Curriculum Vitae

Last updated April, 2009

Personal Data

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Status: US Citizen

Primary Academic Appointments

2007-present — Associate Professor with Tenure
Department of Biomedical Engineering
Division of Biokinesiology and Physical Therapy

2008-present — Associate Professor joint appointment
Department of Aerospace and Mechanical Engineering
Department of Computer Science

Professional Areas

Human Dexterous Manipulation, Biomechanics, Robotics, Computer Modeling of Neuromuscular Systems, Neuromuscular Control, Sensorimotor Integration, Optimization of Surgical and Non-Surgical Rehabilitation, Electromyography, Nonlinear System Dynamics, Mechanical Design.

Academic Summary

PhD — April, 1997
Design and Biomechanical Engineering Divisions
Mechanical Engineering Department
Stanford University
Specialization: Biomechanics

MS Eng — June, 1991
Queen's University
Mechanical Engineering Department
Specialization: Biomechanics

BS — June, 1988
Swarthmore College
Major: Engineering
Specialization: Structural Engineering

Academic Positions

2005-2008	Associate Professor with Tenure Sibley School of Mechanical & Aerospace Engineering Cornell University
2006-2008	Associate Professor of Applied Biomechanics Department of Orthopaedic Surgery Joan and Sanford I. Weill Medical College Cornell University
2005-2008	Associate Scientist, Research Division The Hospital for Special Surgery, New York, NY.
1999-2005	Assistant Professor, Sibley School of Mechanical & Aerospace Engineering, Cornell University.
1999-2005	Assistant Scientist, Research Division The Hospital for Special Surgery, New York, NY.
1999-2000	Consulting Assistant Professor, Department of Functional Restoration Stanford University School of Medicine.
1997-1999	Research Associate, Biomechanical Engineering Division Mechanical Engineering Department, Stanford University.
1997-1999	Lecturer, Mechanical Engineering Department, Stanford University.

Teaching

Engineering Courses Taught at the University of Southern California

2007-present	Fall and spring seminar series on Engineering, Neuroscience and Health. Weekly speakers at both the University Park and Health Sciences Campuses.
Fall 2007	ENGR 102: Engineering Freshman Academy Two section, each with enrollment of 40 students.

University of Southern California, Guest Lectures

Fall 2008	NEUR 532 Lecture. "Neuromechanics of dynamic manipulation in humans", December 10 ENGR105 lecture. Muscles as actuators, September 11 ENGR 105 lecture. Sensorimotor integration, September 23
Fall 2007	ENGR105 lecture. Muscles as actuators, September 6 ENGR 105 lecture. Sensorimotor integration, September 11 BME 452 lecture. Complex biomechanical systems. September 20

Engineering Courses Taught at Cornell University, Sibley School of Mechanical & Aerospace Engineering

Fall 2000-6	MAE479/579: Analysis and Simulation of Mechanical and Aerospace Systems. Enrollment: 42 (2000), 36 (2001), 40 (2002), 35 (2003), 30 (2004), 30 (2006)
Spring 2004	MAE663: Neural Control. Enrollment: 10
Spring 2001	MAE663: Advanced Topics in Neuromuscular Biomechanics. Enrollment: 10
Spring 2000-03, 05	ENGRG 606: Fundamentals of Biomedical Engineering II. Module 3: Section on Muscle mechanics, College of Engineering. In conjunction with Profs. Bartel and van der Meulen. Enrollment: 12 (2000), 24

	(2001), 24 (2002), 14 (2003). Lecture on "Muscle function" and "EMG " Laboratory
Spring 2000, 2, 3, 5, 7	MAE463: Neuromuscular Biomechanics. Enrollment: 10 (2000), 40 (2002), 25 (2003), 26(2005), 28 (2007).
Fall 1999	MAE325: Mechanical Design and Analysis. Sibley School of Mechanical & Aerospace Engineering. In conjunction with Prof. Ruina. Enrollment: 85

Cornell University, Guest Lectures

Summer 2002	Curie Academy. College of Engineering. "Neuromuscular Biomechanics"
Spring, Fall 2001	ENGG 501: Bioengineering Seminar. College of Engineering. "Neuromuscular Biomechanics of the Hand"
Fall 2000	ENGRI 120: Introduction to Biomedical Engineering. College of Engineering. "Rehabilitation of hand function"
Spring 2000	Ergonomics Class. College of Human Ecology. "Biomechanics".
Fall 1999	ENGG 501: Bioengineering Seminar. College of Engineering. "Hand Biomechanics" (November 18th).

Stanford University, Mechanical Engineering Department

1997-1999	Graduate Seminar in Biomechanics for the Biomechanical Engineering Division. Fall, Winter and Spring (1997-1998), Spring (1999).

Stanford University, Mechanical Engineering Department, Guest Lectures

Spring 1998	Lecture on Moment Arms, Gear Ratios and Structural Elements of the Body for the undergraduate class ME180 "Form and Function of the Musculoskeletal System."
Fall 1998	Two lectures on Muscle Physiology, Muscle Modeling and Muscle Coordination for the graduate class ME281 "Orthopedic Biomechanics."
Fall 1997	Two lectures on Muscle Mechanics for the graduate class ME281 "Orthopedic Biomechanics."

Teaching Assistantships

1989-1991	Air Compressor Laboratory, Fall 1991 Tempering Laboratory, Spring 1990 Kinematics Class, Fall 1989 Mechanical Engineering Department, Queen's University

Research

Research Positions

Post-doctoral:

2006	Visiting Scientist, Karolinska Institute, Neuropediatric Research Unit. Stockholm, Sweden. Sabbatical Leave position funded by the Wenner-Gren Foundation.
2005-2006	Visiting Scientist, Max Planck Institute for Human Cognitive and Brain Sciences, Sensorimotor Coordination Group. Munich, Germany. Sabbatical Leave. Sabbatical Leave position funded by the Alexander von Humboldt Foundation.
1999-present	Director, Neuromuscular Biomechanics Laboratory, Sibley School of Mechanical & Aerospace Engineering, Cornell University.
1991-1999	Biomedical Engineer, Neuromuscular Systems Section Rehabilitation Research and Development Center VA Palo Alto Health Care System, Palo Alto, CA Established and directed a program to study the coordination of hand musculature during grasping to improve surgical restoration of grasp in quadriplegia

Pre-doctoral:

1991-1997	Research Assistant, Doctoral Program Design and Biomechanical Engineering Divisions Mechanical Engineering Department, Stanford University
1989-1991	Queen's-CIDA Scholar Mechanical Engineering Department, Queen's University Developed non-invasive *in-vivo* method to quantify wrist kinematic integrity
1988	Swarthmore College, Engineering Program Senior Year Project Finite element model of stress profile at boundary between total wrist implant metal stem and metacarpal bone
1987	Swarthmore College, Engineering Program Junior Year Independent Project Biomechanics of the wrist joint, design specifications for total wrist prostheses, and evaluation of the three common models
1986	Swarthmore College, Engineering Program Sophomore Year Independent Project Designed and built uni-axial force plate to investigate the impact force attenuation properties of running shoes
	Swarthmore College, Engineering Program Sophomore Year Summer Internship Computer simulation of bird migration trajectories
	U. of Pennsylvania Biomedical Engineering Program Design of a tooth-root implant as part of a Graduate Level Biomaterials Class

Post-Doctoral Fellow Supervision in Research at the University of Southern California

2009--present	Heiko Hoffmann, PhD. Project: Machine learning applied to slow finger movements.

2008--present	Jason Kutch, PhD. Projects: Motor noise in the planning and execution of sensorimotor function; Neural control finger motion and force.
2007--2008	Kevin Keenan, PhD. Projects: Stochastic combination of single motor unit action potentials into surface EMG; Control of finger motion and force.
2007-2008	Weiwei Li, PhD. Projects: Extraction of optimal control strategies in the neuromuscular system; Real-time estimation of biomechanical parameters.

