

Venkat N. Krovi

Work

Mechanical and Aerospace Engineering
University at Buffalo (SUNY)
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Buffalo, NY 14260
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Williamsville, NY 14221

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Research Interests

Lifecycle treatment (conception, design, modeling, analysis, control, implementation and verification) of articulated, multibody, electromechanical and mechatronic systems for manipulation tasks.

Education

1992-1998

University of Pennsylvania, Philadelphia, Pennsylvania

Ph.D., Mechanical Engineering and Applied Mechanics, December 1998
Advisors : Prof. Vijay Kumar and Prof. G. K. Ananthasuresh

M.S.E., Mechanical Engineering and Applied Mechanics, December 1995
Advisor: Prof. Vijay Kumar

1988-1992

Indian Institute of Technology, Madras, India

B.Tech., Department of Mechanical Engineering, June 1992

Employment

University at Buffalo (SUNY), Buffalo, New York

Sep. 2007-present *Associate Professor*, Department of Mechanical and Aerospace Engineering
Jun. 2005-present *Adjunct Assistant Professor*, Department of Electrical Engineering
Sep. 2002-present *Director (Robotics & Haptics)*, New York State Center for Engineering Design and Industrial Innovation (NYSCEDII)
Apr. 2003-present *Member*, UB Center for Advanced Technology in Bioengineering
Sep. 2001-Aug. 2007 *Assistant Professor*, Department of Mechanical and Aerospace Engineering

McGill University, Montreal, Quebec

Jan. 1999-Sep. 2001 *Assistant Professor*, Department of Mechanical Engineering
Jan. 1999-Sep. 2001 *Faculty Member*, McGill Center for Intelligent Machines (CIM)

University of Pennsylvania, Philadelphia, Pennsylvania

Dec. 1992-Oct. 1998 *Research Assistant*, Mechanical Engineering and Applied Mechanics

Awards and Honors

National Science Foundation CAREER Award, Robotics and Human Augmentation Program, Division of Information and Intelligent Systems, 2004.

Riefler Award, University at Buffalo, 2002, 2003.

2000 Petro-Canada Young Innovator Award, McGill University, Montreal, Canada, 2000.

Proctor & Gamble Best Student Paper Award, 5th National Applied Mechanisms & Robotics Conference, Cincinnati, Ohio, 1997.

John A. Goff Outstanding Graduate Student Award, Mechanical Engineering and Applied Mechanics, University of Pennsylvania, 1997.

Proctor & Gamble Best Student Paper Award, 4th National Applied Mechanisms & Robotics Conference, Cincinnati, Ohio, 1995.

Finalist, All India Class X Mathematics Olympiad, India, 1986.

National Talent Search Examination Scholarship Recipient, National Council of Educational Research and Training (NCERT), Govt. of India, 1985-1992.

Professional Memberships and Activities

▪ **Memberships**

American Society of Mechanical Engineers (ASME)

Member, 1996-present.

Chair, Robotics Technical Committee, Dynamic Systems and Control Division, 2006-2009.

Vice Chair, Robotics Technical Panel, Dynamic Systems and Control Division, 2003-2006.

Elected Voting Member, Mechanisms Technical Committee, Design Division, 2002-2008.

Institute of Electrical and Electronics Engineers (IEEE)

Member, 1996-present.

American Society for Engineering Education (ASEE)

Member, 2002-present.

▪ **Editorial Duties**

Technical Editor, **IEEE/ASME Transactions on Mechatronics**, April 2008-March 2009.

Associate Editor, **ASME Journal of Dynamic Systems Measurement and Control**, January 2008- December 2010.

Editor, **Springer Journal of Intelligent Service Robotics**, January 2008- December 2010.

Guest Co-Editor, Special Issue of the **International Journal of Robotics Research**, Vol. 27, No. 2, February 2008.

Guest Co-Editor, Focused Section on Biomimetics and Novel Aspects in Robotics, **IEEE/ASME Transactions on Mechatronics**, Vol. 11, No. 2, April 2006.

Guest Co-Editor, Special Issue on Novel Robotics and Control, **ASME Journal of Dynamic Systems Measurement and Control**, Vol. 128, No. 1, March 2006.

▪ **Funding Agency Reviews**

National Science Foundation Panel, Robust Intelligence Program, CISE Directorate, 2008

National Science Foundation Panel, GOALI Program, ENGDirecatorate, 2008.

National Science Foundation Panel, Dynamic Systems Program, ENGDirecatorate, 2008.

National Science Foundation Panel, CAREER Panel, Robust Intelligence Program, CISE Directorate, 2007

National Science Foundation Panel, CBET Program, CISE Directorate, 2007.

National Science Foundation Panel, Robust Intelligence Program, CISE Directorate, 2007.

Army Research Office, 2005.

National Science Foundation Panel, Robotics and Human Augmentation Program, CISE Directorate, 2004.

National Science Foundation Panel, SENSORS Program, ENG Directorate, 2003.

National Academy of Science, COBASE program, 2003.

Natural Sciences and Engineering Research Council of Canada, Individual New Researcher Program, 2001.

Canadian Foundation for Innovation, 2000.

Le Fonds pour la Formation de Chercheurs et l'Aide à la Recherche, Equipe Program, 2000.

▪ **Journal Manuscript Review**

ASME Journal of Mechanical Design (For Associate Eds. G.K. Ananthasuresh, S. Agrawal, G. Chirikjian, C. Gosselin, Q.J. Ge, L. Howell, K. Lewis, P. Larochele, J. M. McCarthy, C. Mavroidis, M. Raghavan, J. Rastegar)

ASME Journal of Dynamic Systems Measurement and Control (For Associate Eds. S. Agrawal, S. Jayasuriya, Y. Hurmuzlu)

IEEE Transactions on Robotics (For Associate Eds. J. Angeles, I. Bonev, M. Buehler, C. Gosselin, N. Sarkar, J. Troccaz)

IEEE Transactions of Automation Science and Engineering (For Associate Eds. S. Akella, P. Fiorini, M. Zhang)

IEEE Transactions on Neural Sciences and Rehabilitation Engineering (For Associate Eds. M. Van der Loos)

ASME/IEEE Transactions on Mechatronics (For Associate Eds. S. Agrawal, D. Mavroidis)

International Journal of Robotics Research (For Associate Eds. M. Buehler)

International Journal of Mechatronics (For Associate Eds. C. Melchiorri)
IEEE Transactions of Control System Technology (For Associate Eds. L. Villiani)
IEEE Control Systems Magazine (For Associate Eds. H. Ashrafiuon)
Mechanisms and Machine Theory (For Associate Eds. K. Kazerounian, G. Chirikjian)
Robotics and Autonomous Systems (For Associate Eds. W. Gruver)
Integrated Computer Aided Engineering (For Associate Eds. H. Adeli).

