

VERONICA J. SANTOS

Curriculum Vitae

September 28, 2009

Arizona State University, Mechanical and Aerospace Engineering
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EDUCATION

- Ph.D. **Cornell University**, Ithaca, NY; May 2007
Francisco J. Valero-Cuevas (chair), Carlos D. Bustamante, Donald L. Bartel, Mark Campbell
- "A Bayesian Approach to Biomechanical Modeling: A Treatise on the Human Thumb"
 - Mechanical and Aerospace Engineering with Biometry Minor
- M.S. **Cornell University**, Ithaca, NY; Jan. 2004
Francisco J. Valero-Cuevas (chair), Carlos D. Bustamante, Donald L. Bartel, Mark Campbell
- Mechanical and Aerospace Engineering
- B.S. **University of California, at Berkeley**; Dec. 1999
- Mechanical Engineering with Music Minor

PROFESSIONAL / RESEARCH EXPERIENCE

- Aug. 2008-
Present *Assistant Professor*, Mechanical and Aerospace Engineering, **Arizona State University**, Tempe, AZ
Graduate Faculty, Bioengineering, **Arizona State University**, Tempe, AZ
- April 2007 -
Aug. 2008 *Postdoctoral Research Associate*, **Alfred E. Mann Institute for Biomedical Engineering at the University of Southern California**, Los Angeles, CA
Advisor: Gerald E. Loeb (primary) and Rahman Davoodi
- Developed a novel biomimetic tactile sensor for prosthetic and mechatronic hands.
 - Designed a testbed for developing controllers for prosthetic fingertips.
- Summer 2002 *Intern*, Immersion Term at the Laboratory for Biomedical Mechanics and Materials, **Hospital for Special Surgery**, New York, NY
- Feb. 2000 -
June 2001 **Guidant Corporation - Vascular Intervention**, Santa Clara, CA
Research and Development Engineer (Feb. 2001 - June 2001)
- Designed and tested coronary stent delivery systems.
 - Supervised a Research and Development Technician.
- Quality Engineer* (Feb. 2000 - Feb. 2001)
- Maintained compliance with regulatory req. for coronary stents, delivery systems.
- Summer 1999 *Intern*, **Lucile Packard's Children's Hospital, Rehabilitation Technology and Therapy Center**, Palo Alto, CA
Advisor: Christine Wright-Ott
- Designed, constructed a strap-on-tray for disabled users of a communication device.
 - Designed, constructed a mock hallway for studies on walkers for disabled children.
- Fall 1998,
Summer 1998,
Summer 1997 *Intern*, **Robotics and Human Engineering Laboratory**, University of California, at Berkeley
Advisor: Homayoon Kazerooni
- Designed chassis and layout for embedded computer components.
 - Assembled circuitry for pneumatics-powered human-assist lifting devices.
- Summer 1997 *Intern*, **Electro-Mechanical Design Laboratory**, University of California, at Berkeley
Advisor: Dennis K. Lieu
- Performed experiments on the effectiveness of Taekwondo helmets.
- Summer 1996 *AutoCAD Drafter*, **Fard Engineers, Inc.**, Walnut Creek, CA
- Revised mechanical, plumbing, and electrical plans.