Post-Doctoral Fellow Supervision in Research at Cornell University

2006-2007	Madhusudhan Venkadesan. Nonlinear dynamical approach to quantification of sensorimotor integration.
2005-2007	Anupam Saxena, PhD. Project: Computational inference of complex biological structures. Visiting Professor from IIT Kangpur.
2005-2007	John Rieffel, PhD. Project: Locomotion in biologically inspired tensegrity structures.
2005-2007	Sanjay Kumar, PhD. Project: Machine-learning approaches to estimate the structure of complex biological systems.
2005-2007	Kevin Keenan, PhD. Projects: Stochastic combination of single motor unit action potentials into surface EMG; Control of finger motion and force
2004-2005	Chandana Paul, PhD. Project: Locomotion in biologically inspired tensegrity structures.
2004-2005	Jae Woong Yi, PhD. Projects: Servo-actuation of cadaveric tendons. On sabbatical leave from the Agency for Defense Development, South Korea.
2001-2007	Stephanie Roach, MD, Board Certified Hand Surgeon. Visiting Scientist. Project: Biomechanical analysis of distal radius fracture plates.
2000-2001	Natalia Castillo, MD, Specialist in Physical Medicine and Rehabilitation. Visiting Scientist. Project: Pinch strength and dexterity in osteoarthritis of the thumb.

Student Supervision in Research at the University of Southern California as Primary Adviser

Graduate Students in the Doctoral Program, Computer Science:

2008-present	Evangelos Theodorou. Optimal control of finger movement and force.

Graduate Students in the Doctoral Program, Biomedical Engineering Department:

2007-present	Manish Kurse. Unsupervised inference of biomechanical systems.
2007-present	Jonathan Weisz. Sensorimotor control in response to perturbations.

Graduate Students in the Doctoral Program, Division of Biokinesiology and Physical Therapy:

2007-present	Sudarshan Dhayanidhi: Clinical estimation and therapeutic enhancement of sensorimotor integration

Graduate Students in the Doctoral Program, Neuroscience Program:

2007-present	Cornelius Raths. Neuromuscular control of multifinger manipulation.

Undergraduate Students in the Bachelor of Science in Engineering Program at the Viterbi School of Engineering:

Spring 2008	Rohit Majumdar: Perturbation analysis for biomechanical systems.
Spring 2008	Robert Taft: Control of a six degree-of-freedom robot.

Summer 2008	Alexandra (Lolly) Simoni: Designing and control of a pneumatic perturbation device for the fingertips. Harvey Mudd College, NSF- Research Experiences at the Biology-Mathematics Interface (REBMI)
Summer 2008	Kari Oki: Designing and implementing a motion capture system for finger movement. Scripps College, NSF- Research Experiences at the Biology-Mathematics Interface (REBMI)

Student Supervision in Research at Cornell University as Primary Adviser

Graduate Students in the Doctoral Program, Sibley School of Mechanical and Aerospace Engineering:

2006-2007	Manish Kurse. 1st year student.
2004-2007	Daniel Brown. NSF-IGERT Graduate Research Fellow: Control of multifinger manipulation.
2001-2007	Veronica Santos. NSF Graduate Research Fellow: Bayesian approach to patient-specific biomechanical models.
2000-2006	Madhusudhan Venkadesan. M&AE Graduate Fellow (2001-2): Control of finger musculature during manipulation of objects with unstable nonlinear dynamical behavior.

Graduate Students in the Doctoral Program, Biomedical Engineering Department:

2005-2007	Alicia Medina: Muscle coordination for manipulation.

Post-Graduate Research Associates at the Sibley School of Mechanical and Aerospace Engineering:

2002-2003	Rebecca J Avrin, MS. A hybrid cadaveric/optimization investigation of the actions of tendon transfers to restore thumb opposition.

Graduate Students in the Masters of Science in Engineering Program at the at the Sibley School of Mechanical and Aerospace Engineering:

2001-2003	Laurel Kuxhaus. NSF Graduate Research Fellow. MS Thesis title: Changes in thumb 3D force production with selective paralysis.
2001-2002	Jonathan Pearlman. NSF Graduate Research Fellow. MS Thesis title: Fundamental actions of the muscles of the thumb.
2003-2005	Saurabh Mahapatra: The production of slow finger motion.
2003-2005	Vikrant Anand. M&AE Graduate Fellow (2004): Genetic algorithms to extract musculoskeletal models from experimental data.

Graduate Students in the Masters of Engineering Program at the at the Sibley School of Mechanical and Aerospace Engineering:

2004-2005	David Ashley. NSF Graduate Research Fellow; IGERT Fellow: Simultaneous control of finger motion and force.
2003-2004	Stanley Song: Sequential control of finger motion and force.
2001-2002	Michael Lin: Study of the evolution of the extensor mechanism of the fingers using computational geometry. Co-Advised with Prof. Hod Lipson.
2000-2001	Jeonghoon Oh: Design of a non-metallic exoskeleton to measure wrist kinematics under load.
1999-2000	Erika Anderson: Computer-control of tendon tensions in cadaver hands.
1999-2000	Michael Graffeo: Programming of force-feedback virtual reality robots.

Graduate Students in the Masters of Engineering Program at the Program in Computer Science:

2000-2001	Xiaozheng Zhong: Programming of force-feedback virtual reality robots.
1999-2000	Nathan Wilson: Web-based visualization of biomechanical function.

Undergraduate Students in the Bachelor of Science in Engineering Program at the Sibley School of Mechanical and Aerospace Engineering:

2005-2007	Shannon Marilee Miller: Motion capture of the human hand.
2006-2007	William Hughes Seidel: Inference of the structure of artificial tendon networks.
2005-2006	Karen Chin: Viscoelastic actuators.; Motion capture of the human hand
2005	Demelza Guizar: Tendon-driven robotic finger.
2003-2004	Christopher Kim: Feedback control of arm movements.
2002-2004	Joshua Savrin: Load dependence of thumb kinematics.
2002-2003	Nicole M Graf: Apparatus to quantify the response of the skeletal column of the thumb to loading during prehension.
2002-2003	Joseph Munaretto: Apparatus to study the state-estimation abilities of the nervous system.
2002-2003	Manuel Hernandez: Computer-controlled system to test tendon-gliding friction.
2002-2004	Richard W Ducharme: Analysis of electromyography of the thumb.
2002	Paul Scholten: Characterization of muscle timing in mudskippers gait from intramuscular EMG recordings.
2000-2001	Michal Weisman: Design and construction of a computer-controlled system to apply tension to cadaver tendons of the hand.
2000-2001	Michael Lin: Manufacturing of devices to test grasp dexterity.
2000-2001	Paul Wilson: Design of virtual objects to test manipulation ability using a force-feedback robot.
2000-2001	Jennifer Pretz: Measurement of hand impairment in patients with osteoarthritis of the thumb.
2000-2001	Kirana Ramakrishna: Measurement of manipulation ability in unimpaired adults.

Undergraduate Students in the Bachelor of Science in Biological and Environmental Engineering Program:

2005-2006	Brenda Chen: Computed tomography of thumb bones during pinch.
2004-2006	Eric Samorodnitsky: Quantification of load-dependent carpometacarpal kinematics.
2004	Alexander M. Deyle: Quantification of load-dependent carpometacarpal kinematics.

Undergraduate Students in the Bachelor of Science in Biology Program:

2003-2005	Erica Weiss: Distortion of thumb force production in median nerve palsy.

Undergraduate Students in the Bachelor of Architecture Program:

2003	Nina F Shih: Computer animation of the human hand.

Undergraduate Students in the Bachelor of Science in Engineering Program at the Program in Computer Science:

2000-2001	Joel Skaliotis: Programming of a force-feedback robot to create virtual objects to study dynamic manipulation.

Underrepresented Minority Undergraduate Students hosted for the Leadership Alliance summer program:

2003 Salvador Turrubiartes: Building a dual processor computer.

Underrepresented Minority High School Students hosted for the NASA-SHARP summer program:

2002 Luis Rodriguez: Building a computer model of the hand.

Student Supervision in Research at Stanford University

Graduate Students in the Doctor of Engineering Program at the Department of Mechanical Engineering:

1999-2005 Niels Smaby: Measurement of strength and dexterity impairments in spinal cord injured patients. Dissertation committee member.

Undergraduate Students in the Department of Mechanical Engineering:

1998 Supervised three Mechanical Engineering Student Team to develop an MRI-friendly instrumented wrist exoskeleton for the undergraduate class ME113 "Mechanical Engineering Design." Primary Adviser.

