Curriculum Vitae

Last updated January 2017

Personal Data

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Status: US Citizen

Primary Academic Appointments

2011-present — Full Professor with Tenure
Department of Biomedical Engineering
Division of Biokinesiology and Physical Therapy

2011-present — Full Professor joint appointment
Department of Aerospace and Mechanical Engineering
Department of Computer Science

Professional Areas

Neuromuscular Control, Sensorimotor Integration, Human Dexterous Manipulation, Biomechanics, Robotics, Computer Modeling of Neuromuscular Systems, 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: Neuromuscular systems

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

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

Prior Academic Positions

2012-2013	Guest Professor Institute of Sport Sciences, Leopold-Franzens-Universität Innsbruck, Austria Department of Health Sciences and Technologies, Swiss Federal Institute of Technology, ETH Zurich, Switzerland
2007-2011	Associate Professor with Tenure Department of Biomedical Engineering Division of Biokinesiology and Physical Therapy University of Southern California
2008-2011	Associate Professor joint appointment Department of Aerospace and Mechanical Engineering Department of Computer Science University of Southern California
2005-2007	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

Fall 2011, 2013, 2014	BME 504: Neuromuscular Systems (Lectures available as webcast at http://bbdl.usc.edu/BMEBKN504.php)
Fall 2009, 2010	BME 599: Graduate course in Neuromuscular Biomechanics.
2007-present	Fall and spring seminar series on Engineering, Neuroscience and Health (all seminars available as webcasts at http://bbdl.usc.edu/ENH). 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 2010	NEUR 532 Systems and Behavioral Neurobiology. Lecture. "Neuromechanics of dynamic manipulation in humans" BKN 550 Neurobehavioral Basis of Movement. Lecture "Modeling Biomechanical function and neuromuscular control"
Fall 2009	NEUR 532 Lecture. "Neuromechanics of dynamic manipulation in humans" ENGR105 lecture. Muscles as actuators.
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

Faculty support and mentoring at USC

2010-2011	Jason Kutch, PhD. Research Assistant Professor in Biomedical Engineering. Projects: Motor noise in the planning and execution of sensorimotor function; Neural control finger motion and force.

Sabbatical and visiting faculty

2014	Prof. Maria Makarov, Assistant Professor, SUPELEC, Automatic Control Department, Paris, France. Model predictive control of tendon-driven systems.
2012-2013	Prof. Robert Riener. Sensory-Motor Systems Lab. Department of Mechanical & Process Engineering. Institute of Robotics and Intelligent Systems. ETH Zurich. Creation of meaningful rehabilitation cohorts through Bayesian classification. Sabbatical Stay at USC.
2010	Marta Covadonga Mora Aguilar, PhD. Optimal control and estimation for tendon actuation of biomechanical systems. Visiting Assistant Professor from the Mechanical Engineering and Construction Department, at Universitat Jaume I, Spain. Sabbatical stay at USC.
2004-2005	Jae Woong Yi, PhD. Projects: Servo-actuation of cadaveric tendons. On sabbatical leave from the Agency for Defense Development, South Korea. Sabbatical Stay at Cornell.
2005-2007	Anupam Saxena, PhD. Project: Computational inference of complex biological structures. Visiting Professor from IIT Kangpur. Sabbatical stay at Cornell.

Post-Doctoral Fellow supervision at USC

2015-present	Jun Yong Shin, PhD. VLSI architecture for real-time neuromorphic circuits.
2015-present	Kian Jalaleddini, PhD. Neuromorphic control of finger muscles.
2015-present	Christopher Laine, PhD. Physiological bases of tremor, tone and dystonia.

2012-2015	Chuanxin Minos Niu *(牛传欣)*, PhD. Secondary advisor. Terence Sanger, primary advisor. Implementation and use of neuromorphic circuitry to simulate spinal circuitry for afferented muscles. *Now Junior Faculty in Department of Rehabilitation, School of Medicine, Shanghai Jiao Tong University, China.*
2012-2014	Susan Duff, PT, OT, EdD, CHT. Training in Rehabilitation Efficacy and Effectiveness Trials (TREET) Fellow for NICHD T32 training grant. Secondary Advisor. Paths to clinical interventions to retain and improve dexterity in persons with neurological conditions. *Now Associate Professor, Department of Physical Therapy, Associate Professor, Secondary Appointment, Department of Occupational Therapy, Associated Faculty, Department of Neuroscience. Thomas Jefferson University.*
2012-2014	Isabella Fassola, MD. Effects of Osteoarthritis on thumb dexterity. *Now staff surgeon at Charité and St. Marien hospitals, Berlin, Germany.*
2011-2013	Srideep Musuvathy, PhD. Optimal and robust control of anatomical and robotic tendon driven systems.
2009	Heiko Hoffmann, PhD. Project: Machine learning applied to slow finger movements. *Now Research staff, Information and Systems Sciences Laboratory, HRL Laboratories, Malibu, CA, USA.*
2008-2010	Jason Kutch, PhD. Projects: Motor noise in the planning and execution of sensorimotor function; Neural control finger motion and force. *Now faculty member, Division of Biokinesiology and Physical Therapy, University of Southern California, Los Angeles, USA.*
2007-2008	Kevin Keenan, PhD. Projects: Stochastic combination of single motor unit action potentials into surface EMG; Control of finger motion and force. *Now faculty member at the University of Wisconsin-Milwaukee, USA.*
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 at Cornell University

2006-2007	Madhusudhan Venkadesan. Nonlinear dynamical approach to quantification of sensorimotor integration. *Now tenure-track faculty member at Yale University.*
2005-2007	John Rieffel, PhD. with Dr. Hod Lipson. Project: Locomotion in biologically inspired tensegrity structures. *Now Faculty member at Tufts University.*
2005-2007	Sanjay Kumar, PhD. Project: Machine-learning approaches to estimate the structure of complex biological systems.
2005-2007	Robert Clewley in Mathematics with Dr. John Guckenheimer. *Now Faculty member at Georgia State University.*
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.
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 at USC

As Primary Adviser

Doctoral Students in Computer Science

2016-present	Jasmine Berry. Sensory flow manifolds.
2015-present	Brian Cohn. Big Data approaches to the neural control of limbs.
2008-2011	Evangelos Theodorou. Optimal control of finger movement and force. (with Prof. Stefan Schaal as co-Primary Adviser). *Now faculty member at Georgia Tech.*

Doctoral Students in Electrical Engineering

2015-present	Suraj Chakravarthi Raja. VLSI implementation of neuromorphic spinal circuitry.

Doctoral Students in Biomedical Engineering Department

2016-present	Daniel Hagen. Neurophysiological constraints on kinematic redundancy. *Viterbi Fellow.*
2015-present	Ali Marjaninejad. Brain Machine Interfaces for predictive real-time control of prosthetic limbs. With Richard Andersen, Caltech. *Provost Fellow.*
2013-2016	Emily Lawrence. Systemic and limb-specific mechanisms for dexterity.
2014-2015	Victor Barradas. Neuromorphic muscle models. *Provost Fellow.*
2012-2015	Sarine Babikian. Potential energy formulation of muscle function (co-advised with Prof. Eva Kanso).
2010-2015	Alexander Reyes. Signal processing of brain and muscle activity.
2009-2012	Joshua Inouye. Design of innovative mechanisms for manipulation.
2007-2012	Manish Kurse. Unsupervised inference of biomechanical systems.

Doctoral Students in Biokinesiology and Physical Therapy

2015-present	Akira Nagamori. Dynamic control of the shoulder joint.
2011-2016	Nahyeon (Hannah) Ko. Sensorimotor integration for manipulation in Parkinson's disease.
2007-2012	Sudarshan Dayanidhi. Clinical estimation and therapeutic enhancement of sensorimotor integration.

Doctoral Students in the Neuroscience Program

2007-2012	Kornelius Rácz. Neuromuscular control of multifinger manipulation.

Medical Students at the Keck School of Medicine

2012-2013	Analiese DiConti. Changes in Hand Coordination in Patients with Neurocognitive Deficiencies. Required Scholarly Project.
2012-2013	Jonathan Lerner. Changes in Finger Dexterity in Neurodegenerative Disorders. Required Scholarly Project.

Masters Students in Global Medicine

2016-present	Priyanka Vachhani. Smartphone games to assess neurotoxicity of air pollution.

Masters Students in Biomedical Engineering

2016-present	Victor Esparza. Neuromorphic quadrupeds.
2014-2015	Akira Nagamori. Effect of eccentric contractions on soleus H-reflex and leg dexterity.
2011-2014	Juan Miguel Ramirez Rocamora. Real-time mechatronic simulation of spinal circuitry for control of tendon-driven systems.
2013-2014	KangWoo Lee. Control of motors to simulate musculotendon forces.
2010-2012	Brendan Holt. Mechanisms for rehabilitation with immersion technologies.
2011-2012	Wenhsin (Alice) Hu. Early detection of Parkinsonian sensorimotor deficits via nonlinear dynamical analyses.
2009-2010	Nora Nelson. Novel sensors for robotic hands and objects.
2007-2009	Jonathan Weisz. Sensorimotor control in response to perturbations.