HONORS & AWARDS

- August 2005 **International Society of Biomechanics Young Investigator Award for Poster Presentation 2005**, awarded at the joint Proc 20th Cong. of the Intl Soc of Biomech (ISB), 29th Annual Mtg of the Amer Soc of Biomech, Cleveland, OH
- Selected from ten finalists out of 650 poster submissions by a jury consisting of seven ISB members for this competitive \$750 award.
- May 2005 **Sibley School Exceptional Teaching Assistant Award**, Sibley School of Mechanical and Aerospace Engineering, *Cornell University*, Ithaca, NY
- Selected as one of two grad. students to receive annual \$100 award for exceptional performance as a teaching asst., as determined by the dept.'s faculty and students.
- 2005 **Finalist for Selected Professions Fellowship, American Association of University Women Educational Foundation**
- Sept. 2004 **American Society of Biomechanics Travel Award**, to attend the 28th Annual Meeting in Portland, OR
- Selected as one of 28 graduate students to receive this highly competitive \$150 award.
- Summer 2004 **Selected attendee for First Motor Control Summer School**, Jim Thorpe, PA
- Selected as one of 30 graduate students to attend a course in motor control theory.
- 2001-2004 **National Science Foundation Graduate Research Fellow**
- Selected as one of 40 mechanical engineering students for three-year graduate fellowship.
- 2000 **Selected for National Physical Science Consortium Fellowship**
- Selected for this highly competitive three-year graduate fellowship.
 - Declined this fellowship in order to accept the NSF Graduate Research Fellowship.
- 1999 - Present **Awarded membership to Tau Beta Pi**, *University of California, at Berkeley*
- Selected for Natl Engineering Honor Society as an engin. senior in the top 5th of the class.
- 1998 - Present **Awarded membership to Mortar Board**, *University of California, at Berkeley*
- Selected as one of 36 seniors for the U.C. Berkeley chapter of this Natl Sr. Honor Soc.
- 1998 - Present **Awarded membership to Pi Tau Sigma**, *University of California, at Berkeley*
- Selected for Natl Honorary Mech. Engin. Fraternity for seniors in the top 3rd of the class.
- 1997 **Society of Women Engineers/Chevron Scholarship**, *University of California, at Berkeley*
- Selected by SWE faculty advisors, treasurer, Chevron industry liaison for \$500 award.
- 1995 - 1999 **Mary C. and William G. Drake Scholar**, *University of California, at Berkeley*
- Selected as one of three freshmen by U.C. Berkeley's Mechanical Engineering Department for a four-year, full-tuition stipend.
- 1995 - 1999 **Regents' and Chancellor's Scholar**, *University of California, at Berkeley*
- Selected as one of 200 students for U.C. Berkeley's most prestigious scholarship for incoming undergraduates.
- 1995 - 1999 **Robert C. Byrd Honors Scholar**, *State of California*
- Selected to receive this merit-based, federally-funded scholarship.

UNIVERSITY / PROFESSIONAL SERVICE

- May 2009 - Present *Member, Undergraduate Minority and Female Student Recruitment and Retention Committee*, Arizona State University, Ira A. Fulton School of Engineering, Tempe, AZ.
- Oct. 2008 *Podium Session Co-chair, 2nd IEEE/RAS-EMBS Intl Conf on Biomedical Robotics and Biomechatronics*, Scottsdale, AZ, "Biorobotics".
- Jan. 2008 *Conference organizer, One-day Advisory Team Meeting for "Biomimetic Tactile Sensors and Grip Control Strategies"* funded by the National Academies Keck Futures Initiative, **University of Southern California**, Los Angeles, CA

- Aug. 2007 *Podium Session Moderator, 30th Annual Meeting of the American Society of Biomechanics*, Palo Alto, CA, "Computational Biomechanics."
- Sept. 2006 *Podium Session Moderator, 29th Annual Meeting of the American Society of Biomechanics*, Blacksburg, VA, "Hand."
- Spring 2004, Fall 2004 *Co-chair, "Machines and Organisms Group: Locomotion and Manipulation" seminars, Cornell University*, Ithaca, NY
- Organized weekly interdisciplinary seminars sponsored by the National Science Foundation Integrative Graduate Education and Research Traineeship Program.
- 2001-2006 *Volunteer, Mechanical and Aerospace Engineering Department Recruiting, Cornell University*, Ithaca, NY
- Met with prospective graduate students and professors.
 - One of two students to help organize the 2005 prospective student visit weekend.

PUBLICATIONS

Peer-reviewed Journal Articles

1. Keenan, K., **Santos, V. J.**, Venkadesan, M., and Valero-Cuevas, F. J. "Maximal voluntary fingertip force production is not limited by movement speed in combined motion and force tasks." *J Neurosci* 2009;29(27):8784-8789.
2. **Santos, V. J.**, Bustamante, C., and Valero-Cuevas, F. J. "Improving the fitness of high-dimensional biomechanical models via data-driven stochastic exploration." *IEEE Trans Biomed Engin* 2009;56(3):552-64.
3. Wettels, N., **Santos, V. J.**, Johansson, R. S., and Loeb, G. E. "Biomimetic tactile sensor array." *Advanced Robotics* 2008;22(8):829-849.
4. **Santos, V. J.** and Valero-Cuevas, F. J. "Reported anatomical variability naturally leads to multimodal distributions of Denavit-Hartenberg parameters for the human thumb." *IEEE Trans Biomed Engin* 2006;53(2):155-163.
5. Miller, A. T., Allen, P., **Santos, V. J.**, and Valero-Cuevas, F. J. "From robotic hands to human hands: A visualization and simulation engine for grasping research." *Ind Robot* 2005;32(1):55-63.
6. **Leong V. J.** "The physics of piano string vibrations." *California Engineer*, May 1999.