Research Support

Current Research Support

2008-2012 **Principal Investigator** "Reverse-engineering the human brain's ability to control the hand"
Nationals Science Foundation EFRI-COPN 0836042
E. Todorov and Y. Matsuoka, U. Washington, Co-Principal Investigators Goal: Dexterous hand manipulation remains at the frontier of engineering research that requires a synergistic combination of novel computational and experimental approaches.

2008-2013 **Thrust Leader of Project 1** "Optimizing Participation Through Technology (OPTT) Rehabilitation Engineering Research Centers Program (RERC)"
Award – 84-133E2008-8: (Winstein & Requejo, Co-PI's)
The National Institute on Disability and Rehabilitation Research (NIDRR) program for Technologies for Successful Aging with Disability
Department of Education
Goal: To enhance the lives of individuals aging with and into disability through cutting-edge technologies made accessible for all intended beneficiaries while providing training opportunities for future rehabilitation researchers.

2005-2009 **Principal Investigator**, "Structure and function of the fingers' tendinous apparatus "
National Institutes of Health; R01-AR052345-01
Priority score: 108; Percentile priority score: 0.5%
Lipson, H, Roach, SS, Co-Investigators; Michael Hausman, Co-Investigator (Mount Sinai Medical Center)

Goal: To characterize the biomechanical coupling within and across fingers due to the tendinous anatomy.

2004-2008 **Principal Investigator**, "Control of finger movement and force for precision pinch" Valero-Cuevas (PI)
National Institutes of Health, R01-AR050520-01A1.
Priority score 132; Percentile priority score: 0.8%.
Goal: To describe and explain how the musculature of the index finger is coordinated to orchestrate fingertip motion and force, a fundamental requirement of dexterous manipulation.

2004-2009 **Co-Investigator**, (L. Mandl, PI), "An RCT for Treating Carpometacarpal Osteoarthritis"
National Institutes of Health, K23 AR050607-01
Goal: To establish the optimal medical treatment for carpometacarpal osteoarthritis, and evaluate accurate outcome measures of hand impairment for carpometacarpal joint dysfunction.

Past Research Support

2006-2008 **Principal Investigator** (No number), "Cortical Development of dexterity in children"
Stiftelsen Frimurare Barnhuset
(Swedish Freemason Children's Hospital Foundation)
Goal: Travel grant to establish the changes in cortical networks for hand dexterity that accompany natural development in young children.
H. Forssberg (Host, Karolinska Institute)

2005-2008 **Principal Investigator**, "Developing a clinically useful measure of dynamic pinch"
National Institutes of Health, R21-HD048566
Priority score 163; Percentile priority score: 12.8%.
Guckenheimer, J (Co-Investigator); Hotchkisss, R, Mandl L, Co-Investigators
(The Hospital for Special Surgery)
Goal: To combine robotics concepts of grasp stability with bifurcation analysis of nonlinear systems to quickly characterize dynamic pinch function in the clinic.

2004-2007 **Co-Principal Investigator,** (Guckenheimer, PI), "Integrative Graduate Education and Research Traineeship (IGERT): Program in Nonlinear Systems."
National Science Foundation, Division of Graduate Education. Gilmour, Sethna, Strogatz Co-Principal Investigators
Award No. 0333366.
Goal: Graduate fellows in the IGERT program participate in courses, seminars internships and projects that give them experience in doing interdisciplinary research involving nonlinear systems.

2003-2007 **Principal Investigators** (Lipson and Valero-Cuevas) "Biologically Inspired Hexapod Platform with Decentralized Neurocontrol and Adaptive Morphology"
National Geospatial-Intelligence Agency (NGA)
NMA501-03-1-2013 DCI Post Doctoral Fellowship
Goal: To use topological and parametric co-optimization to design and build a legged robot to navigate rough terrain.

2003-2008 **Principal Investigator**, "CAREER: Educational Program in Neuromuscular Biomechanics & Uncovering the Neuromuscular Biomechanics of Dexterous Manipulation"
National Science Foundation
Faculty Early Career Development Program CAREER award.
BES-0237258
Directorate for Engineering, Biomedical Engineering/Research to Aid Persons with Disabilities Program, Division of Bioengineering and Environmental Systems.
Goal: To develop an integrative characterization of human dexterous manipulation by combining biomechanics, nonlinear mathematics, electromyography and functional brain imaging.

2002-2007 **Co-Principal Investigator** (Cornell), "Alliance for Graduate Education and the Professoriate (AGEP): The Central New York to Puerto Rico-Mayagüez (CNY-PR)"
National Science Foundation, Division of Human Resources Development, Minority Graduate Activities. Johnson (PI, Syracuse University). Warhaft, Bustamante Co-Principal Investigators
Goal: To increase the number of science, mathematics and engineering professors from underrepresented groups.

2003-2006 **Principal Investigator** (Cornell University), "Collaborative Research: Information Technology Research (ITR): A Robotics-Based Computational Environment to Simulate the Human Hand"
National Science Foundation
Directorate for Computer and Information Science and Engineering, Robotics and Computer Vision Program, Division of Information and Intelligent Systems.
ITR-0312271
P. Allen, Principal Investigator (Columbia University).
Goal: To create a realistic computer model of the human hand for robotic and motor control research.

2002-2006 **Principal Investigator**, "Load dependence of thumb and carpal bone configuration during static pinch"
Weill Cornell Center for Aging Research and Clinical Care Grant.
Goal: To characterize the naturally occurring *in-vivo* movement of the skeletal column of the thumb during pinch to develop measures of degeneration of thumb joints in osteoarthritis.

2004-2005	**Principal Investigator**, "A hybrid cadaveric/optimization simulation of static force production in the paretic and post-operative thumb" $80,000 total cost Whitaker Foundation, Transitional Funding Grant. Research Grant No. RG-00-0397 Goal: To apply nonlinear parameter optimization techniques to create subject-specific models of cadaveric human digits.
2001-2004	**Principal Investigator**, "A hybrid cadaveric/optimization simulation of static force production in the paretic and post-operative thumb" Whitaker Foundation Biomedical Engineering Research Grant. Research Grant No. RG-00-0397 Goal: To establish the biomechanical interactions among thumb muscles that produces thumbtip forces in the able, paretic and post-operative thumb.
1999-2001	Lead-author as post-doctoral research associate, "Functional Restoration of Grasp in Quadriplegia" Peer-reviewed, Veterans Affairs Rehabilitation Research and Development Service. Three year Merit Review continuation project to study the restoration of index-thumb grasps. 10% effort. Drs. Felix Zajac and Vincent R. Hentz, Co-Principal Investigators.
1996-1999	Lead-author as graduate student, "Functional Restoration of Grasp in Quadriplegia" Peer-reviewed, Veterans Affairs Rehabilitation Research and Development Service. Three-year Merit Review project to study the biomechanics of index-thumb grasps. 100% effort. Drs. Felix Zajac and Vincent R. Hentz, Co-Principal Investigators.
1994-1996	Lead-author as graduate student, "Functional Restoration of Grasp: Pilot Proposal" Peer-reviewed, Veterans Affairs Rehabilitation Research and Development Service. One year project to establish feasibility of modeling the force generating capabilities of human fingers. 100% effort. Drs. Felix Zajac and Vincent R. Hentz, Co-Principal Investigators.
1989-1991	Queen's-CIDA Research Scholarship Two-year grant to pursue graduate studies and research. Mechanical Engineering Department, Queen's University & Canadian International Development Agency. 100% effort.
1986	Eugene M. Lang Foundation Independent Research Award Grant to study wrist joint total prostheses Swarthmore College. 100% effort.