- **Conference Service**

- **Reviewer**

- ASME Design Engineering Technical Conferences – DAC, MECH, CIE (1999-present).

- ASME International Mechanical Engineering Congress and Exposition (2001-present).

- IEEE International Conference on Robotics and Automation (2004-present).

- IEEE/RSJ International Conference on Intelligent Robots and Systems (2005-present).

- IEEE Conference on Decision and Control (2004, 2005).

- **Session Organizer and Chair**

- ASME Design Engineering Technical Conferences (2002 - 2007).

- ASME International Mechanical Engineering Congress and Exposition (2003 - 2007).

- IEEE International Conference on Robotics and Automation (2005 - 2007).

- IEEE/RSJ International Conference on Intelligent Robots and Systems (2005 - 2007).

- 2002 NSF Workshop on Fundamental Issues and Future Research Directions for Parallel Mechanisms and Manipulators.

- 2004 IEEE Engineering in Medicine and Biology Conference.

- **Chair**, ASME Student Mechanism Design Competition, 27th Biennial Mechanisms and Robotics Conference, Montreal, Canada, Sep. 29 – Oct. 2, 2002, URL: <http://www.eng.buffalo.edu/~vkrovi/MechDesignContest2002>.

- **Publicity Chair**, ASME Design Engineering Technical Conferences, Philadelphia, PA, September 10 -13, 2006 <http://www.asmeconferences.org/IDETC06/Organizers.cfm>.

Service

- **University at Buffalo**

- **University**

- Member, IRDF Review Panel, Office of VP (Research), University at Buffalo, June 2006.

- Member, IRCAF Review Panel, Office of VP (Research), University at Buffalo, October 2004.

- Member, MyUB Improvement Committee, University at Buffalo, Feb. 2004-present.

- Judge, Sigma Xi Student Research Competition, 2005, 2006, 2007.

- **School of Engineering and Applied Sciences**

- Department Representative, SENS Computing Advisory Committee, School of Engineering and Applied Sciences, Spring 2006-present.

Judge, IEEE Region I Micromouse Maze Competition, June 2005.

Planning Committee Report to the Dean Karwan on deployment of EDS Software in the MAE Dept. and SEAS.

Mentor, Freshman Mentoring Program, 2004-present.

Contributor, Igniting Ideas 6, “Big Picture Engineering: Visualization, Simulation, and Modeling,” 2005.

Invited Speaker, “What is Robotics and Mechatronics?,” Engineering Cooperative Society Student Group, University at Buffalo, NY, Nov. 2005.

▪ **Department**

Seminar Chair, Mechanical and Aerospace Engineering, University at Buffalo, 09/2004-08/2007.

Ph. D. Qualifying Committee, Dynamics and Control Group, 2001-present.

Over 20 Ph. D. and M.S. Committees, 2001-present (more details under Research Supervision: Committee Membership).

Lab Tours for Open House 2001, 2002, 2003, 2004, 2005, 2006.

Lab Tours for Preview Day 2002, 2003, 2004, 2005, 2006, 2007.

▪ **Community Service and Outreach**

“2006 Summer Workshop on Robotics for High School Students,” 2006 NYSCEDII Cyber Engineering High School Summer Workshop, July 10 - 14, 2006. Website: <http://mechatronics.eng.buffalo.edu/education/summerworkshop2006/>.

“Summer Workshop on Robotics for High School Students,” 2005 NYSCEDII Summer Workshops in Scientific Visualization and Robotics, August 3 - 5, 2005. Website: <http://mechatronics.eng.buffalo.edu/education/summerworkshop2005/>.

Mentor, State University of New York Louis Stokes Alliance for Minority Participation (SUNY LSAMP) Research Internships: (A) Ms. Sara Forde – Summer 2002, Fall 2002; (B) Ms. Philana Owusu – Summer 2003, (C) Ms. Denisse Yopez – Summer 2004 Website: http://mechatronics.eng.buffalo.edu/people/SARAs_FOLDER/.

Mentor, Buffalo Engineering Alliance for Minorities (BEAM) Summer Research Internships for: (A) Mr. Christopher Guerra – Summer 2005.

“2003 Workshop on Robotics for High School Students,” 2003 NYSCEDII Summer Workshops in Scientific Visualization and Robotics, July 7 - 11, 2003. Website: <http://mechatronics.eng.buffalo.edu/education/summerworkshop2003/>.

“Taking Virtual Prototyping to High Schools, ” Workshop on Virtual Prototyping Technologies for Newfane High School, October 26th 2002 and November 2nd 2002. Website: <http://mechatronics.eng.buffalo.edu/NewfaneHighSchool/>.

▪ **McGill University**

Coordinator, Mechatronics Curriculum Option in Mechanical Engineering, McGill University, 2000-2001.

Chair, Robotic Seminar Series, Center for Intelligent Machines, McGill University, 1999-2001.

Faculty Advisor, Student Chapter of American Society of Mechanical Engineers at McGill University, 1999-2001.

Courses Taught (*Enhancement of Existing Course; *Newly developed Course Content)

▪ **University at Buffalo (SUNY), Buffalo, New York,**
Department of Mechanical and Aerospace Engineering

MAE 340 ⁺	Systems Analysis Laboratories (8 Lab Sections)	S'03, S'04, S'05, S'06, S'07
MAE 512 ⁺	Machines and Mechanisms II (Graduate)	F'05, F'06, F'07 (<i>Also Enginet F'07</i>)
MAE 412 ⁺	Machines and Mechanisms II	F'01, F'02, F'03, F'04, F'05, F'06, F'07
MAE 493/593*	Mathematical Methods in Robotics	F'05 (<i>Also Enginet F'05</i>)
MAE 505	Special Topics – Robotics	F'03, F'04 (<i>Also Enginet F'04</i>)
MAE 476/576*	Mechatronics	S'02, S'03 (<i>Also Enginet S'03</i>)
MAE 459	Capstone Design Groups	2001, 2002, 2003, 2004, 2007
MAE 501/601	Individual Problems (Graduate)	F'01, F'02, F'03, F'04, F'05, F'06, F'07 S'02, S'03, S'04, S'05, S'06, S'07, S'08

▪ **McGill University, Montreal, Canada,**
Department of Mechanical Engineering

305-554A*	Microprocessors for Mechanical Systems	F'99, F'00
305-412B ⁺	Dynamics of Systems	S'00, S'01
305-404B	Honors Thesis	F'99