Peer-reviewed Conference Proceedings Articles (full-length abstracts)

1. Fishel, J. A., **Santos, V. J.**, and Loeb, G. E. "A robust micro-vibration sensor for biomimetic fingertips." *Proc 2nd IEEE/RAS-EMBS Intl Conf Biomed Robotics and Biomechatronics*, Scottsdale, AZ, Oct. 19-22, 2008.
2. Wettels, N., Smith, L. M., **Santos, V. J.**, and Loeb, G. E. "Homogeneous skin geometry and material selection to control the response of a biomimetic tactile sensor." *Proc 2nd IEEE/RAS-EMBS Intl Conf Biomed Robotics and Biomechatronics*, Scottsdale, AZ, Oct. 19-22, 2008.
3. Wettels, N., Popovic, D., **Santos, V. J.**, Johansson, R. S., and Loeb, G. E. "Biomimetic tactile sensor for control of grip." *Proc 10th Intl Conf Rehab Robotics*, Noordwijk, the Netherlands, June 13-15, 2007.
4. **Santos, V. J.** and Valero-Cuevas, F. J. "A Bayesian approach to biomechanical modeling to optimize over large parameter spaces while considering anatomical variability." *Proc 26th Ann Intl Conf IEEE Engin Med Biol Soc*, San Francisco, CA, Sept. 2004. Podium.
5. Miller, A., Allen, P., **Santos, V. J.**, and Valero-Cuevas, F. J. "From robotic hands to human hands: A visualization and simulation engine for grasping research." *Proc Intl Conf Intelligent Manip Grasping*, Genoa, Italy, 2004.
6. **Santos, V. J.** and Valero-Cuevas, F. J. "Anatomical variability naturally leads to multimodal distributions of Denavit-Hartenberg parameters for the human thumb." *Proc 25th Ann Intl Conf IEEE Engin Med Biol Soc*, Cancun, Quintana Roo, Mexico, Sept. 2003. Poster.

Peer-reviewed Conference Proceedings Abstracts

1. De Gregorio, M., Bair, K., and **Santos, V. J.** “Characterizing reflexive grip responses to rotational perturbations of an object in precision grasp,” *Proc Robotics: Science and Systems Conf*, Seattle, WA, June 28 - July 1, 2009.
2. Valero-Cuevas, F. J., Venkadesan, M., Keenan, K. G., and **Santos, V. J.** “The neuromuscular systems does ordinary manipulation tasks the “hard” way: Lessons for robotic manipulators?,” *Proc Robotics: Science and Systems Conf*, Seattle, WA, June 28 - July 1, 2009.
3. De Gregorio, M., Bair, K., and **Santos, V. J.** “Kinematic and kinetic analyses of reflexive grip responses to rotational perturbations of an object in precision grasp.” *Proc 19th Neural Control of Movement Ann Mtg*, Waikoloa, HI, April 28 - May 3, 2009.
4. Wettels, N., **Santos, V. J.**, and Loeb, G. E. “Biomimetic tactile sensor array for grip control.” *Proc Ann Intl Conf IEEE Robotics and Automation*, Pasadena, CA, May 19-23, 2008.
5. Wettels, N., Popovic, D., **Santos, V. J.**, Johansson, R. S., and Loeb, G. E. “Biomimetic tactile sensing.” *Proc Ann Fall Mtg Biomed Engin Soc*, Los Angeles, CA, Sept. 26–29, 2007.
6. **Santos, V. J.**, Bustamante, C. D., and Valero-Cuevas, F. J. “A Data-driven Markov Chain Monte Carlo Metropolis-Hastings Algorithm for a Model of the Human Thumb.” *Proc 30th Ann Mtg Amer Soc Biomech*, Palo Alto, CA, Aug. 22-25, 2007. Podium.
7. Clewley, R., Valero-Cuevas, F. J., Guckenheimer, J., McNamara III, R. V., and **Santos, V. J.** “Rigorous estimation of neuromuscular degrees of freedom requires both fractal dimension and principal component analyses: Demonstration using hand motions.” *Proc 5th World Cong Biomech*, Munich, Germany, July 29 - Aug. 4, 2006.
8. Medina, F. A., McNamara III, R. V., Backus, S. L., Venkadesan, M., **Santos, V. J.**, and Valero-Cuevas, F. J. “Muscle redundancy enables the transition between, and adjustments of, complex motor tasks.” *Proc 5th World Cong Biomech*, Munich, Germany, July 29 – Aug. 4, 2006. *J. Biomech 2006, Vol. 39, Suppl. 1, p.S33.*
9. Valero-Cuevas, F. J., McNamara III, R. V., **Santos, V. J.**, Venkadesan, M., Song, S., and Grace-Martin, K. “The nervous system transitions rapidly between incompatible control strategies by predictively exploiting the margins of error of the task.” *Proc 5th World Cong Biomech*, Munich, Germany, July 29 – Aug. 4, 2006. *J. Biomech 2006; Vol. 39, Suppl. 1, p.S95.*
10. Medina, F. A., McNamara III, R. V., Backus, S. L., Venkadesan, M., **Santos, V. J.**, Valero-Cuevas, F. J. “Muscle redundancy: tool or trouble?” *Proc 16th Neural Control Mvt Ann Mtg*, Key Biscayne, FL, Poster Session I. Limb Motor Function: Synergies, Poster No. D-04, May 5, 2006.
11. **Santos, V. J.**, Miller, A., Allen, P., and Valero-Cuevas, F. J. “Implementing data-driven models of the human thumb into a robotic grasp simulator to predict grasp stability.” *Joint Proc 20th Cong Intl Soc Biomech, 29th Ann Mtg Amer Soc Biomech*, Cleveland, OH, Musculoskeletal Modeling podium, Aug. 5, 2005, p.774 and Modeling poster, Aug. 4, 2005, p.993.
12. Valero-Cuevas, F. J., Lipson, H., **Santos, V. J.**, 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.” *Joint Proc 20th Cong Intl Soc Biomech, 29th Ann Mtg Amer Soc Biomech*, Cleveland, OH, Aug. 2005, p.963.
13. Ashley, D., Venkadesan, M., **Santos, V. J.**, McNamara III, R. V., and Valero-Cuevas, F. J.. “Competing constraints in hybrid force-motion tasks may lead to a severe reduction of maximum voluntary force magnitudes.” *Proc 15th Neural Control Mvt Ann Mtg*, Key Biscayne, FL, April 2005.
14. **Santos, V. J.** and Valero-Cuevas, F. J. “Thumb kinematics with non-orthogonal and non-intersecting axes of rotation may be necessary to predict realistic isometric thumbtip forces in multiple directions.” *Proc 28th Ann Mtg Amer Soc Biomech*, Portland, OR, Sept. 2004. Poster.
15. **Santos, V. J.** and Valero-Cuevas, F. J. “Thumb kinematics with non-orthogonal and non-intersecting axes of rotation may be necessary to predict realistic isometric thumbtip forces in multiple directions.” *Proc 5th Triennial Intl Hand and Wrist Biomech Symp*, Syracuse, NY, Sept. 2004. Podium.