Research Support for Undergraduate Students

Past Research Support

Summer 2005	Eric Samorodnitsky Demelza Guizar Brenda Chen Karen Chin
Summer 2004	Erica Weiss Alexander M. Deyle Eric Samorodnitsky Competitive Research Experience for Undergraduates, National Science Foundation, Summer stipends. Principal Adviser
Fall 2001	Michal Weisman, GE "Faculty of the Future" research grants for Undergraduate women in Science. Competitive, $1,500 Stipend. Principal Adviser
Summer 2000, 2001	Michal Weisman, "Bartel Family Fund" research grants for Undergraduate students Competitive, $1,500 Summer Stipend. Principal Adviser
Summer 2000	Kirana Ramakrishna, GE "Faculty of the Future" research grants for Undergraduate women in Science Competitive, $1,500 Stipend. Principal Adviser

Engagement

Academic Engagement at the University of Southern California

March 2009	Spaker, USC Neurorehabilitation Retreat, Huntington Library, Pasadena, CA
February 2009	Participant, BMES ERC Annual Retreat, Mandalay Beach, Oxnard, CA
2009	Chair, Biomedical Engineering Department. Chair Evaluation Committee
August 2008	Participant, Provost's Research Leadership Retreat, Descanso Gardens
October 2008	Participant, Keck School of Medicine and Viterbi School of Engineering Research Retreat, Huntington Beach
February 2008	Participant, USC Research Summit, Huntington Beach
2008-present	Director, Diversity and Training, BMES ERC
2008	Member, delegation to launch Viterbi-UNAM collaboration
2008	Chair, Ad hoc appointment committee
2008	Interview Committee, Trustee Scholarship Program
2008	Member, Engineering Faculty Council

2007-present	Lead, UCS-CONACyT collaborative agreement application

Academic Engagement at Cornell University

2007	Search Committee Member, Biomechanics Position
2007-2008	Member Undergraduate Biology Curriculum Task Force
2004-present	Founder and faculty coordinator International Undergraduate Engineering Research Internship/Mexico. Program to host outstanding undergraduate engineering students from first-rank Mexican universities to do a research internship with a Cornell engineering faculty member.
2003-present	Founder and faculty coordinator Graduate Fellowship Agreement between Mexico's National Committee on Science and Technology (CONACYT) and Cornell University to continually fund 10 3-year graduate research fellowships across Cornell.
2003	Member Search Committee for Director of Minority Programs in the School of Engineering
2004-5	Cornell Representative at the Postgraduate Recruitment Fair, Mexican National Council for Science and Technology (CONACyT), Mexico City.
2002-present	Faculty Adviser Mexican Student Association

Academic Engagement at the Sibley School of Mechanical & Aerospace Engineering, Cornell University

2003-2004	Educational Programs Assessment Committee (EPAC)
2001-2003	Masters in Mechanical Engineering Committee
2001-2003	Academic Committee
1-2001	Department Secretary

Recruitment of Underrepresented Minorities, Cornell University

2004	University of Puerto Rico at Mayagüez, Ivy League Graduate Fair, September 27.
2003	University of Puerto Rico at Mayagüez, CNY-PR Alliance for Graduate Education and the Professoriate, Inaugural Event, February 20.

Professional Engagement

Associate Editor:	IEEE Transactions on Biomedical Engineering (2003-2008)
Journal Reviewer:	Brain Research Clinical Biomechanics Experimental Brain Research IEEE Transactions on Biomedical Engineering IEEE Transactions on Rehabilitation Engineering IEEE Transactions on Systems, Man and Cybernetics Journal of Applied Biomechanics

Journal of Applied Physiology
Journal of Biomechanical Engineering
Journal of Biomechanics
Journal of Hand Surgery
Journal of Neurophysiology
Journal of Orthopaedic Research
Journal of Theoretical Biology
Medical & Biological Engineering & Computing
Muscle & Nerve

Article Reviewer: Yearbook of Hand Surgery (1995, 1996)
IEEE International Conference on Robotics and Automation (1997)

Contributing Editor: Yearbook of Hand Surgery (1997-2000)

Review Panels: **National Science Foundation**
•Directorate for Engineering, Division of Bioengineering and Environmental Systems, Biomedical Engineering and Research to Aid Persons with Disabilities: **2002**; **2003**.
•Directorate for Social, Behavioral and Economic Sciences, Division of Behavioral and Cognitive Sciences, Physical Anthropology Program: **2003**.

National Institutes of Health, Center for Scientific Review
• Motor Function, Speech and Rehabilitation (MFSR) Study Section. *Ad hoc* member: **2004**. Regular member **2005-2009.**
• Musculoskeletal Rehabilitation Sciences (MRS) Study Section. Musculoskeletal, Oral and Skin Sciences Integrated Review Group. *Ad hoc* member: **2004.**

Taskforces: **National Institutes of Health,** Taskforce on childhood motor disorders. Bethesda, MD. June 7-9, 2008.

Awards Committee **East Los Angeles College, Monterey Park, CA**
Math, Engineering, Science Achievement (MESA) and Minority Science and Engineering Improvement (MSEIP) programs
Summer research Science Presentations, September **2008**

The Claremont Colleges, Monterey Park, CA
Research Experiences at the Biology-Mathematics Interface (NSF-REBMI)
Summer Science Projects, September **2008**

Conferences: **Chair (2008)**
ICRA 2008 Tutorial, Pasadena, CA
"Is human-like dexterous manipulation within our robotic grasp?"

Program Chair (2007)
30th Annual Meeting of the American Society of Biomechanics

Symposium Chair, Progress in Motor Control V
August 17-20, 2005
State College, PA.

Program Committee Member
28th Annual Meeting of the American Society of Biomechanics
and Co-Chair of session on Neuro-Orthopedics
September 8-11, 2004
Portland, OR.

Chair of session on Control of Neuromuscular control of a fascinatingly complex system: The hand
26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, September 1-4, 2004
San Francisco, CA.

Program Committee Member
27th Annual Meeting of the American Society of Biomechanics
September 24-27, 2003
Toledo, OH.

Co-Chair of Upper extremity biomechanics session
25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, September 17-21, 2003
Cancun, Quintana Roo, Mexico.

Program Committee Member
26th Annual Meeting of the American Society of Biomechanics
World Congress of Biomechanics, August 4-9, 2002
Calgary, Alberta, Canada.

Co-Chair of ASB Symposia on the Hand and Upper Extremity
World Congress of Biomechanics, August 4-9, 2002
Calgary, Alberta, Canada.

Chair of Instructional Course on the Neuromuscular Biomechanics of the Hand
Meeting of the American Society for Surgery of the Hand, October 4-6, 2001, Baltimore, Maryland, U.S.A.

Chair of Symposium on hand and finger control
In Progress in Motor Control II Conference: Structure-Function Relations in Voluntary Movements, August 19-22, 1999, The Pennsylvania State University, State College, Pennsylvania, U.S.A.

Chair of Review Board
ICORR '99, Sixth International Conference on Rehabilitation Robotics, July 1-2, 1999, Stanford University, Stanford, California, U.S.A.

Memberships:
American Society of Biomechanics
American Society of Mechanical Engineers
Institute of Electrical and Electronics Engineers: Engineering in Medicine and Biology Society
International Society of Biomechanics
Society for Neuroscience

Awards

2006 **Wenner-Gren Fellowship.** From the Wenner-Gren Foundation to work at Neuropediatric Research Unit of the Karolinska Institute in Stockholm, Sweden. (Declined)

2005-2006 **Humboldt Research Fellowship.** From the Alexander von Humboldt Foundation to work at the Max Planck Institute for Human Cognitive and Brain Sciences in Munich, Germany.

2003 **Post-Doctoral Young Scientist Award**, American Society of Biomechanics. Annual Meeting, Univ. of Toledo, Toledo, OH.

2003 **National Science Foundation Faculty Early Career Development Program CAREER award**.

1999 **Ersten Preis, Tiroler Innovationspreis**
(First Prize, Innovation Prize from the State of Tirol)
For the design of a reusable frame system to create architectural arch forms, Innsbruck, Austria.

1998 **Best Poster Post-Doctoral Award**
First National Meeting of the Rehabilitation Research and Development Service of the Department of Veterans Affairs. Washington, DC.

1988-1989 **Fellow, The Thomas J. Watson Foundation**
Award to study Sankhya Yoga Philosophy in India and Nepal.

1987 **First Prize, Outstanding Undergraduate Research Paper Award**, Philadelphia Club of Engineers.