Masters Students at other institutions

2014	Hörður Yngvason. Physiologically-meaningful query of high-dimensional zonotopes for tendon-driven systems. Master's Degree student at the Swiss Federal Institute of Technology, ETH Zurich, Switzerland.
2012	Richard Bumann. Control of finger musculature at the verge of failure. Master's Degree student at the Swiss Federal Institute of Technology, ETH Zurich, Switzerland.
2008-2010	Corey Baker. Control of linear motors as unstable haptic systems. Master's Degree student supported by the Louis Stokes Minority Participation (LSAMP) Bridges to the Doctorate program at California State University Los Angeles (CSULA) funded by the National Science Foundation.

Undergraduate Students at other institutions

2016	Darío Urbina. Undergraduate thesis: Observability of posture using a simulated sacro-lumbar organ in a robotic guinea fowl, National Autonomous University of Mexico, UNAM, Mexico.
2013-2014	Victor Barradas. Undergraduate thesis: Controllability of tendon-driven systems, National Autonomous University of Mexico, UNAM, Mexico.

Undergraduate Students at the Viterbi School of Engineering:

2016-present	Sebastien Arnold. Supervised deep learning for control of anatomical limbs. Computer Science
2015-present	Taegyum Kim. High dimensional data visualizaations. Computer Sciences.
2013-2014	Kristianna Gadalla: Bench-top simulation of brain stimulation.
Spring 2008	Rohit Majumdar: Perturbation analysis for biomechanical systems.
Spring 2008	Robert Taft: Control of a six degree-of-freedom robot.
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)

Visiting Medical Students

Fall 2010	Novalie Lilja and Isak Hägg, Karolinska Medical School, Stockholm.

Visiting Undergraduate Students

Summer 2012	Bryn Nisbet, Claremont McKenna College, Michelle Chen, Harvey Mudd College. Portable device for quantifying upper and lower extremity dexterity. NSF- Research Experiences at the Biology-Mathematics Interface (REBMI).
Summer 2011	Dana Canfield, Scripps College, Alison Kent, Pitzer College, Timothy Law, Claremont McKenna College, Akshata (Tasha) Ramesh, Scripps College. NSF-Research Experiences at the Biology-Mathematics Interface (REBMI).
Summer 2010	Devin von Stade, Pitzer College, and Kevin Varela Ohara, Harvey Mudd College. NSF- Research Experiences at the Biology-Mathematics Interface (REBMI).
Summer 2009	Vy Vo: Algorithms for control of electrical motors. Swarthmore College. NSF-REU site in Computer Science.
Summer 2009	Cecilia Jou: Swarthmore College. NSF-REU site in Computer Science.
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)

As Co-Adviser

Doctoral students

2014-present	Xuechen Huang, in BME with Dr. Gerald Loeb.
2014-present	Dorsa Beroukhim Kay, in BKN with Dr. Carolee Winstein.
2014-present	K. Michael Rowley, in BKN with Dr. Carolee Winstein.
2012-present	Yupeng Xiao, in NGP with Dr. Stefan Schaal.
2012-present	Won Joon (Eric) Sohn, in BME with Dr. Gerald Loeb.
2012-present	Vincent Enachescu, in NGP with Dr. Stefan Schaal.
2012-present	Hyeshin Park, in BKN with Dr. Nicolas Schweighofer.
2011-present	Kristamarie Pratt, in BKN with Dr. Susan Sigwart.
2010-present	Adam Feinman, in BME with Dr. Terrence Sanger.
2009-present	Chia-Hsien Lin, in BME with Dr. Gerald Loeb.
2009-2010	Nicholas Wettels, in BME with Dr. Gerald Loeb.
2009-2011	Jeremy Fishel, in BME with Dr. Gerald Loeb.
2007-2009	Taehoon Shin, in EE with Dr. Krishna Nayak.
2007-2012	Mark Lyle, in BME with Dr.. Chris Powers.
2007-2008	Dan Song, in BME with Dr. Gerald Loeb.

Student Supervision at Cornell University

As Primary Adviser

Doctoral Students in the 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. *Now tenured faculty member at UCLA.*
2000-2006	Madhusudhan Venkadesan. M&AE Graduate Fellow (2001-2): Control of finger musculature during manipulation of objects with unstable nonlinear dynamical behavior. *Now tenure-track faculty member at Yale University.*

Masters Students in the Biomedical Engineering Department

2005-2007	Alicia Medina Cianchetti: Muscle coordination for manipulation.

Research Associates at the Sibley School of Mechanical and Aerospace Engineering

2002-2003	Rebecca J Avrin Zifchock, MS. A hybrid cadaveric/optimization investigation of the actions of tendon transfers to restore thumb opposition. *Now faculty member at the United States Military Academy, West Point.*

Masters of Science Students 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. *Now faculty member at Clarkson University.*
2001-2002	Jonathan Pearlman. NSF Graduate Research Fellow. MS Thesis title: Fundamental actions of the muscles of the thumb. *Now faculty member at the University of Pittsburgh.*
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. *Now faculty member at Emory University.*

Masters of Engineering Students 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.

Masters of Engineering Students 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 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 Biological and Environmental Engineering

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 Biology

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

Undergraduate Students in Architecture

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

Undergraduate Students 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.

As Co-Adviser

Doctoral students

2005-2007	Michael Sherback in Controls with Dr. Raffaelo D'Andrea.

Student Supervision at Stanford University

As Co-Adviser

Doctoral Students in Mechanical Engineering:

1999-2005	Niels Smaby: Measurement of strength and dexterity impairments in spinal cord injured patients. With Mark Cutkosky.

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.

Development

Gifts

2015-2016	Support for summer internships for Mexican students at USC. IME-Becas program. Consulate General of Mexico $39,000
2014-2015	Support for summer internships for Mexican students at USC. IME-Becas program. Consulate General of Mexico $35,000

Research Support

Current Research Support

2013-2016	**Co-Investigator**, "Redundancy in Linear and Neuromuscular Systems" Swiss National Science Foundation 160'000 CHF (Swiss Francs) Principal Investigators: B. Gärtner, K. Fukuda Goals: On the theoretical level, understand the structure of redundancy and the complexity of redundancy explicitly or implicitly. On the application side, compute redundancy and assess the role of redundancy in neuromuscular control.
2013-2018	**Principal Investigator**, "Structure and function of the fingers' tendinous apparatus" National Institutes of Health, R01-AR052345-06 $2,543,557 total cost Co-Investigators: Loeb GE, Sanger TD, Lightdale N, Stevanovic, M. Goal: To implement a physiologically realistic synthetic analog of spinal circuitry to control finger function via populations of spiking neurons.
2010-2016	**Principal Investigator**, "Control of finger movement and force for precision pinch" Valero-Cuevas (PI) National Institutes of Health, R01-AR050520-A6.

$1,900,060 total cost
New Priority score 11; Percentile priority score: 1%.
Goal: To describe and explain how multifinger musculature enables manipulation.

2016-2018 **Principal Investigator**, **Research Supplements to Promote Diversity in Health-Related Research Program for Victor Esparza**
"Neuromorphic quadrupeds"
Valero-Cuevas (PI)
National Institutes of Health, 3R01AR052345-09S1.
$115,737 total cost
Goal: Using physiologically faithful neuromorphic models of the human spinal cord to control quadruped robots.

2016-2019 **Co-PI (USC Lead),** "*Design and Validation of Implantable Passive Mechanisms for Orthopedic Surgery*."
Department of Defense, MR150091
Principal Investigator: Balasubramanian, Oregon State University
$283,497 USC total cost
Goal: To maximize the functional capability of tendon transfers. Percent effort: 5%

Completed Research Support

2010-2015 **Co-Investigator**, "TREET: Training in Rehabilitation Efficacy and Effectiveness Trials"
NIH T32 Doctoral Training grant. Clark, F (PI)

2012-2015 **Principal Investigator**, **Research Supplements to Promote Diversity in Health-Related Research Program for Alexander Reyes**
"Efficient functional mapping of human brain via sparse experimentation"
Valero-Cuevas (PI)
National Institutes of Health, 3R01-AR050520 - 08W1.
$184,887 total cost
Goal: Understand cortical activity for hand function using intra-operative ECoG.

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)
$4,750,000 total cost
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.

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.

2005-2011 **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.

2004-2010 **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.

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"
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"
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"
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" 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

Engagement outside the University of Southern California

2014-present	Co-Chair, México Innova Initiative, Los Angeles Chapter. Education, Science and Technology Group. The Consulate General of Mexico in Los Angeles

2015-present	Co-Founder of the non-profit Acceso Academy (accesoacademy.org) to provide low-cost SAT preparatory courses to low-income Latino students.