16. **Santos, V. J.** and Valero-Cuevas, F. J. "Anatomical variability naturally leads to different types of thumb kinematics." *Proc 5th Triennial Intl Hand and Wrist Biomech Symp*, Syracuse, NY, Sept. 2004. Podium.
17. Valero-Cuevas, F. J., **Santos, V. J.**, Venkadesan, M., Song, S. "During abrupt transitions from finger motion to static force, errors in force direction are tuned to exploit the allowable margin of error afforded by surface friction." *Proc 5th Triennial Intl Hand and Wrist Biomech Symp*, Syracuse, NY, Sept. 2004.
18. **Santos, V. J.** and Valero-Cuevas, F. J. "Investigating the interaction between variability in both musculoskeletal structure and muscle coordination for maximal voluntary static thumb forces." *Proc 14th Neural Control Mvt Ann Mtg*, Sitges, Spain, March 2004. Poster.
19. Valero-Cuevas, F. J., **Santos, V. J.**, Song, S., and Venkadesan, M. "During abrupt transitions from finger motion to static force, errors in force direction are tuned to exploit the allowable margin of error afforded by surface friction." *Proc 14th Neural Control Mvt Ann Mtg*, Sitges, Spain, March 2004.
20. **Santos, V. J.** and Valero-Cuevas, F. J. "Stochastic analysis of anatomical data suggests three characteristic kinematic descriptions of the thumb." *Proc 27th Ann Mtg Amer Soc Biomech*, Toledo, OH, Sept. 2003. Poster.
21. **Santos, V. J.** and Valero-Cuevas, F. J. "Stochastic analysis of anatomical data suggests three characteristic types of thumb kinematics." *Proc Amer Soc Mech Engin Summer Bioeng Conf.*, Key Biscayne, FL, June 2003. Poster.

Other Conference Proceedings Abstracts

1. Naufel, S., Meller, D., **Santos, V. J.**, and Helms Tillery, S. I. "Evaluating performance in object discrimination tasks for neuroprosthetic hand research." *Proc Ann. Mtg. of Soc of Neuroscience*, Chicago, IL, Oct. 17-21, 2009.
2. Fishel, J., Wettels, N., **Santos, V. J.**, and Loeb, G. E. "Measurement of sliding friction-induced vibrations for tactile feedback control." *Proc 12th Ann Grodins Graduate Research Symposium*, University of Southern California, Los Angeles, CA, April 5, 2008, pp. 33-34.
3. Wettels, N., **Santos, V. J.**, and Loeb, G. E. "Biomimetic tactile sensor: Functional electro-hydraulic impedance sensing." *Proc 12th Ann Grodins Graduate Research Symposium*, University of Southern California, Los Angeles, CA, April 5, 2008, pp. 145-146.