1984 **4-year Undergraduate Engineering Scholarship**
Institute for International Education and Swarthmore College

Awards to students

2006 **Journal of Biomechanics Award**. M Venkadesan. 30th Annual Meeting of the American Society of Biomechanics. Venkadesan, M, J Guckenheimer, FJ Valero-Cuevas. Dynamic multisensory integration at the boundary of instability is explained by a simple data-based model. Blacksburg, VA.

2005 **Boeing Company Best Paper Award**. Paul C. International Conference on Advanced Robotics, ICAR. "Gait Production in a tensegrity based robot" C. Paul, J W Roberts, H Lipson, FJ Valero-Cuevas

2005 **First Place Award**. 3rd Annual Bioengineering Expo, Institute for Biological Engineering, Cornell University Chapter. “Load dependence of carpal bone kinematics” A Deyle, E Samorodnitsky, S Wolfe, S Backus, D Mintz, FJ Valero-Cuevas.

2005 **ISB Young Investigator Award for Poster Presentation**. VJ Santos. XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics, Cleveland, OH. Santos VJ, Miller AT, Allen PK, and Valero-Cuevas FJ. Implementing data-driven models of the human thumb into a robotic grasp simulator to predict grasp stability.

Distinctions

2007 **Program Chair**. 30th Annual Meeting of the American Society of Biomechanics.

2005-2009 **Study Section Regular Member**. National Institutes of Health, Center for Scientific Review. Motor Function, Speech and Rehabilitation (MFSR) Study Section.

2004 **Sloan Faculty**. Elected by the Alfred P. Sloan Foundation to serve as mentor to Sloan Scholars at Cornell University Alfred P. Sloan Foundation Minority Ph.D. Program.

2003 **Doctoral Dissertation Opponent**. Dept. of Woman and Child Health, Neuropediatrics Research Unit, The Karolinska Institute, Stockholm, Sweden. Anders Fagergren, Candidate. Prof. Hans Forssberg, Principal Adviser. December 5, 2003.

2002 **Finalist, Post-Doctoral Young Scientist Award**, American Society of Biomechanics. IVth World Congress of Biomechanics.
Calgary, Alberta, Canada.

2002 **Elected participant** in the *New Century Scholars Workshop* for young faculty sponsored by the National Science Foundation at Stanford University.

2002-2005 **Featured engineer** in the "*Ask an Engineer*" traveling interactive show "Tech City" sponsored by the National Science Foundation.

1999 **Finalist, ISB Young Investigator Award**
17th Congress of the International Society of Biomechanics.
Calgary, Alberta, Canada.

1988 **Associate Member, The Scientific Research Society Sigma-Xi.**

1996 **Finalist, ASB Pre-Doctoral Young Scientist Award**
Meeting of the American Society of Biomechanics
Atlanta, Georgia.

1989-1991 **Queen's-CIDA Scholar**. Canadian International Development Agency
Two-year full scholarship to pursue Masters Degree.

1986 **Eugene M. Lang Foundation Independent Research Award**
Swarthmore College.

1986, 1987 **Twice Recipient, Scott Lilly Engineering Scholarship**
Swarthmore College.

Keynote Lectures

2009 **Keynote Speaker**. School of Dentistry Research Day, The University of Southern California, Los Angeles, CA. February 18th 2009.

2008 **Keynote Speaker**. National Polytechnic Institute, UPIBI Bioengineering Conference, Mexico City. April 4, 2008.

2007 **Presidential Keynote Speaker**. 2007 The Gait and Clinical Movement Analysis Society (GCMAS) Annual Meeting.

2007	**Plenary Speaker**. 2007 Society for Industrial and Applied Mathematics (SIAM) Conference on Applications of Dynamical Systems.

Media Coverage

January 2009	Front page feature article, La Opinión http://www.impre.com/laopinion/noticias/primera-pagina/2009/1/25/de-inmigrante-a-bioingeniero-105403-1.html
February 2008	What gives us finger dexterity? www.usc.edu/uscnews/stories/14839.html www.physorg.com/news121616418.html www.physorg.com/pdf120313173.pdf www.sciencedaily.com/releases/2008/01/080123085319.htm viterbi.usc.edu/news/news/2008/what-gives-us.htm
April 2002	Feature Article in the *Cornell Engineering Magazine* www.engineering.cornell.edu/engrMagazine/magazine.cfm?issue=SPRING2002&page_number=1&section=feature4
November 2001	Radio interview in the program *Science Update* from the American Association for the Advancement of Science. www.scienceupdate.com/Nov01.html#011120 Link "The Thumb"
October 2001	Newspaper article in the *Ithaca Journal* www.ithacajournal.com/news/stories/20011001/topstories/1034517.html

Professional

2008-present	Seed funding to develop commercial products to asses and improve dexterity. Karolinska Institute Development Office (KIAB). With Prof. Hans Forssberg.
1996-present	Co-Founder and Engineering Director, Multiarc Vertriebs GmbH & CoKG. A Corporation for structural and architectural design
1988	Engineer-in-Training exam

Mechanical Design Experience

1998	A multi-actuator system to test muscle function, simulate specific palsies and evaluate surgical outcomes on cadaver forefingers
1997	A sensory-motor system to enhance, exercise and clinically quantify grasping ability
1996	A reusable, adjustable form-work mechanism to construct architectural arches and archways
1995	Robot-based finger force testing station
1992	A tape dispenser for the masking of automotive parts. Funded by Ford Motor Co.
1990	Low-cost apparatus to quantify wrist joint integrity
1987	Low-cost uniaxial force plate for human jumping studies
1985	Tooth-Root incisor implant

Invited Seminars

2009 "A short introduction to the study of complex neuromuscular systems" Chemistry Seminar Series, East Los Angeles Community College, Los Angeles, CA, March 18th, 2009.

2008 "Brain-body interactions for hand dexterity: a clinical view" Noon conference, Orthopedics Department, University of California at San Diego, San Diego, CA, December 8th, 2008.

2008 "Exploring the hand-brain system to develop clinically useful measures of hand function" Grand Rounds, UCLA/Orthopaedic Hospital Center for Cerebral Palsy, University of California at Los Angeles, Los Angeles, CA, July 16th, 2008.

2008 "The challenge of dexterous robotic manipulation: Lessons learned from the human hand" Defense Advanced Research Projects Agency (DARPA) NeuroRobotics Workshop, San Diego, CA, May 22nd, 2008.

2008 "Anatomical features of the hand enabling brain-body co-evolution for dexterous function" Joint Science Department of The Claremont Colleges, Claremont, CA, April 6th, 2008.

2008 "Neuromechanics of dynamic manipulation in humans" Mathematical Challenges in Developmental Biology 2008-2009. Workshop 4: Neuromechanics of Locomotion: Participants. Mathematical Biosciences Institute. The Ohio State University. April 3rd, 2008.

2008 "Towards understanding dexterous manipulation in humans" Mathematical Challenges in Developmental Biology 2008-2009. Workshop 3: Biomechanics and Neural Control - Muscle, Limb, and Brain. Mathematical Biosciences Institute. The Ohio State University. January 17th, 2008.

2007 "Bioengineering approaches to neurological problems." Department of Neurology & Neuroscience, Burke-Cornell Medical Research Institute, Weill Medical College of Cornell University. March 2, 2007.

2006 "Training digital precision movements." Control of Movement - Cellular bases of motor behavior. Course directors Professors Ole Kiehn and Sten Grillner. Department of Neuroscience, Karolinska Institute, Stockholm. November 3, 2006.

2006 "Is the human hand versatile because of, or in spite of, its anatomy." The School of Computer Science, Carnegie Mellon University, Pittsburgh, PA. September 29, 2006.

2006 "Inverse biomimetism: Understanding neuromuscular systems though the lens of engineering science." The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. March 29, 2006.

2006 "Integrative biomechanical and neurophysiological approach to understanding complex neuromuscular systems." Aerospace and Mechanical Engineering Department, University of Southern California, Los Angeles, CA. March 6, 2006.

2005 "Experimental, computational and theoretical advances in the study complex neuro-musculo-skeletal systems." Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. December 7, 2005.

2005 "Cortical modulation of dynamic sensorimotor integration." Neuropediatric Research Unit, Karolinska Institut, Stockholm, Sweden. September 22, 2005.