Research Supervision

▪ University at Buffalo (SUNY), Buffalo, New York, Department of Mechanical and Aerospace Engineering

Ph.D., University at Buffalo

Lengfeng Lee	Topic: Haptic Cooperation in Teleimmersive Environments	May. 2009 (Expected)
Chin-Pei Tang	Topic: A Geometric Framework for Cooperative Payload Transport by Robot Collectives	Sep. 2008 (Expected)
Rajan Bhatt	Towards Modular Cooperation Between Multiple Nonholonomic Wheeled Mobile Manipulators	Feb. 2007

M.S. (Thesis), University at Buffalo

Srikanth Kannan	Topic: Haptic Surgical Simulator	Sep. 2008 (Expected)
Madusudanan Sathianathan	Topic: Musculoskeletal Analysis	Sep. 2008 (Expected)
Qiushi Fu	Topic: Leg-Wheel Robot Systems	Sep. 2008 (Expected)
Hao Su	Topic: Formation Control of Unmanned Ground Vehicles	Sep. 2008 (Expected)
Yao Wang	Topic: Dynamics of Parallel Robot Manipulators	Sep. 2008 (Expected)
Patrick Miller	Topic: Haptic Teleoperation of Mobile Manipulators	Sep. 2008 (Expected)
Kun Yu	Virtual Prototyping based Analysis of Cable Robot Manipulators.	Feb. 2008
Anand Naik	A Study of Haptic Feedback for Steer-By-Wire Applications	May 2007
Glenn White	Simultaneous Motion and Interaction Force Control of a Nonholonomic Mobile Manipulator	Jun. 2006
Michael Del Signore	A Screw-Theoretic Framework For Musculoskeletal System Analysis	Feb. 2006
Lengfeng Lee (Stayed for Ph.D)	Decentralized Motion Planning within an Artificial Potential Framework (APF) for Cooperative Payload Transport by Multi-Robot Collectives	Feb. 2005
Talib Bhabrawala	Shape Modeling using Extended Superquadrics	Feb. 2005
Chetan Jadhav	A Low-Cost Framework for Individualized Interactive Telerehabilitation	Sep. 2004
Chin-Pei Tang	Control of a Modular Composite System of Mobile	Jun. 2004

(Stayed for Ph.D)	Manipulators	
Seung Kook Jun	Design Considerations for an Articulated Leg-Wheel Locomotion Subsystem	Jun. 2004
Rajan Bhatt (Stayed for Ph.D)	Physical Cooperation of a Modular Composite System of Several Mobile Manipulators	Feb. 2004
Pravin Nair	Quantitative Performance Evaluation of Upper-Limb Dysfunction	Feb. 2004

M.S. (Project), University at Buffalo

Matthew Szymanski	Topic: CAD Applications in Toy Making	May 2008
Nicholas Gill	Comparison of Crank-Rocker Balancing in Pro-Engineer 2.0 and Analytical Methods	Feb. 2008
Chihan Yang	Artificial Mechanical System Modeling And Simulation	Feb. 2006
Kiran Konakanchi	Musculoskeletal Modeling Of Smilodon Fatalis For Virtual Functional Performance Testing	Sep. 2005
Tao Gan	Automated CAD Generation to Improve Design Process- A Fourbar Linkage Case Study	Sep. 2005
Ajay D'Souza	Modeling and Kinematic Analysis of a 6 D.O.F. Motion Base using Virtual Prototyping Tools	Jun. 2003
Daniel O. Gott	The Smart Car Project: A Case Study in Computer-Mediated Interfaces	Jun. 2003
Chris Nowak	Wireless Data Acquisition System for In-Flight Acceleration Measurement of a Football	Jun. 2003
Harpreet Virk	Shape Synthesis of a Compliant Mechanism for Path Following	Jan. 2003

M.S. (Course) , University at Buffalo

Prasanna Venkatesan		Jun. 2003
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Undergraduate Research, University at Buffalo

John R. Amend, Jr. Shajan Thomas	Leg-Wheel Locomotion for Robotic Applications (NSF REU)	Fall 2007 Spr. 2008
Sophie Gomez	Optimization of Four-Bar Linkages	Summer 2007
Brendan Yadav	Independent Mechatronics Project: Control of the BoEBot	Spring 2006
Srivatsa Mahesh	Freshman Research Internship: Virtual Prototyping with CAD	Fall 2005
Christopher Guerra	2005 BEAM/SEAS Honors Research Summer Program, 11 th Grade Student from Canisius High School	Summer 2005

Annapurna Vanga	Senior Design Project: Conversion of CAT-scans of Sabertooth Skulls using MIMICS	Sep. 2004
Ben Whiting	6-week Research Internship for High School Students	Summer 2004
Denisse Yepez	SUNY Louis Stokes Alliance for Minority Participation (SUNY LSAMP), Freshman Research Internship: Modeling of SmartCAR in SolidEdge	May-July 2004
Jonathan Westcott	Senior Design Project: Development of Web-Based Self-Paced Tutorials for Studying Planar Mechanisms	Sep. 2003
Philana Owusu	SUNY Louis Stokes Alliance for Minority Participation (SUNY LSAMP) Freshman Research Internship: Virtual Prototyping of a Wheeled Mobile Robot	May-July 2003
Lengfeng Lee	Senior Design Project: Virtual Prototyping Approach to Teaching Planar Mechanism Analysis	Dec. 2002
Neexon Khoo Arturo Machuca Kok-Kuan Leong Swee Lei Pang	Senior Design Project: Virtual Prototyping of the Suspension System of an All-Terrain Vehicle	Dec. 2002
Sara Forde	SUNY Louis Stokes Alliance for Minority Participation, Freshman Internship, Virtual Prototyping with CAD	May-Dec. 2002

Committee Member, University at Buffalo

Lalit Kumar (M.S.)	Development Of An Interface Between Matlab And Pro/Engineer Using J-Link	April. 2007
Sousaku Kawaguchi (M.S.)	Comprehensive Exam - no title	Oct. 2006
Matthew Morse (M.S.)	Comprehensive Exam - no title	Sep. 2006
John Eddy (Ph.D)	Solving Distributed, Non-Cooperative Design Problems Using Multi-Agent Systems	Feb. 2006
Min-Chang Tsai (M.S.)	Pitch-Arm Control and Virtual Realization of T-Type Robot Helicopter	Sep. 2005
Thomas Conord (M.S.)	Linear Matrix Inequality Based Robust Control Synthesis	Sep. 2005
Vamsi Pateel (M.S.)	Bite Force Estimation Of Smilodon Fatalis: Using Forward And Inverse Methodologies	Jun. 2005
Rohit Thali (M.S.)	A Study of Uncertainty and Optimality in Distributed Product Design	Jun. 2005
Sai Gavirneni (M.S.)	Comprehensive Exam - no title	Jun. 2005
Jairam Ramaswamy (M.S.)	Comprehensive Exam - no title	Jun. 2005
Amol Kulkarni (M.S.)	Unigraphics NX Open Application Programming	Jun. 2005