White Papers

1. **Santos, V. J.**, Davoodi, R., and Loeb, G. E. "Intelligent Local Grasp Control Algorithms for Tele-operated Robotic Manipulators." Submitted in response to a Neurobotic Control Workshop hosted by the Defense Advanced Research Projects Agency, June 2008.
2. **Santos, V. J.**, Davoodi, R., and Loeb, G. E. "Intelligent Local Grasp Control Algorithms Plan for RP2009." Defense Advanced Research Projects Agency Revolutionizing Prosthetics 2009 Program, Aug. 2007.

Manuscripts in Preparation

1. **Santos, V. J.** and Valero-Cuevas, F. J. "A study of anthropometric measurements of the human hand." *Target journal: J. Biomech* Short communication.

RESEARCH SUPPORT

Funded

- 2009 - 2012 *Principal Investigator*, "CPS:Small:Cyber-physical system challenges in man-machine interfaces: context-dependent control of smart artificial hands through enhanced touch perception and mechatronic reflexes," **National Science Foundation**
Stephen I. Helms Tillery (co-I)
- \$549,999 total cost
 - Goal: To address challenges posed by the man-machine interface in the context of neuroprosthetic hand systems.

- 2008 - 2011 *Principal Investigator*, “Biomimetic tactile sensing and grasp control for prosthetic hands,” **National Institutes of Health**, Ruth L. Kirschstein National Research Service Awards for Individual Postdoctoral Fellows (F32).
- \$149,991 total cost
 - Goal: To advance the functionality of prosthetic hands through the development of control algorithms for low-level grasp and manipulation primitives and their integration with high-level commands representing intent.
 - Declined in order to accept appointment as Assistant Professor at Arizona State Univ.
- 2007 - 2008 *Co-author as postdoctoral research associate*, Provost’s Distinguished Visitors Program – Candidate: Roland S. Johansson of Umeå University, Sweden; **University of Southern California**, Los Angeles, CA
Gerald E. Loeb (Sponsor)
- \$1400 total cost
 - Goal: To further the university’s goal of globalization by hosting a prominent researcher and organizing events to connect the researcher with faculty and students at USC.
- 2006 *Lead-author as graduate student*, “Data-driven Markov chain Monte Carlo simulations of musculoskeletal models of the human thumb,” **Cornell Theory Center, Cornell University**, Ithaca, NY
Francisco J. Valero-Cuevas (PI)
- Awarded 9600hrs of supercomputer research time.
- 2006 *Lead-author as graduate student*, “Investigating the interaction between variability in both musculoskeletal structure and muscle coordination for maximal voluntary static thumb forces,” **National Partnership for Advanced Computational Infrastructure, San Diego Supercomputer Center**
Francisco J. Valero-Cuevas (PI)
- Awarded 1000hrs of supercomputer research time.
- 2004 - 2008 *Co-author as graduate student*, “Control of finger movement and force for precision pinch,” **National Institutes of Health, R01-AR050520-01A1**
Francisco J. Valero-Cuevas (PI)
- \$915,050 total cost
 - Priority score: 132; Percentile priority score: 0.8%
 - Goal: To study the coordination of index finger musculature during fingertip motion and force production, as a step towards understanding dexterous manipulation.

Pending

- 2010 - 2015 *Principal Investigator*, “CAREER: Primitives and policies for complex behavior in human and robotic hands,” **National Science Foundation**
- \$554,349 total cost
 - Goals: To advance robotic manipulation with primitives and policies inspired by the human hand; To reduce the barriers to entry for pre-college students to explore robotics and to expand undergraduate- and graduate-level robotics curriculum.
- 2009 - 2011 *Personnel*, “Shaping the future of brain repair: The ethics of neurobiological innovation ,” **National Institutes of Health**
Jason S. Robert (PI)
- \$893,041 total cost
 - Goal: To address scientific, ethical, and policy aspects of converging technologies for brain repair, including the development of implantable neural prosthetics.