Academic Engagement at the University of Southern California

2017-present	Chair, Vice Dean Evaluation Committee, Engineering Faculty Council (EFC).
2016-present	BME representative, Engineering Faculty Council (EFC).
2016-present	Member, Research Advancement Committee (RAC). Division of Biokinesiology and Physical Therapy.
2015-2016	Chair, Neuroengineering faculty search committee, Department of Biomedical Engineering
2014-2016	Viterbi School of Engineering Transformative Faculty Committee
2014-2016	Viterbi School of Engineering Appointments, Promotion and Tenure (APT)
2014-2016	Viterbi School of Engineering Appointments, Promotion and Tenure (APT) Executive Committee
2014-2016	Division of Biokinesiology and Physical Therapy Promotion and Tenure Committee
2014-present	Member, University Committee on Academic Review (UCAR).
2010-present	Academic Director, USC-CONACYT Collaborative Agreement
2012-2015	T32 TREET NIH Training Grant Minority Recruitment Advisory Board member.
2013-2014	Faculty liaison, *Vice Provost for Faculty Affairs* "Casting the Net Widely" initiative for the recruitment of top scholars.
2011-2014	Member, Ostrow School of Dentistry Faculty Development Committee (FDC) for promotion and tenure.
2010-2012	Member, Viterbi School of Engineering Viterbi IT Advisory Council (VITAC)
2010-2012	Member, Viterbi School of Engineering Women in Science and Engineering (WISE) Program Committee
2010-2012	Member, Viterbi School of Engineering Faculty Council (EFC)
2009-2012	At-large-member, Viterbi School of Engineering Appointment, Promotion Tenure (APT) Committee.
2009-2014	Director, Education and Outreach, NIDRR funded research center: RERC-OPTT
2010	Member, Office of the Provost for Global Initiatives, Search Committee for Director of Mexico City Office
2010	Member, Viterbi School of Engineering Merit Review Committee
2009-2010	Member, Academic Senate and the Office of the Provost Committee on Academic Programs and Teaching (CAPT).
Spring 2009	BME interim representative, Engineering Faculty Council (EFC).
March 2009	Speaker, 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.
2008-2010	Member, Viterbi School of Engineering Academic Programs Committee. Task force on Improving the Quality and Image of the VSoE Masters' Programs.

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.
2008	Member, BME neuroengineering faculty search committee.
February 2008	Participant, USC Research Summit, Huntington Beach
2008-2009	Director, Diversity and Training, BMES ERC
2008	Member, delegation to launch Viterbi-UNAM collaboration
2008-2009	Chair, Ad hoc BME 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.
2002-2007	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

Advisory Board	Member, NSF-ERC Center for Sensorimotor Neural Engineering (CSNE), University of Washington. Director: Rajesh Rao (2012-present)
Editor:	IEEE Transactions on Biomedical Engineering (2003-2008) PLoS Computational Biology, guest editor 2014-present Co-Editor for Frontiers Research Topic "Neuromechanics and Control of Physical Behavior: from Experimental and Computational Formulations to Bio-inspired Technologies" 2016- Frontiers in Computational Neuroscience | Frontiers in Neurorobotics
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 Neuroscience Journal of Neurophysiology Journal of Orthopaedic Research Journal of Theoretical Biology Medical & Biological Engineering & Computing Muscle & Nerve Public Library of Science (PLOS) Computational Biology Robotica
Curator:	Scholarpedia, section on Neuromechanics
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**.

• Directorate for Social, Behavioral and Economic Sciences, Division of Behavioral and Cognitive Sciences, Perception, Action, and Cognition program: **2015**

National Institutes of Health, Center for Scientific Review

• Sensorimotor Integration (SMI) Study Section. Regular member **2016-2020** (invited).

• Special Emphasis Panel ZRG1 Biobehavioral and Behavioral Processes (ZRG1 BBBP-D (04)), February 24, **2015.**

• NIH Application Comparison Pilot, October 6, **2014**

• Special Emphasis Panel, Musculoskeletal, Oral and Skin Sciences (MOSS) IRG, June 26, **2012.**

• Special Emphasis Panel ZRG1 Biobehavioral and Behavioral Processes (BBBP-D 03), January 28, **2011.**

• 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, 2011.**

College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE)

• Fellow Review Subcommittee for Neural Engineering, **2014**

UW-Milwaukee Research Foundation, 2009

Christopher & Dana Reeve Foundation, Science Advisory Council (SAC) for our next grant review**, 2010**

Alberta Innovates, Alberta Ingenuity New Faculty Awards, **2010**

Shriners Hospitals for Children, Research Advisory Board, **2011, 2012, 2015**
ETH Zurich Research Commission for scientific evaluation, Reviewer, **2013**

Taskforces: **National Institutes of Health,** Taskforce on childhood motor disorders. Bethesda, MD. June 7-9, **2008**. January **2012**.

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**

Summer Schools

Faculty, 2014 First European Computational Motor Control Summer School, Valflaunès, France.
Faculty, 2015 Second European Computational Motor Control Summer School, Valflaunès, France.

2016 Summer School in Computational Sensory-Motor Neuroscience (CoSMo 2016), Minneapolis, MN.

Conferences: **Workshops**

Invited Participant, DARPA ElectRx Proposer's Day, Washington, DC, December 16, 2014.

Invited Participant, Computing Community Consortium (CCC) & NSF, Brain Workshop, Washington, DC, December 4, 2014.

Invited Speaker, RSS 2014 Workshop on Human Versus Robot Grasping and Manipulation, Robotics Science and Systems, Berkeley, CA. July 12, 2014.

Invited Participant, DARPA HAPTIX Sensorimotor Prosthetics Workshop, Scottsdale, AZ, February 12, 2014.

Review Committees
2013, 2014 Society for the Neural Control of Movement
2011 ICRA
2011 Advances in Computational Motor Control (ACMC), Society for Neuroscience, San Diego, CA
2011 35th Annual Meeting of the American Society of Biomechanics, Long Beach, CA
2010 IEEE Engineering in Medicine and Biology Conference
Buenos Aires, Argentina
ASME 2010 Summer Bioengineering Conference (SBC2010)
Naples, FL
2010 Advances in Computational Motor Control (ACMC), Society for Neuroscience, San Diego, CA

Session Chair: Technology for Contemporary Rehabilitation Engineering (with Zev Rymer). RERC State of the Science Conference (SOSC): Building Rehabilitation Research Capacity at the Nexus of New Technologies, Aging, and Disability October 26, Marina del Rey, CA

Scientific Advisory Board, Member
21st International Society of Electrophysiology and Kinesiology (ISEK) Congress, Chicago from July 5-8, 2016 (in progress)

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

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.

35th Annual Meeting of the American Society of Biomechanics, Long Beach, CA, Virtual Tours chair.

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
American Physiological Society

Awards and Distinctions

Awards

2015	Orange County Engineering Council **OCEC President's Prestigious Award**. *For Scholarly and Outstanding Contributions to the Engineering Profession*
2014	**Elected Fellow**, College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE). *For Outstanding Contributions to the Mathematical and Engineering Understanding of the Neural Control of Limbs to Produce Versatile Function*
2013	**Elected Senior Member** of the IEEE
2013	**Outstanding Technical Achievement Award**. 25th Conference Hispanic Engineer National Achievement Awards Corporation (HENAAC), Great Minds in STEM
2011	**Mellon Award** for Undergraduate Mentoring
2006	**Wenner-Gren Fellowship.** From the Wenner-Gren Foundation to work at Neuropediatric Research Unit of the Karolinska Institute in Stockholm, Sweden.
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

2016	American Society of Biomechanics. Pre-Doctoral Young Scientist Award. Emily Lawrence.
2015	Platform First Place Award. 19th Annual Fred S. Grodins Research Symposium. Department of Biomedical Engineering, USC. Alexander Reyes.
2015	Neuroscience Category Poster First Place Award. 19th Annual Fred S. Grodins Research Symposium. Department of Biomedical Engineering, USC. Victor Barradas-Patiño.

2014	Finalist for best paper award. 6th Annual USC Graduate Research Symposium. Health Sciences category. Emily Lawrence.
2011	Science, Technology, Engineering and Medicine category, Graduate and Professional Students Senate Poster Competition, University of Southern California. 2nd Place: Manish U Kurse, Lipson H, **Valero-Cuevas FJ**, "Inference of computational models of the fingers' tendinous networks through sparse experimentation"
2010	USC Herman Ostrow School of Dentistry Annual Research Day, **Best Poster Award** in Category of Neural Control & Motor Behavior. 2nd Place: Mark Lyle "Relationship Between Lower Extremity Dexterity and Agility"
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

2014	**Best paper award, Gait and Clinical Movement Analysis Society: GCMAS conference**, University of Delaware Clayton Hall in Newark, DE**.** Nina Lightdale-Miric, Nicole M. Mueske, Jamie Berggren, Jennifer Loiselle, Emily L. Lawrence, Sudarshan Dayanidhi, Francisco J. Valero-Cuevas, Tishya A. L. Wren. Quantitative Assessment of Dynamic Control of Fingertip Forces After Pollicization.
2007	**Program Chair**. 30th Annual Meeting of the American Society of Biomechanics. Stanford, CA
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.

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

2008-2010	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 Presentations

Keynote Lectures

2016	**Keynote Speaker.** International Symposium on the Neuromechanics of Human Movement. A Ruperto-Carola symposium funded by the Klaus-Georg and Sigrid Hengstberger Prize. Heidelberg, Germany, *October 5th*
2016	**Keynote Speaker.** Jornada de Investigación de Sistemas Biomédicos (Seminar on Biomedical Systems Research), Department of Biomedical Systems Engineering, Universidad Nacional Autónoma de México, Mexico City, Mexico, *May 6th*.
2016	**Keynote Speaker.** Evnin Lecture, Department of Mechanical Engineering, Princeton University, Princeton, NJ, *April 20th*.
2016	**Keynote Speaker.** Distinguished Lecture Series, College of Engineering at the University of Tennessee, Knoxville, TN. *January 27th*.
2015	**Keynote Speaker.** Latino Youth Summit, Centralia College, Centralia, WA, November 17th.
2015	**Keynote Speaker.** Leibniz-Zentrum für Informatik, Multimodal Manipulation Under Uncertainty Conference. Schloss Dagstuhl, Germany, *October 7th*.
2015	**Keynote Speaker.** USC President C.L. Max Nikias Presidential Event. Mexico City, *March 4th*.
2014	**Keynote Speaker.** Hand, Brain and Technology Conference, Locarno, Switzerland, *September 10th*.
2014	**Keynote Speaker.** International Running Symposium held in honor of the retirement of Dr. Benno Nigg, Calgary, Alberta, Canada, *August 16th*.
2014	**Keynote Speaker.** *México Innova* Conference, Residence of the Consul General of Mexico, Los Angeles, CA, *May 26th*.
2014	**Keynote Speaker.** Northwest Biomechanics Symposium, American Society of Biomechanics, Willamette *University, Willamette, OR, May 16th*.
2014	**Keynote Speaker.** USC Center for Neurorestoration Van Der Meulen Symposium. *University of Southern California, Los Angeles, CA, May 3rd*.