	Interface	
Sameer Patwardhan (M.S.)	Using Anthropometric Modeling for Optimal Ergonomic Considerations in Automobile Interior Design	Feb. 2005
Gaurav Tyagi (M.S.)	A Heuristic Optimization Based Methodology for Fire Evacuation Simulation Incorporating Human Behaviors	Feb. 2005
Rajaey Kased (M.S.)	Rest-to-Rest Motion of an Experimental Flexible Structure Subject to Friction	Sep. 2004
Jonathan Moscato (M.S.)	Virtual Modeling of Centrally Controlled Real Time Systems using Object Oriented Programming	Sep. 2004
Bertrand Douillard (M.S.)	Design & Implementation of a Slam Algorithm on an Amigobot	Sep. 2004
Arun Natarajan (M.S.)	Spacecraft Attitude Maneuvers with Input Saturation using Model Error Control Synthesis	Sep. 2004
Amit Paygude (M.S.)	Development of an Interoperability Tool in Parasolid	Sep. 2004
Saurabh Srivastava (M.S.)	Local discontinuous Galerkin methods : application to elastodynamics and elastoplasticity	Feb. 2004
Ganesh Balasubramanian (M.S.)	Shape memory effect studies in electrochemically deposited Co- Ni alloy thin films	Feb. 2004
Mitul Patel (M.S.)	System Design Through Coupled Subsystem Selection	Feb. 2004
Guoshi Li (M.S.)	Application of Model-Error Control Synthesis to the Control of a Pneumatic Muscle Actuator System	Sep. 2003
Vincent Chanron (M.S.)	A study of convergence in decentralized design	Sep. 2002
Adeline de Villardi, (M.S.)	A set-based approach to facilitate distributed design	Sep. 2002
Ulrich Staehlin (M.S.)	Closed Loop Input Shaping Controllers	Sep. 2002

Research Supervision (Cont'd)

- **McGill University, Montreal, Canada,
Department of Mechanical Engineering**

M. Eng. (Thesis), McGill University

Waseem Khan	Distributed and Modular Forward Dynamic Simulation of Parallel Manipulators	Feb. 2003
Michel Abou-Samah	A Kinematically Compatible Framework for Collaboration of Multiple Nonholonomic Wheeled	Dec. 2001

Mobile Robots
Xichun Nie Design of Reconfigurable Manipulation Assist Aids Dec. 2000
by Fourier Methods

Undergraduate Research, McGill University

Robert Johnson Senior Design Project: Shape Optimization of a Jun. 2001
Compliant Cantilever Beam for Path Following
Yeow-Wei Pang Honors Thesis: Fourier Methods for Synthesis of CSC Dec. 1999
Mechanisms

Committee Membership, McGill University

Erick Dupuis (Ph.D.) A general framework for the manual teleoperation of Jun. 2001
kinematically redundant space-based manipulators
Eric Martin, (Ph.D.) Dynamic interaction of a space manipulator with its base Sep. 2000
attitude controller

Research Grant Support

Active

04/2008- **CRI:IAD A Real-Time Haptic Immersive \$ 360,000.**
03/2011 **Virtual Environment (RT-HIVE)**
Computing Research Infrastructure, National Science Foundation
Investigators: V. Krovi (PI) & F. Mendel

10/2007- **Vertebrate Mastication Testbed: Virtual & Mechanical Prototypes \$ 195,000.**
12/2008 **Mars Foods**
Investigators: F. Mendel (PI), A. Patra & V. Krovi (33 %)

10/2007 - **New York State Center for Engineering Design and Industrial \$ 250,000.**
09/2008 **Innovation**
NYSTAR Grant, State of New York
Investigators: K. Lewis (PI), K. English, H. Stenger, V. Krovi (10%)

02/2004- **CAREER: Cooperative Payload Transport by Robot Collectives \$ 512,000.**
01/2009 **CAREER Grant**, Robotics & Computer Vision, National Science Foundation
Investigators: V. Krovi (PI – 100%)

Pending

09/2008- **III-CXT: MED: A Multiresolution Digital Osteological Library \$ 899,886.**
08/2011 **Enabled by Natural Shape Analysis and Morphometrics**
Intelligence, Information and Informatics Program, National Science Foundation

Investigators: V.Govindaraju (PI), V. Krovi, F. Mendel **Submitted:** November 2007.

Prior

- 10/2006 - 09/2007 **New York State Center for Engineering Design and Industrial Innovation** \$ 250,000.
NYSTAR Grant, State of New York
Investigators: K. Lewis (PI), K. English, M. Karwan, C. Bloebaum, V. Krovi (10%)
- 06/2006-05/2007 **Virtual Musculoskeletal Cadaver Case-Studies for Gross Anatomy** \$ 10,000.
UBIT Proposal, Office of the CIO, University at Buffalo
Investigators: F. Mendel (PI), V. Krovi (50%)
- 07/2005 – 12/2006 **Scale Effects on Musculoskeletal Design in Terrestrial Crabs** \$ 48,000.
Research and Creative Activities Proposal, VP, Research, University at Buffalo
Investigators: S. Medler (PI), V. Krovi (35%), S. White and K. Hulme
- 11/2005 **Mechatronics 2-Day Workshop for Fisher-Price** \$ 11,440.
Short Course, The Center for Industrial Effectiveness, University at Buffalo
Investigators: V. Krovi (PI – 100%)
- 10/2005 - 09/2006 **New York State Center for Engineering Design and Industrial Innovation Center** \$ 250,000.
NYSTAR Grant, State of New York
Investigators: C. Bloebaum (PI), K. English, M. Karwan, K. Lewis, V. Krovi (10%)
- 06/2005 – 05/2006 **Integrating Technology and Design in Architecture Curriculum** \$ 8,500.
Education Technologies Grant, VP, Educational Technology, University at Buffalo
Investigators: S. Vassigh (PI), K. Mackay and V. Krovi (50%)
- 07/2004 - 09/2005 **New York State Center for Engineering Design and Industrial Innovation Center** \$ 250,000.
NYSTAR Grant, State of New York
Investigators: C. Bloebaum (PI), K. English, M. Karwan, K. Lewis, V. Krovi (10%)
- 2004-2005 **The Vertebrate Analyzer: A simulator of form/function/behavior of extant/extinct vertebrates** \$ 28,000.
Research and Creative Activities Proposal, VP Research, University at Buffalo
Investigators: V. Krovi (PI – 40%) F. Mendel, K. Hulme, A. Patra and D. Pendergast
- 2003-2004 **Teleoperated Virtual Access Laboratories (WEBLABS)** \$ 3,300.
Education Technologies Grant, VP, Educational Technology, University at Buffalo
Investigators: V. Krovi (PI – 100%)
- 2002-2003 **EDS PLM-Suite: Solid-Edge, Jack, Unigraphics NX, e-Factory, I-DEAS, Teamcenter** \$ 53,400.
In-kind software grant, Electronic Data Systems Inc.