INVITED PRESENTATIONS

- 2009 “Development of artificial grip reflexes that utilize the adduction/abduction capabilities of human fingers”
- Full-day workshop: "Understanding the human hand for advancing robotic manipulation," **Robotics: Science and Systems Conference**, Seattle, WA, June 28.
- 2008 “Grasping the Future of Prosthetic and Robotic Hands”
- Mechanical and Aerospace Engineering Department seminar, **Arizona State University**, Tempe, AZ, Nov. 21.
- 2008 “Grasping the Future of Prosthetic and Robotic Hands”
- Bioengineering Department seminar, **Arizona State University**, Tempe, AZ, Oct. 3.
- 2008 “Biologically-inspired tactile sensors and grip control strategies for robotic hands”
- **Defense Advanced Research Projects Agency Neurobotic Control Workshop**, San Diego, CA, May 22.
- 2008 “Biomimetic tactile sensor array for neuroprosthetics”
- Biomimetic MicroElectronic Systems Engineering Research Center National Science Foundation site visit, **University of Southern California**, Los Angeles, CA, May 21.
- 2008 “A non-numerical, biologically-inspired approach to grip control”
- Full-day tutorial: “Is human-like dexterous manipulation within our robotic grasp?,” **IEEE International Conference on Robotics and Automation**, Pasadena, CA, May 20.
 - Abstract coauthored by Nicholas Wettels and Gerald E. Loeb.
- 2008 “Human and robotic hands: Two sides of the same dexterous coin”
- Mechanical Engineering Department seminar, **Stanford University**, Palo Alto, CA, May 12.
- 2008 “Sensory event-driven grip control of prosthetic hands”
- Engineering Neuroscience and Health seminar, **University of Southern California**, Los Angeles, CA, April 28.
- 2008 “Human and robotic hands: Two sides of the same dexterous coin”
- Mechanical and Aerospace Engineering Department seminar, **Arizona State University**, Tempe, AZ, Feb. 25.
- 2008 “Non-numerical, biologically-inspired approach to grip control”
- Advisory Team Meeting for “Biomimetic Tactile Sensors and Grip Control Strategies” funded by the National Academies Keck Futures Initiative, **University of Southern California**, Los Angeles, CA, Jan. 25.
- 2007 “Biomimetic Tactile Sensor”
- Biomimetic MicroElectronic Systems Engineering Research Center faculty meeting, **University of Southern California**, Los Angeles, CA, September 11.
- 2006 “A Bayesian approach to biomechanical modeling: A study of the human thumb”
- Loeb Modeling and Controls meeting, **University of Southern California**, Los Angeles, CA, September 21.
- 2005 “A Bayesian approach to biomechanical modeling to optimize over large parameter spaces while considering anatomical variability”
- Mechanical and Aerospace Engineering seminar, **University of Florida**, Gainesville, FL, March 24.
- 2004 “Thumb kinematics with non-orthogonal and non-intersecting axes of rotation may be necessary to predict realistic isometric thumbtip forces in multiple directions”
- Undergraduate/graduate Mechanical and Aerospace Engineering course “Modeling and simulation of mechanical and aerospace systems,” **Cornell University**, Ithaca, NY, November 23.

- 2004 “Effects of anatomical variability on a model of the thumb”
- Machines and Organisms Group: Locomotion and Manipulation seminar, sponsored by a National Science Foundation Integrative Graduate Education and Research Traineeship grant, **Cornell University**, Ithaca, NY, February 12.

TEACHING EXPERIENCE

- Fall 2009 *Instructor*, “Mechanical Design and Control of Robots,” Mechanical and Aerospace Engineering Department, Arizona State University, Tempe, AZ
- Teaching a 25-student graduate course on robotics.
- Fall 2008 *Instructor*, “Engineering Mechanics,” Mechanical and Aerospace Engineering Department, Arizona State University, Tempe, AZ
- Taught a 70-student undergraduate course on statics and dynamics.
- Spring 2005 *Graduate Teaching Assistant*, “Mechanical Property and Performance Laboratory,” Mechanical and Aerospace Engineering Department, **Cornell University**, Ithaca, NY; ~12hrs/wk
- Assisted with a 120-student undergraduate course on material properties and behavior.
 - Taught lab sessions on techniques such as tensile testing and transducer construction, hosted office hours, and graded lab notebooks.
- Fall 2004 *Graduate Teaching Assistant*, “Modeling and Simulation of Mechanical and Aerospace Systems,” Mechanical and Aerospace Engineering Department, **Cornell University**, Ithaca, NY; ~15hrs/wk
- Assisted with a 30-student undergraduate/graduate course emphasizing the computational tools for simulating linear and nonlinear systems.
 - Assisted with assignment preparation, grading, course website, interactive MATLAB simulation webserver for final project, and hosted office hours.