2014	**Keynote Speaker.** Department of Mechanical Engineering Distinguished Centennial Lecture. *University of Texas at Austin, Austin, TX, April 11th*.
2012	**Keynote Speaker**. Canadian Society of Biomechanics Annual Meeting, Burnaby, B.C., Canada, June 9th.
2010	**Keynote Speaker**. XXXIII Congreso Nacional de Ingenieria Biomedica, Sociedad Mexicana de Ingeneiría Biomedica, Leon, Guanajuato, October 8th.
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.

Invited Seminars

2016 "Neuromechanics"
Department of Mechanical Engineering, Columbia University, New York, NY, November 11, 2016.

"Development of Dexterity Measures for Basic Science, Athletic and Clinical Research"
Biomechanics Laboratory, The Hospital for Special Surgery, New York NY, November 10, 2016.

"From Mechanics to Neuromechanics"
Mechanical Engineering Colloquium. Yale University, November 8, 2016.

"An Engineering Approach to Dexterity: From Basic Science to Athletic and Clinical applications"
Physiology & Biomedical Engineering Seminar Series at Mayo Clinic, October 27, 2016.

"Dexterity"
Nike Global Research Symposium, Beaverton, OR, October 26, 2016.

"Neuromorphic Systems to Reverse Engineer Reflex Function"
Biomedical Engineering Department, McGill University, Montreal, Quebec, Canada, September 30, 2016.

"Reverse Engineering Spinal Circuitry"
Convergent Biosciences Seminar Series, University of Southern California, Los Angeles, CA, September 14, 2016.

"Dexterity"
Institute for the Developing Mind, Children's Hospital Los Angeles, Los Angeles, CA, August 25, 2016.

"Challenging classical tenets of biomechanics and neural control"
Biomechanics and Neural Control of Movement 20th Anniversary meeting, Sterling, OH, June 14, 2016.

"Reverse Engineering Spinal Circuitry"
Center for Sensorimotor Neural Engineering (CSNE), University of Washington, Seattle, WA, May 16, 2016.

"Fundamentals of neuromechanics"
Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, April 22, 2016.

"A computational approach to the neural control of limbs"
Perceptual Robotics Laboratory (PERCRO), The Institute of Communication, lnformation and Perception Technologies (TeCIP), Scuola Superiore Sant'Anna, Pisa, Italy, March 22, 2016.

2015 "Computer chips that simulate the basic functions in the spinal cord"
Timberland Regional Library, Olympia, WA, November 16, 2015.

"A Neuromorphic Approach to Neuromechanics"
Department of Integrative Physiology, University of Colorado at Boulder, October 30, 2015.

"Cuantificación ingenieril de mecanismos neuronales de destreza manual y corporal"
Mechantronics Department, Universidad Nacional Autónoma de México. October 23, 2015.

"Dexterity"
Boston Scientific, Valencia, CA, October 20, 2015.

"Reverse engineering of hand control, in order to understand neural control of finger motions and forces"
Italian Institute of Technology (IIT), Genoa, Italy, June 15, 2015.

"Using linear algebra to understand the neuromechanical control of vertebrate limbs"
Howard Hughes Medical Institute Summer Project at the Claremont Colleges, Claremont, CA, June 10, 2015.

"Challenges to the classical notion of muscle redundancy: Does the CNS face an under- or over-determined control problem?"
USC Joint Symposium on Neural Computation. USC, Los Angeles, CA, May 16, 2015.

"How to pursue a graduate degree"
Dezember House, Whittier College, Whittier, CA, April 10, 2015

"Neuromechanics: What control problem does a biological brain face when controlling a mechanical body?"
Departments of Biology and Engineering,

Swarthmore College, Swarthmore, PA, March 20, 2015.

"Clinical quantification and scientific exploration of finger dexterity" Department of Orthopaedics' Grand Rounds at Mt. Sinai School of Medicine. New York, NY, March 18, 2015.

2014 "The strength-Dexterity Paradigm" Novel GmbH, Munich, Germany, October 27, 2014.

"Robots and Dexterity" Department of Computer Engineering and Microelectronics, Technische Universität Berlin, Berlin, Germany, October 25, 2014

"Neural control of Dexterity" Department of Bioengineering & Department of Computing, Imperial College, London, England, April 28, 2014.

"Challenging the cortico-centric view of the neural control of the hand" Department of Neurorehabilitation Engineering & Bernstein Center for Computational Neuroscience Universitätsmedizin Göttingen & Georg-August-Universität, Göttingen, Germany, April 22, 2014

2013 "What is the central problem of motor control?" Department of Neuromotor Physiology, IRCCS Fondazione Santa Lucia, Rome, Italy, July, 2013.

"Leg dexterity: A novel means to quantify the sensorimotor capabilities of the leg to dynamically control instabilities during ground contact" Department of Neurological & Movement Sciences, University of Verona, Verona, Italy, June 17, 2013.

"Is the neuromechanical system truly redundant?" Department of Bioengineering, University College, London, England, May 23, 2013.

"Computational methods for hypothesis testing in neuromuscular systems" Department of Bioengineering & Department of Computing, Imperial College, London, England, May 22, 2013.

"The business model of science" Lion's Club, Kitzbühel Chapter, Kitzbühel, Austria, April 14, 2013.

"Sensorimotor control for dynamic stabilization" Department of Applied Mechanics, Budapest University of Technology and Economics, Budapest, Hungary, April 26, 2013.

"Computational Neuromechanics" Computer Science Department, University of Innsbruck, Innsbruck, Austria, March 14, 2013.

"Tendon-driven systems" Innsbruck Robot Learning Summit in Obergurgel, Austria, March 7, 2013.

2012 "What is the central problem of motor control?" NSF ERC Center for Sensorimotor Neural Engineering, University of Washington, Seattle, WA, December 11, 2012.

"Novel way to assess, and potentially train, sensorimotor function in the upper and lower extremities across the lifespan: Cases from healthy subjects, patients, and athletes" Adidas AG - World of Sports - Adidas Innovation Team, Herzogenaurach, Germany, November 29, 2012.

"Applications of vertex enumeration to understanding the neural control of musculature" Theory of Combinatorial Algorithms Seminar, Institute of Theoretical Computer Science, Eidgenössische Technische Hochschule, ETH, Swiss Federal Institute of Technology, Zurich, Switzerland, November 13, 2012.

"Mechanical Engineering as a critical contributor to sensorimotor neuroscience and the design of the next generation of versatile robots" Department of Mechanical and Aerospace Engineering, University of California at Los Angeles, Los Angeles, CA, June 21, 2012.

"Brain-hand interactions for successful dexterous manipulation" Department of Neurosurgery, Keck School of Medicine of USC, Los Angeles, CA, May 30, 2012.

"Hypothesis testing in neuromuscular systems" Department of Computer Science, University of British Columbia, Vancouver, BC, Canada, June 8, 2012.

"Neuroimaging: fMRI studies of the neuroanatomical substrates for dexterous manipulation" Department of Neurology, Keck School of Medicine of USC, Los

Angeles, CA, May 30, 2012.

"A mathematical introduction to muscle redundancy" California State University, Los Angeles, CA, May 29, 2012.

"Reverse engineering brain control of the hand" NSF EFRI Grantees Conference, Bethesda, MD, March 8, 2012.

"Combining orthopedics and neuroscience: Some new directions" Joseph H. Boyes Hand Conference, Hand Surgery Service, LAC+USC Healthcare Network, Los Angeles, CA, March 6, 2012.

"Exploring the anatomical and neural bases of dexterity: Implications to diagnosis and rehabilitation" Human Adaptation and Countermeasures Office, NASA Johnson Space Center, Houston, TX, January 24, 2012.

"An integrated neuro-mechanical approach to sensorimotor function and dysfunction" Department of Human Physiology, University of Oregon, Eugene, OR, January 20, 2012.

"Hypothesis testing in neuromuscular systems" Department of Mechanical Engineering, Oregon State University, Corvallis, OR, January 19, 2012.

2011 "Computational methods for realistic models of neuromuscular systems" Institute of Robotics and Intelligent Systems. Eidgenössische Technische Hochschule, ETH, Swiss Federal Institute of Technology, Zurich, Switzerland, April 14, 2011.

"Towards an integrated neuro-mechanical approach to sensorimotor function and dysfunction" Fakultät für Psychologie und Sportwissenschaft, Faculty for Psychology and Sports Sciences. Innsbruck University, Innsbruck, Austria, October 21, 2011.