Net Commercial Value: \$55,214,760.00, University List Price for Installation and 1st year maintenance fees (Waived per grant).

Investigators: V. Krovi (PI- 100%)

- 2002-2003 **Xilinx Suite: Digilab, Sysgen and ISE Foundation Xilinx Systems** \$ 5,280.
In-kind hardware and software grant, Xilinx Corp.
Net Commercial Value: \$29,269.00, University List Price for Installation and 1st year maintenance fees (Waived per grant).
Investigators: V. Krovi (PI- 100%)
- 2002-2003 **User-Customized Haptic Rehabilitation Environment (UCHRE)** \$ 48,000.
Research and Creative Activities Proposal, VP Research, University at Buffalo
Investigators: V. Krovi (PI – 50%) and N. Fisher
- 2002-2003 **Web-based Virtual Prototyping Tutorials/Case-Studies** \$ 6,600.
Education Technologies Grant, VP Educational Technology, University at Buffalo
Investigators: V. Krovi (PI- 100%)
- 2001 **ADAMS: Dynamic Analysis Suite** \$ 1,000.
In-kind software grant, Mechanical Dynamics Inc.
Installation and 6-month maintenance fees (Waived per grant).
Investigators: V. Krovi (PI- 100%)
- 1999-2003 **Minimal Complexity Manipulation Assistive Devices** CDN \$ 67,200.
(ended Sept. 2001) *Individual New Researcher*, Natural Science & Engg. Research Council of Canada
Investigators: V. Krovi (PI- 100%) [McGill Univ.]
- 2000-2001 **Petro Canada Young Innovator Award** CDN \$ 16,000.
Investigators: V. Krovi (PI- 100%) [McGill Univ.]
- 2000-2003 **Computation Visualization and Realization Laboratory** CDN \$ 482,000.
(ended Sept. 2001) *New Opportunities Award*, Canadian Foundation for Innovation
Investigators: X. Chang, L. Cortelezzi, V. Krovi (25%), K. Siddiqi [McGill Univ.]
- 2000-2002 **Cooperation Frameworks for Actively Articulated Wheeled Vehicles** CDN \$ 45,000.
(ended Sept. 2001) *Nouveaux Chercheur*, Le Fonds Formation de Chercheurs et l'Aide à la Recherche
Investigators: V. Krovi (PI – 100%) [McGill Univ.]
- 2000-2003 **Computational Kinematics** CDN \$ 145,000.
(ended Sept. 2001) *Equipe*, Le Fonds pour la Formation de Chercheurs et l'Aide à la Recherche
Investigators: J. Angeles, V. Krovi (30%) and P. Zsombor-Murray [McGill Univ.]

Publications

Patents

- [P1] Kumar, V., Wellman, P., and Krovi, V., “*Adaptive mobility system,*” **United States Patent 5,513,716**. *Appl. No.:* 239,951, *Filed:* May 9, 1994, *Granted:* May 7, 1996.

Book Chapters (Supervised Students are bolded)

- [B3] **Lee, L.-F.** and Krovi, V., “Performance Evaluation of Potential Field based Distributed Motion Planning Methods for Robot Collectives,” **Mobile Robots Motion Planning**, Ed. A. Lazinica, I-Tech Publishing, Vienna, Accepted for publication in April 2008.
- [B2] Krovi, V., and Kumar, V., “*Rapid Design and Prototyping of Customized Rehabilitation Aids,*” **Encyclopedia of Microcomputers**, Eds. A. Kent and J. G. Williams, Marcel Dekker, New York, September 1999.
- [B1] Kumar, V., T. Rahman, and Krovi, V., “*Assistive Devices for People with Motor Disabilities,*” **Wiley Encyclopaedia of Electrical and Electronics Engineering**, Ed. J. G. Webster, March 1999.

Invited Journals/Editorials

- [IJ3] Agrawal, S. K., Krovi, V. and O’Malley, M., “*Editorial: Special Section on ASME IMECE ARDC 2006 Machines for Human Assistance and Augmentation,*” **International Journal of Robotics Research**, Vol. 27, No. 2, pp.231-231, February 2008.
[doi:10.1177/0278364907085556](https://doi.org/10.1177/0278364907085556)
- [IJ2] Agrawal, S. K., and Krovi, V., “*Guest Editorial: Introduction to the Focused Section on Biomimetics and Novel Aspects in Robotics,*” **IEEE/ASME Transactions on Mechatronics**, Vol. 11, No. 2, pp. 117- 118, April 2006.
- [IJ1] Agrawal, S. K., Krovi, V., and O’Malley, M., “*Guest Editorial: Special Issue on Novel Robotics and Control,*” **ASME Journal of Dynamic Systems Measurement and Control**, Vol. 128, No. 1, pp. 1-2, March 2006.

Journal Articles (Accepted and Published) (Supervised Students are bolded)

- [J22] **Naik, A.P., Lee, L-F.,** and Krovi, V., “*Study of Vehicle Dynamics Modeling Fidelity on Haptic Collaboration in Steer-by-Wire Systems,*” Special Issue on Haptic Interfaces, ASME Journal of Computation and Information Science in Engineering, Accepted for publication in Feb 2008.
- [J21] **White, G.D., Bhatt, R. M.,** and Krovi, V., “*Task-Space Control of Redundant Nonholonomic Wheeled Mobile Manipulators: Theory and Experiments,*” IEEE/ASME Transactions on Mechatronics, Accepted for publication in February 2008.
- [J20] **Bhatt, R.M., Tang, C-P., Lee, L-F.,** and Krovi, V., “*A Case for Scaffolded Virtual Prototyping Tutorial Case-Studies in Engineering Education,*” International Journal of Engineering Education, Accepted for publication in June 2006, In Press.