MENTORING

- Fall 2009 Shashank Prasanna, Arizona State Univ., Tempe, AZ, *Master’s Grad student*
- Fall 2009 Ben Teplitzky, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Fall 2009 Emma Blass, Arizona State Univ., Tempe, AZ, *Undergrad student (primary advisor for undergrad research award)*
- Sum. 2009 - Pres. Margaret Duff, Arizona State Univ., Tempe, AZ, *Doctoral Grad student (secondary advisor)*
- Sum. 2009 - Pres. Walter Meacham, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Sum. 2009 - Pres. Chad Ripley, Arizona State Univ., Tempe, AZ, *Undergrad student (primary advisor for undergrad research award)*
- Sum. 2009 - Pres. Brent Dodson, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Spring 2009 - Pres. Ryan Manis, Arizona State Univ., Tempe, AZ, *Undergrad student (primary advisor for undergrad research award)*
- Spring 2009 - Pres. Nicholas Fette, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Spring 2009 Eric Hannoush, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Spring 2009 Adrian Knowles-Jackman, Arizona State Univ., Tempe, AZ, *Undergrad student*
- Spring 2009 - Pres. Albert Hsia, Arizona State Univ., Tempe, AZ, *Undergrad student (primary advisor for undergrad research award)*
- Spring 2009 A. Candace Derenge, Arizona State Univ., Tempe, AZ, *Undergrad student (primary advisor for undergrad research award)*

Spring 2009	Shane Sandler, Arizona State Univ., Tempe, AZ, <i>Undergrad student (primary advisor for undergrad research award)</i>
Spring 2009 - Pres.	Stephanie Naufel, Arizona State Univ., Tempe, AZ, <i>Undergrad student (co-advisor for undergrad research award and honor's thesis)</i>
Spring 2009	Kurtis Townsend, Arizona State Univ., Tempe, AZ, <i>Undergrad student</i>
Spring 2009 - Pres.	Qiushi Fu, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (secondary advisor)</i>
Fall 2008 - Pres.	Jeffrey Ward, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (secondary advisor)</i>
Fall 2008 - Pres.	Matthew Holgate, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (secondary advisor)</i>
Fall 2008 - Pres.	Michael De Gregorio, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (primary advisor)</i>
Fall 2008 - Pres.	Kevin Bair, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (primary advisor)</i>
Fall 2008 - Pres.	Ruben Ponce Wong, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student (primary advisor)</i>
Fall 2008	Vivek Patel, Arizona State Univ., Tempe, AZ, <i>Master's Grad student (secondary advisor); Thesis: "Vision based grasping of planar objects"</i>
Fall 2008	Jong-Hwa Lee, Arizona State Univ., Tempe, AZ, <i>Doctoral Grad student</i>
Sum. 2008	Andy Chu, Univ. of Southern California, Los Angeles, CA, <i>Undergrad student.</i>
Sum. 2008	Damien Dziepak, Research Experience for Teachers Program, Univ. of Southern California, Los Angeles, CA, <i>Middle school teacher.</i>
Spring 2008	Matthew Borzage, Univ. of Southern California, Los Angeles, CA, <i>Grad student.</i>
Fall 2007 - Sum. 2008	Jeremy Fishel, Univ. of Southern California, Los Angeles, CA, <i>Grad student.</i>
Fall 2007 - Spring 2008	Andrew Weitz, Univ. of Southern California, Los Angeles, CA, <i>Grad student.</i>
April 2007 - Sum. 2008	Nicholas Wettels, Univ. of Southern California, Los Angeles, CA, <i>Grad student.</i>
Sum. 2007 - Sum. 2008	Juhi Patel, Science, Technology, and Research Program, Univ. of Southern California, Los Angeles, CA, <i>High school student.</i>
Sum. 2007	Jesus Robles, Science, Technology, and Research Program, Univ. of Southern California, Los Angeles, CA, <i>High school student.</i>
Sum. 2007	Nava Davuluri, Research intern from Univ. of California, Santa Cruz, CA, <i>Undergrad student.</i>
Sum., Fall 2006	Shannon Marilee Miller, Cornell Univ., Ithaca, NY, <i>Undergrad student.</i>
Sum. 2005; Sum., F 2006	Karen Chin, Cornell Univ., Ithaca, NY, <i>Undergrad student.</i>
Sum. 2005	Brenda Chen, Cornell Univ., Ithaca, NY, <i>Undergrad student.</i>