"The mechanics of engineered and biological tendon driven systems" Deutches Zentrum für Luft und Raumfahrt DLR, German Center for Aerospace Sciences. Institute of Robotics and Mechatronics. Weßling, Germany, October 20, 2011.

"Theoretical and computational neuroscience approaches to understanding brain-body interactions for dexterous manipulation" Division of Engineering and Applied Science. Harvard University, Cambridge, MA, April 15, 2011.

"Computational methods for realistic models of neuromuscular systems" Biology, Electrical and Computer Engineering, and Physics Departments. Northeastern University, Boston, MA, April 14, 2011.

"Reverse engineering brain control of the hand via mechatronic control of cadaveric hands" Sensorimotor Performance Program, Rehabilitation Institute of Chicago, Chicago, IL, March 4, 2011.

"Computational methods for realistic models of neuromuscular systems" Mechanical Engineering and Biomedical Engineering Departments. Northwestern University, Evanston, IL, March 3, 2011.

2010 "Reverse engineering sensorimotor function" Mechanical Engineering and Material Sciences Colloquium. Yale University, November 10, 2010.

"Towards an integrated neuro-mechanical approach to sensorimotor function" CNS Seminar, California Institute of Technology, Pasadena, CA
October 25th, 2010.

"The central and peripheral bases for dexterous sensorimotor function " Japan Institute of Sport Sciences, Tokyo, Japan, September 24, 2010.

"COPN-EFRI 0836042: Reverse-engineering the human brain's ability to control the hand" NSF-EFRI PI's Conference Arlington, VA March 18th, 2010.

"Combinando ingeniería, neurociencia y matemática pare entender la función motora humana, mejorar la rehabilitación y crear robots versátiles" Colloquium, Mechatronic Engineering Department. Universidad Nacional Autónoma de México, Mexico City, Mexico
March 4th, 2010.

"How does the brain control a complex musculoskeletal system?" talk in the session Linking Mechanics, Robotics, and Neuroscience: Novel Insights from Novel Systems, AAAS meeting, Washington, DC, February 19, 2010.

"Understanding finger manipulation: Using a little math to understand brain-body interactions at the neural and anatomical levels" Research Experiences at the

Biology-Mathematics Interface. The Claremont Colleges, Claremont, CA. February 1st, 2010.

2009 "Studies in hand dexterity: Opportunities to understand complex sensorimotor systems and create better robots"
University of Calgary, Calgary, Alberta, Canada. November 12th, 2009.

"Studying the spectrum of strength vs. dexterity in multifinger manipulation"
Department of Orthopedics, Erasmus University, Rotterdam, Netherlands September 17th, 2009.

"Lessons learned from the sensorimotor control of hand dexterity: Opportunities for the design of dexterous robots?
Swiss Federal Institute of Technology (ETH), Zürich, Switzerland. July 9th, 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.

"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.

"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.

"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.

"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.

5th APS Workshop on Opportunities in Biological Physics
American Physical Society Meeting, New Orleans, LA, March 9, 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.

"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.

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

"Cortical modulation of dynamic sensorimotor integration." Neuropediatric Research Unit, Karolinska Institut,

Stockholm, Sweden. September 22, 2005.

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

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

"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.

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

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

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

"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.

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

"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.

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

"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

"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

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

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

"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.

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

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

"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.

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

"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

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

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

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

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

"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.

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

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

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

"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.

"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.

"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 21st.

Patents

2015 Ravi Balasubramanian, Taymaz Homayouni , **Valero-Cuevas FJ**. Implanted Passive Engineering Mechanisms And Methods For Their Use And Manufacture. U.S. Patent Application No. 14/725,971 filed May 29, 2015.

2012 Valero-Cuevas FJ, Alexander Reyes, Christianne Heck, and Charles Liu. Efficient functional mapping of human brain via sparse experimentation. US Provisional Patent filed October 19, 2012.

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

Books

Fundamentals of Neuromechanics
Valero-Cuevas, FJ.
Springer-Verlag London 2015
Series in Biosystems & Biorobotics Vol. 8, DOI 10.1007/ ISBN 978-1-4471-6747-1

Peer-reviewed Journal Articles

To download PDFs and see all publications organized by topic, go to http://bbdl.usc.edu/PublicationsByTopic.php

1. Niu CM, Jalaleddini K, Sohn WJ, Rocamora J, Sanger TD, Valero-Cuevas FJ. **Neuromorphic meets Neuromechanics PART I: The Methodology and Implementation.** Journal of Neural Engineering, Accepted 2017.

2. Jalaleddini K, Niu CM, Chakravarthi Raja S, Sohn WJ, Loeb GE, Sanger TD, Valero-Cuevas FJ. **Neuromorphic meets Neuromechanics PART II: The Role of Fusimotor Drive.** Journal of Neural Engineering, Accepted 2017.

3. Nagamori A, **Valero-Cuevas FJ**, Finley JM. **Unilateral Eccentric Contraction of the Plantarflexors Leads to Bilateral Alterations in Leg Dexterity.** Frontiers in Physiology, 2016.

4. **Valero-Cuevas FJ**, Klamroth-Marganska V, Winstein CJ, Riener R. **Robot-assisted and conventional therapies produce distinct rehabilitative trends in stroke survivors .** *Journal of NeuroEngineering and Rehabilitation,* October 2016.

5. Laine CM, Nagamori A, **Valero-Cuevas FJ**. **The Dynamics of Voluntary Force Production in Afferented Muscle Influence Involuntary Tremor.** *Frontiers in Computational Neuroscience,* Accepted 2016.

6. Brock O, **Valero-Cuevas FJ**. **Transferring synergies from neuroscience to robotics, Comment on "Hand synergies: Integration of robotics and neuroscience for understanding the control of biological and artificial hands" by M. Santello et al.** *Physics of Life Reviews,* 2016.

7. Babikian S, **Valero-Cuevas FJ**, and Kanso E. **Slow Movements of Bio-inspired Limbs.** *Journal of Nonlinear Science,* 2016.

8. Inouye, JM and **Valero-Cuevas, FJ**. Muscle synergies heavily influence the neural control of arm endpoint stiffness and energy consumption. *PLoS Computational Biology*. 2016.

9. Lawrence EL, Cesar GM, Bromfield M, Peterson R, **Valero-Cuevas FJ**, Sigward SM. **Strength, multi-joint coordination, and sensorimotor processing are independent contributors to overall balance ability.** *BioMed Research International, Special Issue "Motor Functional Evaluation from Physiology to Biomechanics to Clinical and Training Application,"* http://dx.doi.org/10.1155/2015/561243, 2015. By Invitation.

10. Krenn O, Werner I, Lawrence EL, **Valero-Cuevas FJ**. **The lower extremity dexterity test quantifies sensorimotor control for cross country skiing.** E. Müller; J. Kröll; S. Lindinger; J. Pfusterschmied & T. Stöggl. Science in Skiing VI. p. 439-45. Meyer & Meyer Sport (UK) ISBN: 978-1-78255-066-2, 2015

11. Ko N, Laine CM, Fisher BE, **Valero-Cuevas FJ**. **Force variability during dexterous manipulation in individuals with mild to moderate Parkinson's disease.** *Frontiers in Aging Neuroscience - The Hand at Work: Effects of Aging* 7(108), doi: 10.3389/fnagi.2015.00151, 2015. By Invitation.

12. Lawrence EL, Dayanidhi S, Fassola I, Requejo P, Leclercq C, Winstein CW, **Valero-Cuevas FJ**. **Outcome measures for hand function naturally reveal three latent domains in older adults: strength, coordinated upper extremity function, and sensorimotor processing** *Frontiers in Aging Neuroscience - The Hand at Work: Effects of Aging*, 7(108), doi: 10.3389/fnagi.2015.00108, 2015. By Invitation.

13. Pavlova EL, Hedberg A, Ponten E, Gantelius S, **Valero-Cuevas FJ**, Forssberg H. **Activity in the brain network for dynamic manipulation of unstable objects is robust to acute tactile nerve block: an fMRI study** *Brain Research*, 1620: p. 98-106, 2015.

14. **Valero-Cuevas FJ**, Cohn BA, Yngvason HF, Lawrence EL. **Exploring the high-dimensional structure of muscle redundancy via subject-specific and generic musculoskeletal models** *Journal of Biomechanics, ASB Special Issue*, 48(11): p. 2887-96, 2015. By Invitation.

15. Duff SV, Aaron DH, Gogola, GR, **Valero-Cuevas FJ**. **Innovative evaluation of dexterity in pediatrics** *Journal of Hand Therapy*, 28(2): p. 144-50, 2015. By Invitation.

16. Lightdale-Miric N, Mueske NM, Lawrence EL, Loiselle J, Berggren J, Dayanidhi S, Stevanovic M, **Valero-Cuevas FJ**, Wren TAL. **Long Term Functional Outcomes After Early Childhood Pollicization** *Journal of Hand Therapy*, 28(2): p. 158-66, 2014.

17. Lightdale-Miric N, Mueske NM, Dayanidhi S, Loiselle J, Berggren J, Lawrence EL, Stevanovic M, **Valero-Cuevas FJ**, Wren TAL. **Quantitative Assessment of Dynamic Control of Fingertip Forces After Pollicization** *Gait & Posture, **Best Paper Award** - GCMAS 2014*, 41(1), p. 1-6, 2014.