2005 "Studies on sensorimotor integration during grasp." Max Planck Institute for Human Cognitive and Brain Sciences, Munich, Germany. September 12, 2005.

2005 "Experimental, computational and theoretical advances in the study complex neuro-musculo-skeletal systems." Concord Field Station, Harvard University. June 10, 2005.

2005 "Experimental, computational and theoretical advances in the study complex neuro-musculo-skeletal systems." Bioengineering Department, University of Southern California, Los Angeles, CA. March 21, 2005.

2005 "From lab to bedside: Clinical applications of basic research on the human hand." Joint meeting of the Board of Trustees of Cornell University and the Board of Supervisors of Cornell Weill Medical College. January 20, 2005.

2004 "Applying engineering to solve biological and clinical problems." Department of Engineering, Swarthmore College. December 6, 2004.

2004 "Hybrid motion/force control in human fingers." Department of Integrative Physiology, University of Colorado at Boulder. July 15, 2004.

2004 "An integrative paradigm to study the neuromuscular biomechanics of the fingers and their clinical rehabilitation." Nemours Biomedical Research, Alfred I duPont Hospital for Children, Wilmington, DE. June 14, 2004.

2004 "An integrative approach to the neuromuscular biomechanics of the fingers." Department of Kinesiology, Penn State University. April 9, 2004.

2004 "An integrative approach to the neuromuscular biomechanics of the fingers." Bioengineering Department, University of Southern California, Los Angeles, CA. April 6, 2004.

2004 "An integrative approach to the impairment and rehabilitation of finger function." Department of Biokinesiology and Physical Therapy, University of Southern California, Los Angeles, CA. April 5, 2004.

2004 "Neuromuscular Biomechanics of the hand." Bioengineering Department, Universidad Iberoamericana, Mexico, D.F., Mexico. March 12, 2004.

2003 "An integrative paradigm to understand hand function and its clinical rehabilitation." Department of Woman and Child Health, Neuropediatrics Research Unit, The Karolinska Institute, Stockholm, Sweden. December 4, 2003.

2003 "Biomechanics in the 21st Century" Keynote speaker. 2nd Mechantronics Symposium, Instituto Tecnológico de Estudios Superiores de Monterrey, Monterrey, Nuevo León , México, September 13.

2003 "Clinical quantification of hand function: An engineering challenge" Grand Rounds, Orthopedics Department, University of California at San Diego, San Diego, CA, August 6.

2002 "Stochastic Modeling of Biomechanical Systems" Department of Bioengineering, Arizona State University, Tempe, AZ, October 3.

2002 "Current State of Hand Models"
A.E. Mann Institute for Biomedical Engineering, University of Southern California, Los Angeles, CA, September 13-15.

2002 "Neuroanatomical Localization (Cortical) of a Neural System for Visual and Tactile Guidance of Dexterous Manipulation Tasks"
Sensorimotor Performance Program, The Rehabilitation Institute of Chicago, Chicago, IL , September 6

2002 "Neuroanatomical Localization (Cortical) of a Neural System for Visual and Tactile Guidance of Dexterous Manipulation Tasks"
Biomechanical Engineering Division, Mechanical Engineering Department, Stanford University, Stanford, CA, July 26

2001 "Neuromuscular Biomechanics of the Hand"
Neural Prosthesis Seminar Series, Cleveland FES Center, Case Western Reserve University, Cleveland, OH , October 11

2001 "Modeling of the Hand"
10th Anniversary Symposium of the National Center for Medical Rehabilitation Research, National Institutes of Health.
Bethesda, MD March 8

2001 "Neuromuscular Biomechanics of the hand: Clinical Implications"
Institute for Human Performance, SUNY Syracuse
Syracuse, NY February 1.

2001 "Modeling of the Hand"
Hospital La Raza, Servicio de Mano
Instituto Mexicano del Seguro Social
México, DF, January 9.

2000 "Novel Surgical Procedures of the hand"
Grand Rounds
The CV Starr Hand Surgery Center
The St. Luke's-Roosevelt Hospital Center
New York, NY, June 6.

2000 "Electromyography of the hand"
Hand Therapy Colloquium
Hand Therapy Clinic, The Hospital for Special Surgery
New York, NY, May 12.

2000 "Biomechanics and motor control of human digits"
Neurosciences Colloquium
Department of Neurology, University of Rochester
Rochester, NY, May 5.

2000 "Applying principles of robotics to understand the biomechanics, neuromuscular control and clinical rehabilitation of human digits"
Symposium on Dexterous Manipulation
International Conference on Robotics and Automation
San Francisco, CA, April 25.

2000 "Biomechanics and motor control of human digits"
Department of Biomedical Sciences
College of Veterinary Medicine
Cornell University, April 11

2000 "Biomechanics and motor control of human digits"
Theoretical and Applied Mechanics Colloquium
Cornell University, February 2

1999 "Biomechanics and motor control of human digits"
Biomedical Engineering Seminar, ENGRG 501
Cornell University, November 18

1999 "Biomechanics and motor control of human digits"
Biomedical Engineering Society
Cornell University, November 10

1999 "Biomechanics and motor control of human digits"
Department of Neurobiology and Behavior Cornell University, October 14.

1999 "Biomechanics and motor control of the human hand"
Innovative Product Division of SRI International, Inc.
Menlo Park, CA, July 27.

1999 "Biomechanics and motor control of the human hand"
Therapiezentrum West Clinic (Therapy Center West), Innsbruck, Austria, May 10.

1999 "Novel approaches in the restoration of hand function"
Orthopedische Abteilung der Universitätskliniken Innsbruck (Department of Orthopedics of the University Clinics of Innsbruck)
Innsbruck, Austria, May 3.

1999 "Novel approaches in the restoration of hand function"
Department of Biomechanics and Biomaterials, The Hospital for Special Surgery. New York, New York, April 12.

1999 "Biomechanics and motor control of the human hand"
Department of Mechanical and Aerospace Engineering
Cornell University. Ithaca, New York, March 4.

1999 "Biomechanics and motor control of the human hand"
Department of Biomedical Engineering, Northwestern University. Evanston, Illinois, January 13.

1999 "Novel approaches in the restoration of hand function"
Sensory Motor Performance Program of the Rehabilitation Institute of Chicago, Department of Physical Medicine and Rehabilitation, Northwestern University School of Medicine. Chicago, Illinois, January 14.

1998 "High fingertip forces are produced by subject-independent patterns of muscle excitation"
Ergonomics Program, Mechanical Engineering Department, University of California at Berkeley. Richmond, California, December 7.

1998 "Application of Robotics concepts to the study of the human hand"
Dexterous Manipulation Laboratory, Design Division of the Mechanical Engineering Department, Stanford University. Stanford, California, December 2.

1998 "Modification of the Zancolli Lasso tendon transfer to improve post- operative fingertip strength"
Orthopedic Surgery Grand Rounds.
Department of Functional Restoration, Stanford University School of Medicine.
Stanford, California. February 3.

1997 "Muscle Coordination of the Human Index Finger"
Electrical Engineering and Computer Science Department, University of California at Berkeley. Berkeley, California, November 21.

Patents

2005 (Submitted provisional) Device to quantify finger interactions during grasp.

2003 **Valero-Cuevas FJ**. Finger force and grasping dexterity measuring device. US Patent No. 6,537, 075. Filed: December 12, 2000. Granted: March 27, 2003.

1999 **Valero-Cuevas FJ**, Sulzenbacher E, Hetzenauer S. Easily adjustable, reusable arch forming assembly for creating a framework for constructing arches and archways. European Union Patent No. 0808965. US Patent No. 6,000, 193. Filed: March 3, 1998. Granted: December 14, 1999.

Publications

Dissertations & Theses

PhD Dissertation (1997) *Muscle coordination of the human index finger*.
Mechanical Engineering Department, Biomechanical Engineering Division.
Stanford University

MS Eng Thesis (1991) *Non-invasive detection of carpal mechanics in wrist flexion under load*.
Mechanical Engineering Department.
Queen's University

Peer-reviewed Journal Articles

1. Song D, **Valero-Cuevas FJ** and Loeb G.E. Control strategies for multi-articular limbs with signal-dependent motor noise. *IEEE Transactions on Biomedical Engineering (In Review)*.