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- [J11] **Jadhav, C., Nair, P.** and Krovi, V., “*Individualized Interactive Home-based Haptic Telerehabilitation,*” IEEE Multimedia Systems, Special Issue on Haptic User Interfaces in Multimedia Systems, Vol. 13, No. 3, pp. 2-9, July 2006.
- [J10] **Tang, C-P., Bhatt, R.M., Abou-Samah, M.,** and Krovi, V., “*A Screw-Theoretic Analysis Framework For Payload Manipulation By Mobile Manipulator Collectives,*” IEEE/ASME Transactions on Mechatronics, Vol. 11, No. 2, pp. 169- 178, April 2006.
- [J09] **Jun, S-K., White, G.D.** and Krovi, V., “*Kinetostatic Design Considerations for an Articulated Leg-Wheel Locomotion Subsystem,*” ASME Journal of Dynamic Systems Measurement and Control, Vol. 128, No. 1, pp. 112-121, March 2006.
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- [J07] **Khan, W. A.,** Krovi, V., Saha, S.K., and Angeles, J., “*Recursive Kinematics and Inverse Dynamics for a Planar 3R Parallel Manipulator,*” ASME Journal of Dynamic Systems Measurement and Control, Vol. 127, No. 4, pp. 529–536, December 2005.

- [J06] **Nie, X.**, and Krovi, V., “*Fourier Methods for Kinematic Synthesis of Coupled Serial Chain Mechanisms*,” ASME Journal of Mechanical Design, Vol. 127, No. 2, pp. 232–241, March 2005.
- [J05] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Kinematic and Kinetostatic Synthesis of Planar Coupled Serial Chain Mechanisms*,” ASME Journal of Mechanical Design, Vol. 124, No. 2, pp.143-155, June 2002.
- [J04] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Kinematic Synthesis of Spatial R-R Dyads for Path Following With Applications to Coupled Serial Chain Mechanisms*,” ASME Journal of Mechanical Design, Vol.123, No. 3, pp. 359-366, September 2001.
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- [J02] Krovi, V., and Kumar, V., “*Modeling and Control of a Hybrid Locomotion System*,” ASME Journal of Mechanical Design, Vol. 121, No. 3, pp. 448-455, September 1999.
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Refereed Conference Publications (Supervised Students are bolded)

- [C40] **Naik, A.P., Lee, L-F.**, and Krovi, V., “Study of Vehicle Dynamics Modeling Fidelity on Haptic Collaboration in Steer-by-Wire Systems,” Proceedings of the **2007 ASME International Mechanical Engineering Congress and Exposition**, IMECE2007-41908, Seattle, WA, November 11 -15, 2007.
- [C39] **White, G.D.**, and Krovi, V., “Motion and Force Control in a Nonholonomic Mobile Manipulator,” Proceedings of the **2006 ASME International Mechanical Engineering Congress and Exposition**, IMECE2006-14703, Chicago, IL, November 5 -10, 2006.
- [C38] **Lee, L-F.**, and Krovi, V., “Virtual Musculoskeletal Analysis-based Refinement of Rehabilitation Programs,” Proceedings of the **2006 IEEE International Workshop on Virtual Rehabilitation**, New York, NY, August 29 -30, 2006.
- [C37] **Lee, L-F.**, and Krovi, V., "A Standardized Testing-Ground for Artificial Potential-Field based Motion Planning for Robot Collectives," Proceedings of the 2006 Performance Metrics for Intelligent Systems Workshop, Gaithersburg, MD, August 21 -23, 2006.
- [C36] **del Signore, M.J., Bhatt, R. M.**, and Krovi, V., “A Screw-Theoretic Analysis Framework For Musculoskeletal Systems,” Proceedings of the **2006 ASME Design Engineering Technical Conferences**, DETC2006-99248, Philadelphia, PA, September 10 -13, 2006.
- [C35] **Bhatt, R.M., Tang, C-P., Abou-Samah, M.**, and Krovi, V., “*A Screw-Theoretic Analysis Framework For Payload Manipulation By Mobile Manipulator Collectives*,” Proceedings of the **2005 ASME International Mechanical Engineering Congress and Exposition**, IMECE2005-81525, Orlando, Florida, November 5-11, 2005.

- [C34] **Bhabrawala, T.**, and Krovi, V., “*Shape Recovery from Medical Data Using Extended Superquadrics*,” Proceedings of the **2005 ASME Design Engineering Technical Conferences**, DETC2005-84738, Long Beach, California USA, September 24-28, 2005,
- [C33] **del Signore. M.**, Mendel, F. and Krovi, V., “*Virtual Prototyping and Hardware-in-the-Loop Testing for Musculoskeletal System Analysis*,” Proceedings of the **2005 IEEE International Conference on Mechatronics and Automation**, Niagara Falls, Ontario, Canada, July 29-August 1, 2005.
- [C32] **Patwardhan, S.S.**, Bloebaum C.L, and Krovi, V., “*Using Anthropometric Modeling for Optimal Ergonomic Considerations in Automobile Interior Design*,” Proceedings of the **2005 SAE Digital Human Modeling for Design and Engineering Symposium**, Paper No. 2005-01-2718, Iowa City, Iowa, June 14-16, 2005.
- [C31] **Lee, L-F., Bhatt, R.M.**, and Krovi, V., “*Comparison of Alternate Methods for Distributed Motion Planning of Robot Collectives Within a Potential-Field Framework*,” Proceedings of the **2005 IEEE International Conference on Robotics and Automation**, Barcelona, Spain, April 18-22, 2005.
- [C30] **Jun, S-K.**, and Krovi, V., “*Design Considerations For An Articulated Leg-Wheel Locomotion Subsystem*,” Proceedings of the **2004 ASME International Mechanical Engineering Congress and Exposition**, IMECE2004-59428, Anaheim, California, November 13-19, 2004.
- [C29] **Tang, C-P.**, and Krovi, V., “*Performance Evaluation of Cooperative Payload Transport by a System of Wheeled Mobile Manipulators*,” Proceedings of the **2004 ASME Design Engineering Technical Conferences**, DETC2004-57476, Salt Lake City, Utah, September 28 - October 2, 2004.
- [C28] Krovi, V., Rae, W., and Nowak, C., “*Flight Data Recorder for the American Football*,” Proceedings of the **5th International Conference on the Engineering of Sport**, Davis, California, September 13-16, 2004.
- [C27] **Jadhav, C.**, and Krovi, V., “*A Low-Cost Framework for Individualized Interactive Telerehabilitation*,” **26th Annual International Conference in IEEE Engineering in Medicine and Biology Society**, Vol. 2, pp.3297 – 3300, San Francisco, California, September 1-5, 2004.
- [C26] **Bhatt, R.M., Tang, C-P.**, and Krovi, V., “*Geometric Motion Planning and Formation Optimization for a Fleet of Nonholonomic Mobile Robots*,” Proceedings of the **2004 IEEE International Conference on Robotics and Automation**, New Orleans, Louisiana, April 26 - May 1, 2004.
- [C25] **Tang, C-P., Bhatt, R.M.**, and Krovi, V., “*Decentralized Kinematic Framework for Payload Transportation by a System of Mobile Manipulators*,” Proceedings of the **2004 IEEE International Conference on Robotics and Automation**, New Orleans, Louisiana, April 26-May 1, 2004.
- [C24] **Jadhav, C.**, and Krovi, V., “*In-Vivo Estimation of Unknown Upper-Limb Kinematic Parameters*,” Proceedings of the **11th National Conference on Machines and Mechanisms**, (NaCoMM-2003), New Delhi, India, December 18-19, 2003.
- [C23] **Khan, W. A.**, Krovi, V., Saha, S.K., and Angeles, J., “*Recursive Kinematics and Inverse Dynamics for Parallel Manipulators*,” Proceedings of the **2003 ASME International**