18. Lawrence EL, Fassola I, Werner I, Leclercq C, **Valero-Cuevas FJ**. **Quantification of dexterity as the dynamical regulation of instabilities: comparisons across gender, age, and disease** *Frontiers in Neurology - Movement Disorders*, 5(53). doi: 10.3389/fneur.2014.00053, 2014.

19. Dayanidhi S and **Valero-Cuevas FJ**. **Dexterous manipulation is poorer at older ages and is dissociated from decline of hand strength** *Journal of Gerontology Series A: Biological Sciences and Medical Sciences*, 69(9): p. 1139-45. doi: 10.1093/gerona/glu025, 2014.

20. Lyle MA, **Valero-Cuevas FJ**, Gregor RJ, Powers CM. **Lower extremity dexterity is associated with agility in adolescent soccer athletes**. *Scandinavian Journal of Medicine and Science in Sports*, Accepted 2013.

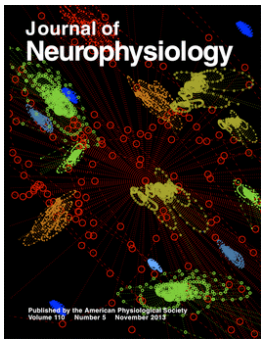
21. Inouye JM and **Valero-Cuevas FJ**. **Computational Optimization and Experimental Evaluation of Grasp Quality for Tendon-Driven Hands Subject to Design Constraints**. *ASME Journal of Mechanical Design*, doi: 10.1115/1.4025964, 2013.

22. Rácz K and **Valero-Cuevas FJ**. **Spatio-temporal analysis reveals active control of both task-relevant and task-irrelevant variables.** *Front. Comput. Neurosci.,* 13 November 2013, doi: 10.3389/fncom.2013.00155.

23. Lyle MA, **Valero-Cuevas FJ**, Gregor RJ, Powers CM. **Control of Dynamic Foot-ground Interactions in Male and Female Soccer Athletes: Females Exhibit Reduced Dexterity and Higher Limb Stiffness During Landing** . *Journal of Biomechanics*, In Press, 2013.

24. Inouye JM and **Valero-Cuevas FJ**. **Anthropomorphic tendon-driven robotic hands can exceed human grasping capabilities following optimization**. *The International Journal of Robotics Research (IJRR), Special Issue on Mechanics and Design of Robotic Hands*, In Press 2013.

25. Dayanidhi S, Kutch JJ, **Valero-Cuevas FJ**. **Decrease in muscle contraction time complements neural maturation in the development of dynamic manipulation**. *Journal of Neuroscience*,33(38): p. 15050-55, 2013. **Press Release**



26. Dayanidhi S, Hedberg A, **Valero-Cuevas FJ**, Forssberg H. **The developmental improvements in dynamic control of fingertip forces last throughout childhood and into adolescence**. *Journal of Neurophysiology*, 110: p. 1583-92, 2013. Cover Article.

27. Lyle MA, **Valero-Cuevas FJ**, Gregor RJ, Powers CM. **The lower extremity dexterity test as a measure of lower extremity dynamical capability**. *Journal of Biomechanics*, 46: p. 998–1002, 2013.

28. Rácz K, Brown D, and **Valero-Cuevas FJ**. An involuntary stereotypical grasp tendency pervades voluntary dynamic multifinger manipulation. *Journal of Neurophysiology*, 108: p.2896-911, 2012.

29. Saxena A, Lipson H and **Valero-Cuevas FJ**. Functional inference of complex anatomical tendinous networks at a macroscopic scale via sparse experimentation. *PLoS Computational Biology*, 8(11): p.1-17, 2012.

30. Inouye JM, Kutch JJ, and **Valero-Cuevas FJ**. A novel synthesis of computational approaches enables optimization of grasp quality of tendon-driven hands. *IEEE Transactions on Robotics*, 28(4): p.958-66, 2012.

31. Kurse MU, Lipson H, and **Valero-Cuevas FJ**. Extrapolatable analytical functions for tendon excursions and moment arms from sparse datasets. *IEEE Transactions on Biomedical Engineering*, 59(6): p.1572-1582, 2012.

32. Kutch JJ and **Valero-Cuevas FJ**. Challenges and new approaches to proving the existence of muscle synergies of neural origin. *PLoS Computational Biology*. 2012;8(5):e1002434. Epub 2012 May 3.

33. Holmström L, de Manzano Ö, Vollmer B, Forsman L, **Valero-Cuevas FJ**, Ullén F, Forssberg H. Dissociation of brain areas associated with force production and stabilization during manipulation of unstable objects. *Experimental Brain Research*, *215:359–367, 2011.*

34. Theodorou EA, Todorov E, **Valero-Cuevas FJ**. Neuromuscular Stochastic Optimal Control of a Tendon Driven Index Finger Model. *American Control Conference ACC 2011*.

35. Kutch, JJ and **Valero-Cuevas FJ.** Muscle redundancy does not imply robustness. *Journal of Biomechanics 2011 Apr 29;44(7):1264-70. Epub 2011 Mar 21.*

36. Mosier K, Lau C, Wang Y, Venkadesan M, and **Valero-Cuevas FJ**. Controlling instabilities in manipulation requires specific cortical-striatal-cerebellar networks. *J Neurophysiology 44:1264–127, 2011.*

37. Sanger TD, Chen D, Fehlings DL, Hallett M, Lang AE, Mink JW, Singer H, Alter K, Ben-Pazi H, Butler E, Chen R, Collins A, Dayanidhi S, Forssberg H, Fowler E, Gilbert DL, Gorman SL, Gormley ME Jr., Jinnah HA, Kornblau B, Krosschell K, Lehman RK, MacKinnon A, Malanga CJ, Mesterman R, Barry Michaels M, Pearson TS, Rose J, Russman B, Sternad D, Swoboda K, and **Valero-Cuevas FJ**. Definition and Classification of Hyperkinetic Movements in Childhood. Review. *Movement Disorders* , 25(11): 1538-1549, 2010.

38. Vollmer B, Holmström L, Forsman L, **Valero-Cuevas FJ**, Forssberg H, Ullén F. A new method for assessment of dexterity in children and adolescents. *Developmental Medicine and Child Neurology* 52(10): 948–954, 2010.

39. Lange BS, Requejo P, Flynn SM, Rizzo AA, **Valero-Cuevas FJ**, Baker L, Winstein C. The potential of virtual reality and gaming to assist successful aging with disability. *Physical Medicine and Rehabilitation Clinics of North America, 21(2): 339-356, 2010*

40. Sherback M, D'Andrea R, **Valero-Cuevas FJ**. Prompt yet slower corrections are an optimal adaptation to increased noise in the elderly. PLoS *Computational Biology 6(3): e1000708. doi:10.1371/journal.pcbi.1000708, 2010.*

41. Rieffel JA, Valero-Cuevas FJ and Lipson H. Morphological Communication: Exploiting Coupled Dynamics in a Complex Mechanical Structure to Achieve Locomotion. *Journal of the Royal Society*, 7:613-621, doi:10.1098/rsif.2009.0240, 2010.

42. Cianchetti, 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* 103(1):108-116, 2010.

43. **Valero-Cuevas FJ**, Hoffmann H, Kurse MU, Kutch JJ, Theodorou EA. Computational models for neuromuscular function. *IEEE Reviews in Biomedical Engineering,* (2), pp. 110–135, 2009. (By Invitation)

44. Keenan KG, Santos VJ, Venkadesan M, and **Valero-Cuevas FJ.** Maximal voluntary fingertip force production is not limited by movement speed in combined motion and force tasks. *J Neuroscience*. 2009 Jul 8;29(27):8784-9.

45. **Valero-Cuevas FJ**, Venkadesan M, and Todorov E. Structured variability of muscle activations supports the minimal intervention principle of motor control. *J Neurophysiology 2009 Jul;102(1):59-68. Epub 2009 Apr 15. Cover Article*

46. Rieffel J, **Valero-Cuevas FJ**, Lipson H. Automated discovery and optimization of large irregular tensegrity structures. *Computers and Structures. 2009 March v.87 n.5-6, p.368-379.*

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

48. 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. 2009 56: 552-564.*

49. 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.*

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53. 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.

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58. 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.
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60. 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.*
61. 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).
62. 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.
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68. **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.
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71. **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 Full-length Conference Papers

1. **Valero-Cuevas FJ**, Cohn BA, Szedlák M, Fukuda K, Gärtner B. "Structure of the set of feasible neural commands for complex motor tasks." 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Milan, Italy, August 25-29, 2015.

2. Lawrence EL, Fassola I, Dayanidhi S, Leclercq C, **Valero-Cuevas FJ**. "An evaluation of clustering techniques to classify dexterous manipulation of individuals with and without dysfunction." 6th International IEEE EMBS Conference on Neural Engineering, pp. 1274-7, San Diego, CA, November 6-8, 2013.

3. Towles J, Hentz V, **Valero-Cuevas FJ**. "Capacity of Small Groups of Muscles to Accomplish Precision Grasping Tasks," 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society pp. 6583-6, Osaka, Japan, July 3-7, 2013.

4. Reyes A and **Valero-Cuevas FJ**. "Inexpensive, Wearable, Wireless, Multi-Channel and Multi-Sensor Data Acquisition System," IEEE EMBS Special Topic Conference on Point-of-Care Healthcare Technologies pp. 216-9, Bangalore, India, January 16-18, 2013.