2. *Brown D* and **Valero-Cuevas FJ.** Multi-finger coordination of grasp force during dynamic manipulation. *J Biomechanics (In Review)*.

3. Saxena A, Lipson H and **Valero-Cuevas FJ**. Judiciously inferred functionally equivalent tendinous networks can be structurally disparate. *PNAS (In Review)*.

4. Mosier K, Lau C, Wang Y, Venkadesan M, and **Valero-Cuevas FJ**. Controlling instabilities in manipulation requires specific cortical-striatal-cerebellar networks. *J Neurophysiology* (In Review).

5. Medina, FA and **Valero-Cuevas FJ** The nervous system fine-tunes the anticipatory control of motion-to-force transitions in response to the difficulty of the task. *J Neurophysiology* (In Review).

6. Sherback M, D'Andrea R, **Valero-Cuevas FJ**. Prompt yet slower corrections are an optimal adaptation to increased noise in the elderly. *Nature Neuroscience (In Review)*.

7. Vollmer B, Holmström L, Forsman L, **Valero-Cuevas FJ**, Forssberg H, Ullén F. A new method for assessment of dexterity in children and adolescents. *Child* (*In Review*).

8. Keenan KG, Santos VJ, Venkadesan M, and **Valero-Cuevas FJ.** Muscle mechanics is not the limiting factor for fingertip force in combined motion and force tasks. *J Neuroscience* (In Review).

9. **Valero-Cuevas FJ**, Venkadesan M, and Todorov E. Structured variability of muscle activations supports the minimal intervention principle of motor control. *J Neurophysiology (In Press).*

10. Rieffel J, **Valero-Cuevas FJ**, Lipson H. Automated discovery and optimization of large irregular tensegrity structures. *Computers and Structures (In Press).*

11. Smaby N, Murray W, Johanson L, **Valero-Cuevas FJ**. Quantitative assessment of pinch stability in the tetraplegic hand. *Arch Phys Med Rehab. (In Press)*

12. Venkadesan M, and **Valero-Cuevas FJ.** Effects of time-delays on controlling contact transitions. *Phil Trans R Soc A. 2009; 367:1163-1179. (*By Invitation).

13. Santos VJ, Bustamante C and **Valero-Cuevas FJ**. Improving the fitness of high-dimensional biomechanical models via data-driven stochastic exploration.. *IEEE Transactions on Biomedical Engineering. 2008 Oct 7. [Epub ahead of print]*

14. Keenan KG and **Valero-Cuevas FJ**. Epoch length to accurately estimate the amplitude of interference EMG is predominantly an artifact of unavoidable amplitude cancellation. *Biomedical Signal Processing and Control 2008 Apr;3(2):154-162.*

15. Clewley R, Guckenheimer J, **Valero-Cuevas FJ**. Estimating degrees of freedom in motor systems. *IEEE Trans Biomed Eng. 2008 Feb;55(2):430-4*

16. Venkadesan M, **Valero-Cuevas FJ**. Neural control of motion-to-force transitions with the fingertip. J Neurosci. 2008 Feb 6;28(6):1366-73.

17. **Valero-Cuevas FJ**, Anand VV, Saxena A, Lipson H. Beyond parameter estimation: extending biomechanical modeling by the explicit exploration of model topology. *IEEE Trans Biomed Eng*. 2007 Nov;54(11):1951-64. ***Invited Paper***

18. Keenan KG, **Valero-Cuevas FJ**. Experimentally valid predictions of muscle force and EMG in models of motor-unit function are most sensitive to neural properties. *J Neurophysiol.* 2007 Sep;98(3):1581-90.

19. **Valero-Cuevas FJ**, Yi JW, Brown D, McNamara RV 3rd, Paul C, Lipson H. The tendon network of the fingers performs anatomical computation at a macroscopic scale. *IEEE Trans Biomed Eng*. 2007 Jun;54(6 Pt 2):1161-6.

20. Venkadesan M, Guckenheimer J, **Valero-Cuevas FJ**. Manipulating the edge of instability. Journal of Biomechanics. *J Biomech. 2007;*40(8):1653-61. Epub 2007 Apr 2. ***Journal of Biomechancis Award Paper***.

21. Paul C, Lipson H**, Valero-Cuevas FJ**. Control of locomotive tensegrity robots. *IEEE Transactions on Robotics.* 2006: 22 (5):pp944 - 957

22. Santos VJ and **Valero-Cuevas FJ**. Reported anatomical variability naturally leads to multimodal distributions of Denavit-Hartenberg parameters for the human thumb. *IEEE Transactions on Biomedical Engineering. 2006, 53(2): 155- 163.*

23. Talati A, **Valero-Cuevas FJ**, Hirsch J. Visual and Tactile Guidance of Dexterous Manipulation Tasks: an fMRI Study. *Perceptual and Motor Skills*. 2005, 101: 317-334.

24. **Valero-Cuevas FJ**. An integrative approach to the biomechanical function and neuromuscular control of the fingers. *Journal of Biomechanics 2005:38(4): p.673-84.* ***ASB Post-Doctoral Young Scientist Award paper.***

25. Kuxhaus L, Roach, SS, **Valero-Cuevas FJ**. Distortion of 3D thumbtip force production in simulated low ulnar nerve palsy. *Journal of Biomechanics 2005:38(4): p. 725-36.*

26. Miller A, Allen P, Santos VJ, and **Valero-Cuevas FJ**. From robotic hands to human hands: A visualization and simulation engine for grasping research. *Industrial Robot*, 2005:32(1).

27. Pearlman JL, Roach, SS, and **Valero-Cuevas FJ**, The fundamental thumb-tip force vectors produced by the muscles of the thumb. *Journal of Orthopaedic Research*, 2004:22(2): p. 306-12.

28. **Valero-Cuevas FJ**, Johanson, ME, and Towles, JD. Towards a realistic biomechanical model of the thumb: The choice of kinematic description may be more critical than the solution method or the variability/uncertainty of musculoskeletal parameters. *Journal of Biomechanics*, 2003:36(7): p. 1019-1030.

29. **Valero-Cuevas FJ**, Smaby N, Venkadesan M, Peterson M, Wright T. The Strength-Dexterity test as a measure of dynamic pinch performance. *Journal of Biomechanics*, 2003:36(2): p. 265-270.

30. **Valero-Cuevas FJ** and Hentz VR. Releasing the A3 pulley and leaving flexor superficialis intact increases pinch force following the Zancolli lasso procedures to prevent claw deformity in the intrinsic palsied finger. *Journal of Orthopaedic Research*. 2002:20(5): p. 902-9.

31. Johanson ME, **Valero-Cuevas FJ**, Hentz VR. Activation patterns in the thumb muscles during stable and unstable pinch tasks. *Journal of Hand Surgery (American)*. 2001:26(4): p. 698-705.

32. **Valero-Cuevas FJ**, Towles JD, Hentz VR. Quantification of fingertip force reduction in the forefinger following simulated paralysis of extensor and intrinsic muscles. *Journal of Biomechanics*, 2000:33(12): p. 1601-09.

33. **Valero-Cuevas FJ**. Predictive modulation of muscle coordination pattern magnitude scales fingertip force magnitude over the voluntary range. *Journal of Neurophysiology*. 2000 83(3): p. 1469-1479.

34. **Valero-Cuevas FJ**, Zajac FE, Burgar CG. Large index-fingertip forces are produced by subject-independent patterns of muscle excitation. *Journal of Biomechanics*, 1998;31(8):p. 693-703.

35. Burgar CG, **Valero-Cuevas FJ**, Hentz VR. Improving selectivity of fine-wire electrode placement for kinesiological and clinical studies: Application to index finger musculature. *American Journal of Physical Medicine and Rehabilitation*, 1997; 76(6),494-501.

36. **Valero-Cuevas FJ** and Small CF. Load dependence in carpal kinematics during wrist flexion in vivo. *Clinical Biomechanics*, 1997; 12(3), 154-9.

Peer-reviewed Journal Articles in Preparation

1. **Valero-Cuevas FJ**, Medina FA, McNamara III RV, Venkadesan M, Santos VJ. The limits of muscle redundacy. Target Journal: *J Neurophysiology*.