Mechanical Engineering Congress and Exposition, IMECE2003-42868, Washington D.C., November 15 - 21, 2003.

- [C22] **Nair, P.K., Jadhav, C.,** and Krovi, V., “*Development and Testing of a Low-Cost Diagnostic Tool for Upper Limb Dysfunction*,” Proceedings of **2003 IEEE/RSJ International Conference on Intelligent Robotics and Systems**, Las Vegas, Nevada, October 27-31, 2003.
- [C21] **Bhatt, R.M., Tang, C-P., Lee, L-F,** and Krovi, V., “*Web-based Self-paced Virtual Prototyping Tutorials*,” Proceedings of the **2003 ASME Design Engineering Technical Conferences**, DETC2003/CIE-48201, Chicago, Illinois, September 2 - 6, 2003.
- [C20] **Jun, S-K.,** and Krovi, V., “*The SmartCar Project: Development and Implementation of a Modular Scaled Testbed*,” Proceedings of the **2003 ASME Design Engineering Technical Conferences**, DETC2003/CIE-48258, Chicago, Illinois, September 2 - 6, 2003.
- [C19] **Abou-Samah, M.,** and Krovi, V., “*Decentralized Kinematic Control of a Cooperating System of Mobile Manipulators*,” Proceedings of the **2002 ASME International Mechanical Engineering Congress and Exposition**, IMECE2002-32691, New Orleans, Louisiana, November 17 - 22, 2002.
- [C18] **Khan, W. A.,** and Krovi, V., “*Comparison of Two Alternate Methods for Distributed Forward Dynamic Simulation of a Four-Bar Linkage*,” Proceedings of the **Workshop on Fundamental Issues and Future Research Directions for Parallel Mechanisms and Manipulators**, Eds. C. M. Gosselin and I. Ebert-Uphoff, Quebec City, Canada, October 3–4, 2002.
- [C17] **Abou-Samah, M.,** and Krovi, V., “*Optimal Configuration Selection for a Cooperating System of Mobile Manipulators*,” Proceedings of the **2002 ASME Design Engineering Technical Conferences**, DETC2002/MECH-34358, Montreal, Canada, September 29 - October 2, 2002.
- [C16] **Nie, X.,** and Krovi, V., “*Passive Reconfigurable Manipulation Assistive Aids*,” Proceedings of the **2001 IEEE/RSJ International Conference on Intelligent Robots and Systems**, Vol. 2, pp. 1036-42, Maui, Hawaii, October 29-November 3, 2001.
- [C15] **Nie, X.,** and Krovi, V., “*Design of Passive Reconfigurable Manipulation Assistive Aids*,” Proceedings of the **2001 ASME Design Engineering Technical Conferences**, DETC2001/DAC-21087, Pittsburgh, Pennsylvania, September 9-12, 2001.
- [C14] **Pang, Y.-W.,** and Krovi, V., “*Kinematic Synthesis of Coupled Serial Chain Mechanisms for Planar Path Following Tasks using Fourier Methods*,” Proceedings of the **2000 ASME Design Engineering Technical Conferences**, DETC2000/MECH-14188, Baltimore, Maryland, September 10-13, 2000.
- [C13] **Pang, Y.-W.,** and Krovi, V., “*Fourier Methods For Synthesis Of Coupled Serial Chain Mechanisms*,” In **7th International Symposium on Advances in Robot Kinematics**, Piran-Portoroz, Slovenia, June 26 - 30, 2000.
- [C12] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Kinematic Synthesis of Spatial R-R dyads for Path Following Revisited using the Rotation Matrix Approach*,” Proceedings of the **1999 ASME Design Engineering Technical Conferences**, DETC99/DAC-8670, Las Vegas, Nevada, September 12-15, 1999.
- [C11] Song, P., Krovi, V., Kumar, V., and Mahoney, R., “*Design and Virtual Prototyping of Human-Worn Manipulation Devices*,” Proceedings of the **1999 ASME Design Engineering Technical Conferences**, DETC99/CIE-9029, Las Vegas, Nevada, September 12-15, 1999.