5. Inouye JM and **Valero-Cuevas FJ**. "Asymmetric routings with fewer tendons can offer both flexible endpoint stiffness control and high force-production capabilities in robotic fingers," IEEE International Conference on Biomedical Robotics and Biomechatronics, Rome, Italy, June 24-27, 2012.

6. Theodorou E, Todorov E, and **Valero-Cuevas FJ**. **Neuromuscular stochastic optimal control of a tendon-driven index finger model.** *American Control Conference*, San Francisco, CA, June 29-July 1, 2011.

7. **Valero-Cuevas FJ**, Kutch JJ, Kurse MU, Hoffmann H, Fassola I, Hentz VR, Leclercq C. Computer control of multiple finger tendons: A novel paradigm to explore the neural control of the hand. Session 9, December 18th.. Société Française de Chirurgie de la Main – GEM. Meeting of the French Society for Surgery of the Hand, Paris, France, December 17-19 2009.

8. Flynn S, Lange B, Rizzo A, Requejo P, **Valero-Cuevas FJ**, Baker L, Winstein C. "An overview of a USC Rehabilitation Engineering Research Center: The use of virtual reality for a range of motor impairments." Virtual Rehabilitation 2009. University of Haifa, Haifa, Israel, June 29 – July 2, 2009.

9. Li W and **Valero-Cuevas FJ**. Linear Quadratic Optimal Control of Contact Transition with Fingertip. American Controls Conference (ACC). Paper WeC11.1 Regular Session "Optimal Control III" (WeC11), Wednesday, June 10, 16:00−16:20, Mills Studio 3. American Control Conference June 10-12, 2009, St. Louis, Missouri, USA.

10. Paul C, Roberts JW, Lipson H, **Valero-Cuevas FJ**. Gait Production in a tensegrity based robot. Proceedings of the 2005 IEEE International Conference on Robotics and Automation, ICRA 2005, April 18-22, 2005, Barcelona, Spain. IEEE 2005

11. 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.

12. 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.

13. 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.

14. Paul C, Lipson ., **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 **

15. 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.
16. 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.
17. **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.
18. 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.
19. 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.
20. **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. **Valero-Cuevas FJ**. "A computational approach to the neuromechanical structure of feasible activations for complex tasks "Fifth Annual Winter Workshop on Neuromechanics and Dynamics of Locomotion Tulane University - New Orleans, Louisiana January 21 – 22, 2016

2. **Valero-Cuevas FJ**. "Neuromorphic meets Neuromechanics" The 2015 International Conference on Brain Informatics and Health Informatics for Human Brain, Behavior and Health. London, United Kingdom, August 30 2015.

3. **Valero-Cuevas FJ**. "Neuromechanics: how brain-body coevolution shaped the nervous system." *3rd DEMOVE Symposium on Translational Engineering for Neurorehabilitation*, Department of Neurorehabilitation Engineering, Universitätsmedizin Göttingen, Göttingen, Germany, October 24, 2014.

4. **Valero-Cuevas FJ**. "Reversing bio-inspired engineering: Applying engineering principles to understand neuroscience." *2014 Society for Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS) National Conference "Creativity, Vision, & Drive: Toward Full Representation in STEM,"* Los Angeles Convention Center, Los Angeles, CA, October 17, 2014.

5. **Valero-Cuevas FJ.** "Finger dexterity: Manipulating objects at the edge of instability." *International Symposium on Biomathematics and Ecology: Education and Research (BEER).* The Claremont Colleges, Claremont, CA, October 11, 2014.

6. **Valero-Cuevas FJ**. "Is subject-specific modeling necessary? Probabilistic approaches can classify populations of models by functional features." *ASB Symposium on Subject- and patient-specific musculoskeletal modeling, 7th World Congress of Biomechanics*, Boston, MA, July 9, 2014.

7. **Valero-Cuevas FJ**. "If information is everywhere already, Why should people come to class?" *Special session on Innovations in Biomechanics Teaching, 7th World Congress of Biomechanics*, Boston, MA, July 9, 2014.

8. Fassola I*, Lawrence EL*, Dayanidhi S, Ko N, Leclercq C, **Valero-Cuevas FJ**. "Is osteoarthritis of the thumb a strictly orthopedic condition?" *Proceedings of the 1st International Thumb Osteoarthrits Workshop*, Newport, RI, October 25-26, 2013. *denotes equal contribution
9. Kutch JJ and **Valero-Cuevas FJ**. "Computational Hypothesis Testing for Neuromuscular Systems." *32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Buenos Aires, Argentina, August 31-September 4 2010.
10. Kutch JJ, Kurse MU, Hentz VR, Lightdale N, Fassola I, **Valero-Cuevas FJ**. "Biomechanical and experimental confounds to the detection of neurally-generated muscle synergies." *The Annual Meeting for the American Society of Biomechanics*, August 18-21, 2010, Providence, Rhode Island.
11. **Valero-Cuevas FJ.** "Manipulating the edge of stability: The thumb-finger spring compression paradigm" Workshop on Noise, Time Delay and Balance Control, Banff International Research Station for Mathematical Innovation and Discovery, Banff, Alberta, Canada. November 8-13th, 2009.
12. Kurse M, Lipson H, and **Valero-Cuevas FJ**. "A fast simulator to model complex tendon-bone interactions: Application to the tendinous networks controlling the fingers." Modeling Analyses of Human Movement Session, Thursday, June 18. ASME Summer Bioengineering Conference, Lake Tahoe, CA. June 17-21, 2009.
13. **Valero-Cuevas FJ.** "The neuromuscular system does ordinary manipulation tasks the 'hard' way: Lessons for robotic manipulators?" RSS 2009 Workshop on Understanding the Human Hand for Advancing Robotic Manipulation. Robotic Science and Systems Conference, June 28, Seattle, WA. 2009
14. **Valero-Cuevas FJ**. "The evolutionary quest for limb versatility lies at the core of many motor control riddles." In Panel Session 5: The distributed control of movement: interactions between neural and musculoskeletal systems in the control of movement. Proceedings of the Nineteenth Annual Meeting of the Society for the Neural Control of Movement, Waikaloa, HI. April 30th, 2009.
15. **Valero-Cuevas FJ.** Reverse-engineering the human brain's ability to control the hand. National Science Foundation Conference on Emerging Frontiers in Research and Innovation (EFRI), Cognitive Optimization and Prediction: From Neural Systems to Neurotechnology (COPN) Program, March 5th, Washington, DC. 2009
16. 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.
17. **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.
18. **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.
19. **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.
20. **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.
21. **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.

22. **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.
23. **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.
24. 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.
25. **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.
26. **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
27. 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. Inouye JM, Kutch JJ, and **Valero-Cuevas FJ**. **Optimizing the Topology of Tendon-Driven Fingers: Rationale, Predictions and Implementation** *in The Human Hand: A Source of Inspiration for Robotic Hands*, Springer Tracts in Advanced Robotics (STAR) series, Balasubramanian, R. and Santos, V.J., Eds., Springer, Heidelberg. 2014.
2. **Valero-Cuevas FJ**. Why the hand? Adv Exp Med Biol 629: 553-557, 2009.
3. **Valero-Cuevas FJ**. A mathematical approach to the mechanical capabilities of limbs and fingers. Adv Exp Med Biol 629: 619-633, 2009.
4. 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. Arnold S, Chu E, **Valero-Cuevas FJ**. "A Performance Comparison between TRPO and CEM for Deep Reinforcement Learning." Southern California Machine Learning Symposium, Pasadena CA, November 18, 2016.

2. Ko N, Laine CM, Fisher BE, **Valero-Cuevas FJ**. "Dynamic fingertip force variability in individuals with ParkinsonÕs disease." Hand Rehabilitation Section, American Physical Therapy Association Combined Sections Meeting, Anaheim, CA, Feb 17-20, 2016.

3. Peppoloni L, Ruffaldi E, **Valero-Cuevas FJ**. "The strength dexterity test quantifies age-related differences in the sensorimotor control dynamics." International Symposium on the Neuromechanics of Human Movement, Heidelberg, DE, October 4-6, 2016.

4. Lawrence EL, Peppoloni L, **Valero-Cuevas FJ**. "Evidence that lower levels of leg dexterity may be a previously unrecognized risk factor for knee ligament injury in women." Proceedings of the 40th Annual Meeting of the American Society of Biomechanics, Raleigh NC, August 2-5, 2016.

5. Hagen DA, Caja S, Chakravarthi S, **Valero-Cuevas FJ**. "Kinetically Similar Basketball Free Throws Have Surprisingly Different Muscle Contraction Velocity Profiles." Proceedings of the 40th Annual Meeting of the American Society of Biomechanics, Raleigh, NC, August 2-5, 2016.

6. Nagamori A, Laine CM, Jalaleddini K, **Valero-Cuevas FJ**. "A closed-loop neuromuscular simulation can provide insights into the origins and task-dependencies of force fluctuations." XXI Congress of the International Society for Electrophysiology and Kinesiology, Chicago, IL, July 5-8, 2016.

7. Laine CM and **Valero-Cuevas FJ**. "Investigating neural strategies for muscle coordination." XXI Congress of the International Society for Electrophysiology and Kinesiology, Chicago, IL, July 5-8, 2016.

8. Nagamori A, Lawrence EL, Finley JM, **Valero-Cuevas FJ**. "The ability to dynamically regulate instabilities with the leg is susceptible to repetitive eccentric contractions." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

9. Laine CM, Nagamori A, Shin JY, **Valero-Cuevas FJ**. "Task-Dependent Coherence Across Finger Muscles." Proceedings of the 46th Annual Meeting of the Society for Neuroscience, San Diego CA, November 12-16, 2016.