2. Venkadesan M, Mandl L, Backus S, **Valero-Cuevas FJ**. Dynamic pinch as a predictor of treatment outcome in osteoarthritis of the thumb. Target Journal: *Arth Rheum*.

3. **Valero-Cuevas FJ**, Laboissiére R, Galván A. Dynamic manipulation with the fingertips is primarily a sensorimotor integration task. Target Journal: *J Neurophysiology*.

4. Santos VJ, Bustamante C and **Valero-Cuevas FJ**. Bayesian estimation of the consequences of anatomical variability to force production capabilities of the thumb. Target Journal: *IEEE Transactions on Biomedical Engineering*.

Peer-reviewed Full-length Conference Papers

1. Paul C, Roberts JW, Lipson H, **Valero-Cuevas FJ**. Gait Production in a tensegrity based robot. International Conference on Advanced Robotics, ICAR 2005.
2. Paul, C. Lipson, H. **Valero-Cuevas, FJ**. Redundancy in the Control of Robots with Highly Coupled Mechanical Structures. Int. Conf. on Intelligent Robots and Systems, Edmonton, Canada, August 2005, pp 802-808.
3. Paul C, Lipson H, **Valero-Cuevas FJ**. Evolutionary Form-Finding of Tensegrity Structures. Proceedings of the 2005 Genetic and Evolutionary Computation Conference (GECCO), June 2005, Washington D.C., U.S.A, pp. 3-10, 2005.
4. Anand V, Lipson H, **Valero-Cuevas FJ**. Blind Inference of Nonlinear Cable Network Topology from Sparse Data. Proceedings of the 2005 Genetic and Evolutionary Computation Conference (GECCO), Late Breaking Paper. 2005.
5. Paul C., Lipson H., **Valero-Cuevas FJ**. , Design of Tensegrity Robots for Fault Tolerant Locomotion. Proceedings of 12th International Conference on Advanced Robotics (ICAR), Seattle, Washington, USA, July 18th-20th, 2005** Best Paper Award **
6. Paul C., Lipson H., **Valero-Cuevas FJ**. Evolutionary Form-Finding of Tensegrity Structures. Proceedings of the 2005 Genetic and Evolutionary Computation Conference, June 2005, Washington D.C. 2005.
7. Santos VJ and **Valero-Cuevas FJ**, A Bayesian approach to biomechanical modeling to optimize over large parameter spaces while considering anatomical variability. *Proceedings of the 26th Annual International Conference of the IEEE EMBS*, San Francisco, CA, 2004.
8. **Valero-Cuevas FJ** and Lipson H. A computational environment to simulate complex tendinous topologies. *Proceedings of the 26th Annual International Conference of the IEEE EMBS*, San Francisco, CA, 2004.
9. Miller A, Allen P, Santos VJ, and **Valero-Cuevas FJ**, From robotic hands to human hands: A visualization and simulation engine for grasping research. *Proc. of the International Conference on Intelligent Manipulation and Grasping*, Genoa, Italy, 2004.
10. Pearlman JL and **Valero-Cuevas FJ**. The 3d thumb-tip forces produced by individual tendons do not superimpose linearly. *Proceedings of the 25th Annual International Conference of the IEEE EMBS*. Can Cun, Mexico, 2003. p. 1819-22.
11. **Valero-Cuevas FJ**. Applying principles of robotics to understand the biomechanics, neuromuscular control and clinical rehabilitation of human digits. *Proceedings of the IEEE International Conference on Robotics and Automation*. 2000. Pages 270-5.

Invited Symposia

1. Vollmer B, Holmström L, Forsman, L, Krumlinde-Sundholm L, **Valero-Cuevas FJ**, Forssberg H, Ullén F. "A new Principle for the Assessment of Dexterity in Children and Adolescents, February 6th, 2009. Genval, Belgium.

2. **Valero-Cuevas FJ**. "Why Haven't We Made Better Artificial Hands? " 5th American Physical Society (APS) Workshop on Opportunities in Biological Physics. March 9th, 2008. New Orleans, Louisiana.

3. **Valero-Cuevas FJ**. "How tactile information is used to stabilize grasp in humans with and without neurological and biomechanical deficits." Workshop No. 59: Give Haptics A Hand. 41st Annual Winter Conference on Brain Research. January 26–February 1, 2008. Snowbird, Utah. Page 75.

4. **Valero-Cuevas FJ**. Neuro-anatomical basis for dexterous manipulation in children. NICHD Taskforce on childhood motor disorders, National Institutes of Health, Bethesda Maryland. June 7-9, 2008.

5. **Valero-Cuevas, FJ**. Neuromechanical foundations of sensorimotor function. Mathematical Biosciences Institute Workshop 4 on Neuromechanics of Locomotion, The Ohio State University. Cleveland, Ohio. March 31-April 4, 2008.

6. **Valero-Cuevas, FJ**. Why haven't we made better artificial hands? 5th Workshop on Opportunities in Biomological Physics. Annual Meeting of the American Physical Society. New Orleans, March 9, 2008.

7. **Valero-Cuevas, FJ**. Use of tactile information to stabilize grasp in humans with and without neurological and biomechanical deficits. In "Give Haptics a Hand" Symposium. 41st Annual Winter Conference on Brain Research, Jan. 30, 2008.

8. **Valero-Cuevas, FJ**. Towards understanding dexterous manipulation in humans. Mathematical Biosciences Institute Workshop 3 Muscle, Limb, Brain Workshop, The Ohio State University. Cleveland, Ohio, Jan. 14-18, 2008.

9. Backus S, Venkadesan M, Mandl LA, **Valero-Cuevas FJ**. Development of a clinically useful measure of dynamic pinch. NICHD Outcomes Measurement Meeting, National Institutes of Health**.** Rockville, Maryland. December 9, 2005.

10. **Valero-Cuevas FJ**, Lipson H, Santos VJ and Anand V. Shifting to population-based models and inferring model structure from data are two directions that will enhance the clinical usefulness of modeling. XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics, Cleveland, OH, ISB Technical Group: Simulation Symposium, August 1, 2005.

11. **Valero-Cuevas, FJ**. Identifying the functional mechanism by which biological hands meet the necessary and sufficient physical requirements for dexterous manipulation. Workshop on Humanoid Manipulation, in Robotics: Science and Systems Conference 2005. Massachusetts Institute of Technology, Cambridge, MA. June 11, 2005

12. Venkadesan M, **Valero-Cuevas FJ**, Guckenheimer JM. The Boundary of instability as a powerful experimental paradigm for understanding complex dynamical sensorimotor behavior: Dexterous manipulation as an example. In Advances in Computational Motor Control II. Symposium at the 33th Annual Meeting of the Society for Neuroscience. New Orleans, LA, 2003.

Book Chapters

1.**Valero-Cuevas FJ**. Why the hand? Adv Exp Med Biol 629: 553-557, 2009.

2.**Valero-Cuevas FJ**. A mathematical approach to the mechanical capabilities of limbs and fingers. Adv Exp Med Biol 629: 619-633, 2009.

3. Chang J, **Valero-Cuevas FJ**, Hentz VR and Chase R. Chapter 163: Anatomy and Biomechanics of the Hand. In Plastic Surgery, Volume VII: The hand and upper limb, Part 1. 2nd Edition. Hentz VR, Editor. Mathes, Series Editor. Saunders, 1005 pp. 2006.

Peer-reviewed Conference Abstracts

1. Medina FA, Backus SL, Keenan KG, McNamara III RV, , Song S, Price C, Venkadesan M, **Valero-Cuevas FJ**. The transition between muscle coordination patterns is context dependent. Motor Control I session. Proceedings of the 30th Annual Meeting of the American Society of Biomechanics, Stanford, CA. August 2, 2007.
2. Santos VJ, Bustamante C, **Valero-Cuevas FJ**. A data-driven Markov Chain Monte Carlo Metropolis-Hastings algorithm for a model of the human thumb. Hand session. Proceedings of the 30th Annual Meeting of the American Society of Biomechanics, Stanford, CA. August 2, 2007.
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Other

Languages

English, Spanish, German