineral Research, Vol. 24 (Suppl. 1). Presented at ASBMR 31st annual meeting, September 11 - 15, 2009, Denver, Colorado.
6) **Prasad, J.**, Bain, S.D., and Gross, T.S., 2009, "Validation of a novel in-vivo paradigm to assess the role of mechanical stimuli in bone healing," Transactions of the Orthopaedic Research Society, Vol. 34. Presented at 55th annual meeting of the Orthopaedic Research Society (ORS), February 22 - 25, 2009, Las Vegas, Nevada.
7) **Prasad, J.** and Diaz, A.R., 2007, "Conceptual design of materials exhibiting frequency-induced softening," in Proceedings of ASME 2007 Design Engineering Technical Conferences (DETC'07), September 4-7, 2007, Las Vegas, Nevada, paper no. DETC2007-34299.
8) **Prasad, J.** and Diaz, A.R., 2007, "Material design for frequency-induced softening using topology optimization," in Proceedings of 7th World Congress on Structural & Multidisciplinary Optimization, May 21-25, 2007, COEX, Seoul, Korea.
9) **Prasad, J.** and Diaz, A.R., 2005, "Synthesis of bistable periodic structures using topology optimization and a genetic algorithm," in Proceedings of ASME 2005 Design Engineering Conferences (DETC'05), September 24-28, 2005, Long Beach, California, paper DETC2005-84904.
10) Tai, K. and **Prasad, J.**, 2005, "Multiobjective topology optimization using a genetic algorithm and a morphological representation of geometry", presented at the 6th World Congress on Structural and Multidisciplinary Optimization, Rio de Janeiro, Brazil, 30 May - 3 June 2005, paper no.1711.
11) Tai, K., Wang, S.Y., Akhtar, S. and **Prasad, J.**, 2003, "Structural topology optimization using a genetic algorithm and a morphological representation of

geometry" in Proceedings of the 3rd Singapore-MIT Alliance (SMA) Annual Symposium, 17-18 January 2003, Singapore.

12) Akhtar, S., Tai, K. and **Prasad, J.**, 2002, "Topology optimization of compliant mechanisms using evolutionary algorithm with design geometry encoded as a graph", ASME 2002 Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Montreal, Canada, September 29 - October 2, 2002, paper no. DETC2002/DAC-34147.

PEER-REVIEW ACTIVITIES

- Journal reviewer for Structural and Multidisciplinary Optimization
- Reviewer for International Journal of Mechanical Sciences
- Reviewer for International Journal of Structural Stability and Dynamics

PROFESSIONAL AFFILIATIONS

- Member, American Society of Mechanical Engineers (ASME)
- Associate Member, Orthopaedic Research Society (ORS)
- Member, American Association for Advancement of Science (AAAS)
- Member, International Society of Biomechanics
- Member, SAE International

AWARDS / HONOR / SCHOLARSHIP

- Honored in Who's Who Among Students In American Universities and Colleges (2006) for academic excellence and outstanding leadership in community service
- Summer Acceleration Fellowship (2006), Michigan State University
- Recognized by the Office of International Students and Scholars (Michigan State University) for community volunteerism
- Graduate Fellowship (2003-04), Department of Mechanical Engineering, Michigan State University
- Research Scholarship (2001-03), Nanyang Technological University, Singapore
- Recognized by Singapore Indian Development Association for the community service (2002)
- Gold Medal, Hindi Dramatics, Indian Institute of Technology Kharagpur Gymkhana (1996)
- Recognized for representing Patel Hall of Residence (Indian Institute of Technology Kharagpur) in various social and cultural activities
- Merit-cum-Means Scholarship, Indian Institute of Technology, Kharagpur (1993-97).

- Jaycees Scholarship (1990-92), Junior Chamber International, Koderma branch, Bihar, India.

COMMUNITY INVOLVEMENT

- Graduate Vice President, International Students Association, Michigan State University, MI, USA (for Academic year 2005-2006)
- Representative of Mechanical Engineering Department to Council of Graduate Students, Michigan State University, MI, USA (for years 2005-2007)
- Representative to University Research Computing Committee (nominated by Council of Graduate Students for the year 2005-2006).
- Volunteer at various events such as Great Lakes Folk Festival (East Lansing, MI, USA), International Student Orientation at Michigan State University, Ragamala/Utsav in Seattle, Research Symposium organized by the University of Washington Postdoc Association, Feed the Homeless (organized by Acts of Kindness Friends) etc.

EXTRA-CURRICULAR ACTIVITIES

- **Music**: Formally trained in Indian classical vocals and also for playing acoustic guitar; composed and sang with orchestra; also play the keyboard and the mouth organ
- **Dramatics** (Hindi): Received Gold Medal
- **Creative Writing** (Hindi & English): Write short stories and lyrics
- **Still Photography**: Experience with Zenit SLR fully manual film camera; experience in developing and printing black & white films
- **Videography**: Experience in videography and video-editing
- **Graphic Design**: Designed cover pages for magazines, T-shirts, banners and posters
- **Ballroom Dance**: Member of various social dance clubs