- [C10] Song, P., Krovi, V., Kumar, V., R. Bajcsy and Mahoney, R., “*Design of Human-Worn Assistive Devices for People with Disabilities*,” Proceedings of the **Sixth International Conference on Rehabilitation Robotics**, pp. 122-128, Stanford, California, July 1-2, 1999.
- [C09] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Synthesis of Spatial Two-Link Coupled Serial Chains*,” Proceedings of the **1998 ASME Design Engineering Technical Conferences**, DETC98/MECH-5890, Atlanta, Georgia, September 13-16, 1998.
- [C08] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Kinetostatic Synthesis of Coupled Serial Chains*,” Proceedings of the **1998 ASME Design Engineering Technical Conferences**, DETC98/MECH-5977, Atlanta, Georgia, September 13-16, 1998.
- [C07] Krovi, V., Haulin, I., Vezien, J-M., Kakadiaris, I., Pito, R., Enciso, R., Kumar, V., Ananthasuresh, G.K., and Bajcsy, R., “*Design and Virtual Prototyping of a Rehabilitation Devices*,” **Video Proceedings of the 1998 International Conference on Robotics and Automation**, Leuven, Belgium, May 16-21, 1998.
- [C06] Krovi, V., Ananthasuresh, G. K., and Kumar, V., “*Synthesis of Coupled Multi-Link Serial Chain Mechanisms*,” Proceedings of the **5th National Applied Mechanisms & Robotics Conference**, AMR97-031, Cincinnati, Ohio, October 12-15, 1997.
- [C05] Krovi, V., Feehery, P., Heinrichs, T., Ternus, J., and Kumar, V., “*Design and Virtual Prototyping of a Head Controlled Feeder*,” Proceedings of the **5th National Applied Mechanisms & Robotics Conference**, AMR97-027, Cincinnati, Ohio, October 12-15, 1997. (Recipient of the Procter & Gamble Best Student Paper Award.)
- [C04] Krovi, V., Kumar, V., Ananthasuresh, G. K., and Vezien, J-M., “*Design and Virtual Prototyping of Rehabilitation Aids*,” Proceedings of the **1997 ASME Design Engineering Technical Conferences**, DETC97/DFM-4361, Sacramento, California, September 14-17, 1997.
- [C03] Krovi, V., and Kumar, V., “*Optimal Traction Control in a Wheelchair with Legs and Wheels*,” Proceedings of the **4th National Applied Mechanisms and Robotics Conference**, AMR95-030, Cincinnati, Ohio, December 10-14, 1995. (Recipient of the Procter & Gamble Best Student Paper Award.)
- [C02] Krovi, V., Wellman, P., and Kumar, V., “*Design of a Walking Wheelchair for the Motor Disabled*,” Proceedings of the **4th International Conference on Rehabilitation Robotics**, pp. 125-31, Wilmington, Delaware, June 10-12, 1994.
- [C01] Wellman, P., Krovi, V., and Kumar, V., “*An Adaptive Mobility System for the Disabled*,” Proceedings of the 1994 IEEE International Conference on Robotics and Automation, pp. 2006-11, San Diego, California, May 8-13, 1994.

Presentations and Workshops

- **The conference presentations listed above were made either by a supervised graduate student in my presence or by me – this list is not being repeated here for brevity.**
- "Advanced Research Techniques in Mechatronics: Vehicle Dynamic Modeling in Steer-By-Wire Systems", Maplesoft e-Symposium Series, Streaming QuickTime, March 18 2008 <http://www.maplesoft.com/company/webinars/view.aspx?SID=5744&sl=1>

- "Shape Recovery from Medical Data Using Extended Superquadrics", Departments of Biophysics and Radiation Medicine, Roswell Park Cancer Institute, March 11 2008.
- "Cooperative Payload Transport by Robot Collectives", Mechanical Engineering, Ohio State University, Columbus, OH, Nov. 17, 2006.
- "Cooperative Payload Transport by Robot Collectives", MAE-GSA Future of Research Seminar, Mechanical and Aerospace Engineering, University at Buffalo, Buffalo, NY, Nov. 3, 2005.
- "Overview of Robotics and Haptics at University at Buffalo", Dean's Council, School of Engineering and Applied Sciences, University at Buffalo, Buffalo, NY, Apr. 21, 2005.
- "Cooperative Payload Transport by Robot Collectives," Mechanical and Aerospace Engineering, Rutgers University, NJ. March 24, 2005
- "Optimal Configuration for a System of Mobile Manipulators," Colloquium Series, Computer Science and Engineering Dept., University at Buffalo, Buffalo, NY, Oct. 11, 2002.
- "Collaboration Frameworks For Multiple Mobile Manipulators," 2002 Army Workshop On Integrated System Approaches To Future Combat Systems (ISAFCS 2002), Washington D.C., May 17, 2002.
- "Reconfigurable Manipulation Assistive Aids," Department of Mechanical, Materials & Aerospace Engineering, Univ. of Central Florida, Orlando, FL, March 2001.
- "Reconfigurable Manipulation Assistive Aids," Department of Mechanical and Aerospace Engineering, State University of New York, Binghamton, NY, February 2001.
- "Passive Reconfigurable Manipulation Assistive Aids," Department of Aerospace and Mechanical Engineering, University of Notre Dame, South Bend, IN, February 2001.
- "Reconfigurable Manipulation Assistive Aids," Department of Mechanical and Aerospace Engineering, State University of New York, Buffalo, NY, February 2001.
- "Passive Reconfigurable Manipulation Assistive Aids," Mechanical Engineering, Rice University, Houston, TX. January 2001.
- "Assistive Aids for Augmenting Human Manipulation," Canadian Space Agency Workshop on Space Robotics, St-Hubert, Quebec, Canada. August 27, 1999.
- "Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices," Department of Mechanical Engineering, Massachusetts Institute of Technology, Boston, MA. April 1999.
- "Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices," Department of Mechanical Engineering, McGill University, Montreal, Canada, April 1999.
- "Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices," Department of Mechanical Engineering, Texas A&M University, College Station, TX, April 1999.
- "Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices," Department of Mechanical Engineering, University of California, Irvine, CA, March 1999.
- "Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices," Department of Mechanical Engineering, University of California, Riverside, CA, March 1999.

- “Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices,” Department of Mechanical Engineering, University of Alabama, Tuscaloosa, AL, March 1999.
- “Virtual and Physical Prototyping of One-of-a-kind User-Customized Assistive Devices,” Department of Industrial Engineering, Texas Tech University, Lubbock, TX, February 1999.
- “Support Tools for the Design and Virtual Prototyping of One-of-a-kind Assistive Devices,” (with P. Song, V. Kumar, R. Bajcsy and R. Mahoney), National Science Foundation Design and Manufacturing Grantees Conference, Long Beach, CA. January 5-8, 1999.
- “Coupled Serial Chain Mechanisms: Design and Optimization” (with V. Kumar and G. K. Ananthasuresh), National Science Foundation Design and Manufacturing Grantees Conference, Long Beach, CA, January 5-8, 1999.
- “Rapid Prototyping of Rehabilitation Aids for the Physically Disabled” (with V. Kumar, R. Bajcsy and R. Mahoney), National Science Foundation Design and Manufacturing Grantees Conference, Seattle, WA, January 6-9, 1997.
- “All Terrain Hybrid Wheelchair” (with V. Kumar), Third Town Square Exhibition, Photonics East 1995 Symposium, SPIE – The International Society for Optical Engineering, Philadelphia, PA, October 24-26, 1995.
- “All Terrain Wheelchair” (with P. Wellman and V. Kumar), First Annual Robotic Wheelchair Exhibition, 14th International Joint Conference on Artificial Intelligence, Montreal, Canada, August 20-25, 1995.

Faculty Development Activity

- Career Development Workshop For New Faculty, University of Maine, Orono, ME, August 26, 2003.
- Teaching Workshop For New Faculty, The Center for Teaching and Learning Resources, University at Buffalo, August 21, 2003.
- 2002 Annual Conference and Exposition of the American Society for Engineering Education, Montreal, Canada, June 16-19, 2002.