OUTREACH / EXTRACURRICULAR ACTIVITIES

- 2009 - 2010 *Faculty advisor, American Society of Mechanical Engineers, Arizona State University, Tempe, AZ.*
- April 2009 *Faculty participant, "Dinner with the Professors," Society of Women Engineers and Tau Beta Pi, Arizona State University, Tempe, AZ.*
- Mar. 2009 *Faculty participant, "Honor's Thesis Night" Undergraduate Initiatives Office in the Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ.*
- Feb. 2009 *Faculty participant, "Engineering Auction Dinner" Society of Women Engineers, Arizona State University, Tempe, AZ.*
- Oct. 2008 *Faculty participant, "Dinner with the Professors," Society of Women Engineers and Tau Beta Pi, Arizona State University, Tempe, AZ.*
- Mar. 2008 *Guest speaker, "How to publish a basic professional webpage at USC," Women in Science and Engineering Postdoctoral Group Meeting, University of Southern California, Los Angeles, CA.*
- Feb. 2008 *Guest speaker, "Student Science Exchange," Marlborough High School, Los Angeles, CA*
- Discussed mechanical/biomedical engineering opportunities with 40 9th-12th grade girls.
- April 2006, April 2005, April 2004 *Workshop Chair, Expanding Your Horizons Program, Cornell University, Ithaca, NY*
- Organized hands-on workshop on center of gravity, "Can You Believe Your Eyes?" as part of a one-day conference designed to introduce 7th-9th grade girls to science.
- Spring 1996 - Spring 1999 **Society of Women Engineers, University of California, at Berkeley**
- President and Regional Conference Co-chair (Fall 1998 - Spring 1999)*
- Supervised activities and goals of the 100-member SWE chapter.
 - Organized the Region A Conference - day of workshops and tours for over 100 professionals, college, and high school students.
- Chair, Elementary School Outreach Program (Fall 1997 - Spring 1998)*
- Coordinated visits to local elementary schools, created hands-on activities, and organized a Young Inventors' Contest to introduce the field of engineering to young minds.
- Co-chair, Junior Solar Sprint Challenge (Fall 1996 - Spring 1997),*
- Committee Member, Junior Solar Sprint Challenge (Spring 1996)*
- Coordinated a model solar-car competition for middle school students.

JOURNAL MANUSCRIPT REVIEWER (*ad hoc*)

American Society of Mechanical Engineers (ASME) Journal of Biomechanical Engineering; Annals of Biomedical Engineering; Clinical Biomechanics; Institute of Electrical and Electronics Engineers (IEEE) Transactions on Biomedical Engineering; IEEE/ASME Transactions on Mechatronics; Journal of Applied Biomechanics; Journal of Biomechanics; Journal of Orthopaedic Research; Medical and Biological Engineering and Computing

BOOK CHAPTER REVIEWER (*ad hoc*)

Springer

CONFERENCE PAPER REVIEWER (*ad hoc*)

IEEE Int'l Conference on Robotics and Automation

PROPOSAL REVIEWER (*ad hoc*)

National Science Foundation; British Columbia Foundation for Research, Science and Technology

PROFESSIONAL AFFILIATIONS

American Soc of Biomechanics; American Soc of Mechanical Engineers; Biomedical Engineering Soc; Institute of Electrical and Electronics Engineers, Engineering and Medicine in Biology Soc; International Soc of Biomechanics; Soc for Neural Control of Movement; Soc of Women Engineers

PATENTS

- Loeb, G.E., Wettels, N., Fishel, J. A., Lin, C. H., **Santos, V. J.**, and Peck, R. “Enhancements to improve the function of a biomimetic tactile sensor.” U.S. Patent Application No. 12/417,535. April 2009.
- Loeb, G.E., Fishel, J. A., Wettels, N., **Santos, V. J.**, and Peck, R. “Robust measurement of sliding friction-induced vibrations for biomimetic tactile sensing.” U.S. Patent Application No. 12/417,532. April 2009.
- Johansson, R. S., Loeb, G. E., Wettels, N., **Santos, V. J.**, Popovic, D. “Biomimetic tactile sensor for control of grip.” U.S. Provisional Patent application to be submitted May 2008.
- Wettels, N., **Santos, V. J.**, and Loeb, G. E. “Tactile imaging device for tissue characterization.” U.S. Provisional Patent application to be submitted May 2008.
- Loeb, G. E., Johansson, R. S., Wettels, N., **Santos, V. J.**, Peck, R., and Smith, L. M. “Elastomer patterning and pressure sensing enhancements for functional transduction in electro-hydraulic impedance sensing devices.” U.S. Provisional Patent No. 61/041,868. April 2008.
- **Santos, V. J.** and Prabhu, S. “Stent with drug coating.” U.S. Patent No. 7169178. Jan. 2007.
- One additional proprietary patent pending for coronary stent design.