10. Nagamori A, Lawrence EL, Finley JM, **Valero-Cuevas FJ**. "The ability to dynamically regulate instabilities with the leg is susceptible to repetitive eccentric contractions." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

11. Ko N, Laine CM, Nagamori A, Hooyman A, Diconti A, Lerner J, Fisher BE, **Valero-Cuevas FJ.** "Distinctive control strategy of dynamic fingertip force in individuals with mild to moderate Parkinson's disease and its clinical implications." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

12. Cohn BA, Yngvason HF, **Valero-Cuevas FJ**. "Visualizing the structure of high dimensional feasible activation sets for static force production." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

13. Lawrence EL, Cesar GM, Bromfield M, Peterson R, Sigward SM, **Valero-Cuevas FJ**. "Outcome Measures for hand and leg function naturally reveal latent domains of strength, limb coordination, and sensorimotor processing." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

14. Laine CM, Dosen S, Dideriksen J, **Valero-Cuevas FJ**, Farina D. "Modulation of tremor during isometric force tracking." Proceedings of the 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

15. Lawrence EL, Cesar GM, Bromfield M, Peterson R, Sigward SM, **Valero-Cuevas FJ**. "Sex differences in control strategies for both static and dynamic balance in young adults." Proceedings of the 25th Annual Conference of the Society for Neural control of Movement, Charleston, SC, April 21-24, 2015.

16. Jalaleddini K, Barradas V, Niu CM, Kearney RE, and **Valero-Cuevas FJ**. "Identification of dynamic stiffness: From the ankle to a neuromorphic joint." Proceedings of the 25th Annual Conference of the Society for Neural control of Movement, Charleston, SC, April 21-24, 2015.

17. Laine CM, Reyes A, Farina D, **Valero-Cuevas FJ**. "Stability-dependent modulation of neural drive to the thumb during precision grip." Proceedings of the 25th Annual Conference of the Society for Neural control of Movement, Charleston, SC, April 21-24, 2015.

18. Nagamori A, Lawrence EL, Finley JM, **Valero-Cuevas FJ**. "Eccentric contractions impede the ability of the leg to regulate dynamic instabilities." Proceedings of the 25th Annual Meeting of the Society for the Neural Control of Movement, Charleston SC, April 21-24, 2015.

19. Reyes A, Kutch JJ, **Valero-Cuevas FJ**. "Changes in corticomotoneuronal drive during stable and unstable object manipulation." Proceedings of the 25th Annual meeting of the Society for the Neural Control of Movement, Charleston, SC, April 20-25, 2015.

20. Ko N, Laine CM, Fisher BE, **Valero-Cuevas FJ.** "Distinctive motor control strategies in Parkinson's disease during an unstable object manipulation and its implications to clinical evaluation." Proceedings of the 25th Annual meeting of the Society for the Neural Control of Movement, Charleston, SC, April 20-24, 2015.

21. Babikian S, Kanso E, **Valero-Cuevas FJ**. "Quasi-static and smooth motions of tendon-driven limbs require non-smooth, highly posture-dependent, neural drive." Proceedings of the 25th Annual Meeting of the Society for the Neural Control of Movement, Charleston SC, April 21-24, 2015.

22. Cohn BA, **Valero-Cuevas FJ**. "Vectormap: Visualization of the feasible force space to observe neuromuscular coordination constraints." Proceedings of the 25th Annual Society for the Neural Control of Movement, Charleston, SC, April 20-24, 2015.

23. Lawrence EL, Werner I, Sigward SM, **Valero-Cuevas FJ**. "Sex differences in sensorimotor mechanisms for dynamic function of the upper and lower extremities." Proceedings of the Annual Meeting of the Organization for the Study of Sex Differences, Stanford CA, April 21-23, 2015.

24. Lawrence EL, Nagamori A, **Valero-Cuevas FJ**, Finley JM. "Prolonged immobilization and unloading leads to profound and long-lasting changes in spinal excitability." Proceedings of the 44th Annual Meeting of the Society for Neuroscience, Washington DC, November 15-19, 2014.

25. Rocamora J, Buchli J, **Valero-Cuevas FJ**. "Robustness of policy learning for optimal control of motion of tendon-driven systems." Proceedings of the 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

26. Reyes A, Liu CY, Heck C, **Valero-Cuevas FJ**. "Context-sensitive Cortical Rhythms During Static and Dynamic Manipulation." Proceedings of the 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

27. Lawrence EL and **Valero-Cuevas FJ**. "Can the Force-Velocity Curve Predict Realistic Muscle Forces for High-Speed Athletic Movements?" Proceedings of the 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

28. Ko N, Lawrence EL, Fisher B, and **Valero-Cuevas FJ**. "While still able to manipulate unstable objects, individuals with Parkinson's disease exhibit distinct neural control strategies." Proceedings of the 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

29. Babikian S, Kanso E, **Valero-Cuevas FJ**. "Slow limb movements require precise muscle control." Proceedings of the 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

30. Miric-Lightdale N, Mueske NM, **Valero-Cuevas FJ**, Wren TAL. "Quantitative Assessment Of Fine Motor Control Of Fingertip Forces After Pollicization." Proceedings of the 15th EFORT Congress, London, England, June 4-6, 2014.

31. Miric-Lightdale N, Mueske NM, Berggren J, Loiselle J, **Valero-Cuevas FJ**, Dayanidhi S, Wren TAL. "Quantitative assessment of fine motor control of fingertip forces after pollicization." Proceedings of the Annual Meeting of the American Association for Hand Surgery, Kauai, HI, January 8-11, 2014.

32. Lawrence EL, Posch M, Melmer F, Dilitz S, Stern V, Werner I, **Valero-Cuevas FJ**. "Does long-term exposure to skiing enhance dynamical leg control in old age?" Proceedings of Translational and Computational Motor Control, San Diego, CA, November 8, 2013.

33. Niu CM*, Rocamora J*, **Valero-Cuevas FJ**~, Sanger T.~ "Assessing the role of neuromuscular components using a tendon-driven robotic plant controlled by neuromorphic hardware." Proceedings of Translational and Computational Motor Control, San Diego, CA, November 8, 2013. * denotes equal contribution, ~ denotes equal leadership

34. **Valero-Cuevas FJ** and Bumann R. "The evolution of fine muscle control for dexterous manipulation in humans is surprisingly incomplete. " Proceedings of Translational and Computational Motor Control, San Diego, CA, November 8, 2013.

35. Babikian S, Kutch JJ, Kanso E, **Valero-Cuevas FJ**. "Feasibility of limb postures and slow motions throughout the workspace with muscles as elastic actuators." Proceedings of the 6th International IEEE EMBS Conference on Neural Engineering, San Diego, CA, November 6-8, 2013.

36. Reyes A, Nayak KS, Loeb GE, Valero-Cuevas, FJ. "Structural MRI identifies precise location of intramuscular electrode recording site based on presence of micro-hematoma." Proceedings of the 6th International IEEE/EMBS Conference of Neural Engineering, San Diego, CA, November 6-8, 2013.

37. Niu CM, Rocamora JM, Sohn WJ, **Valero-Cuevas FJ**, Sanger TD. "Force-velocity property of muscle is critical for stabilizing a tendon-driven robotic joint controlled by neuromorphic hardware." Proceedings of the 6th International IEEE/EMBS Conference of Neural Engineering, San Diego, CA, November 6-8, 2013.

38. Rocamora JM, Niu CM, Sanger TD, **Valero-Cuevas FJ**. "Series Elastic Element Is Critical for Stabilizing a Tendon-Driven Robotic Joint Controlled by Physiologically Realistic Models." Proceedings of the 6th International IEEE/EMBS Conference of Neural Engineering, San Diego, CA, November 6-8, 2013.

39. Stern V*, Lawrence EL*, Hu W, Lyle M, Winstein C, Requejo P, and **Valero-Cuevas FJ**. "Reduced ability to stabilize ground contact with the leg may explain gait changes in aging," 65th Annual Gerontological Society of America Meeting, symposium presentation, San Diego, CA, November 11-14, 2012. *equal contribution

40. Sohn WJ, Niu CM, Nandyala SK, **Valero-Cuevas FJ**, and Sanger TD. "VLSI emulation of excessive involuntary cortical activity as a model of hypertonic dystonia," 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 13-17, 2012.

41. Inouye JM and **Valero-Cuevas FJ**. "Asymmetric routings with fewer tendons can offer both flexible endpoint stiffness control and high force-production capabilities in robotic fingers," IEEE International Conference on Biomedical Robotics and Biomechatronics, Rome, Italy, June 24-27, 2012.

42. Dayanidhi S, Hedberg Å, Forssberg H, and **Valero-Cuevas FJ**. "Small force dexterous manipulation reveal changes across the lifespan," Canadian Society of Biomechanics / Societe Canadienne de Biomechanique Conference (CSB/SBC), Burnaby, BC, June 6-9, 2012.

43. Kurse MU, Lipson H, and **Valero-Cuevas FJ**. "Inference of compact analytical functions describing tendon routing in the fingers," Canadian Society of Biomechanics / Societe Canadienne de Biomechanique Conference (CSB/SBC), Burnaby, BC, June 6-9, 2012.

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Languages

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