MARCO SANTELLO, PH.D.

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RESEARCH INTERESTS

Motor control and learning, biomechanics, human performance, sensorimotor integration, movement disorders and neurorehabilitation, rehabilitation engineering, neural imaging, non-invasive neuromodulation.

EDUCATION

1995-1999 **Postdoctoral training, Neuroscience**
Mentor: John F. Soechting
Department of Physiology (now Neuroscience)
University of Minnesota, Minneapolis, MN, USA

1995 **Ph.D., Sport and Exercise Sciences**
Concentration: Motor control and neurophysiology
Advisor: Martin J.N. McDonagh
Applied Physiology Research Unit, Sport and Exercise Sciences
University of Birmingham, Birmingham, U.K.

1994 **NATO Summer School on Multisensory Control of Movement**
Trieste, Italy

1991-1993 **M.Phil. (Qual), Sport and Exercise Sciences**
Concentration: Motor control and neurophysiology
Advisor: Martin J.N. McDonagh
Applied Physiology Research Unit, Sport and Exercise Sciences
University of Birmingham, Birmingham, U.K.

1986-1990 **Bachelor of Science in Kinesiology, *Summa Cum Laude***
Istituto Superiore di Educazione Fisica, L'Aquila, Italy

PROFESSIONAL EXPERIENCE

APPOINTMENTS AT ARIZONA STATE UNIVERSITY

School of Biological and Health Systems Engineering
Ira A. Fulton Schools of Engineering

July 2022-Present	Fulton Professor of Neural Engineering
July 2022-Present	Science and Technology Center in Human Performance, Director
July 2022-Present	BRAIN, NSF Industry/University Cooperative Research Center, Phase 2, Site Director
Apr 2017-June 2022	BRAIN, NSF Industry/University Cooperative Research Center, Phase 1, Director and Site Director
May 2012-2022	School Director
May 2011-2022	Harrington Endowed Chair
May 2011-Apr 2012	Interim School Director
July 2010	Professor
Sept 2000	Affiliate Faculty

Global Security Initiative's Center for Human, Artificial Intelligence, and Robot Teaming (CHART)

May 2017-Present	Affiliate faculty member

Barrett Honors College

Aug 2013–Present	Barrett Honors Faculty

Department of Kinesiology, College of Liberal Arts and Sciences

Jan-June 2010	Interim Chair
Aug 2009	Professor
Aug 2004	Associate Professor
Aug 2004-Dec 2009	Director, PhD Program
Aug 2002-Aug 2004	Director, Master's Program
Aug 1999	Assistant Professor

PhD Programs in Bioengineering, Psychology, Speech & Hearing Sci.

Jan 2008–Present	Graduate Faculty

APPOINTMENTS AT OTHER INSTITUTIONS

Tokyo Institute of Technology, Tokyo, Japan

Aug 2019 – 2021	Position: Visiting Professor

Mayo Clinic, Rochester, Minnesota

Jan 2014 – 2016	Position: Research Collaborator

Centro Interdipartimentale E. Piaggio, School of Engineering
University of Pisa, Pisa, Italy

Nov – Dec 2008	Visiting Professor (Sabbatical)

	Department of Biobehavioral Sciences **Teachers College, Columbia University, New York, NY**
Sept – Oct 2008	Visiting Professor (Sabbatical)
	Institute for Neural Computation, University of California San Diego, San Diego, CA
Aug 2008	Visiting Professor (Sabbatical)
	Barrow Neurological Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ
June 2008 – Present	Research Associate Professor
	Mayo Clinic, Scottsdale, Arizona
June 2005 – Dec 2013	Position: Visiting Scientist
	Department of Physiological Sciences, University of Catania, Italy
Feb 2010 – 2012	Graduate Faculty, Graduate Program in Neuroscience
Dec 2007	Visiting Professor
	Department of Biobehavioral Sciences **Teachers College, Columbia University, New York, NY**
Mar 2005 – Feb 2006	Position: Adjunct Faculty
	Department of Biobehavioral Sciences, **Teachers College, Columbia University, New York, NY**
July 2001	Position: Visiting Professor
	Department of Neuroscience, University of Minnesota, Minneapolis, MN
July 2000	Position: Visiting Professor
	Department of Physiology, University of Minnesota, Minneapolis, MN
1995 – 1999	Position: Postdoctoral Associate Mentor: John F. Soechting
	Department of Drama and Theatre Studies, **University of Birmingham, Birmingham, U.K.**
1994	Visiting Lecturer
	School of Sport and Exercise Sciences **University of Birmingham, Birmingham, U.K.**
1992 – 1994	Position: Post-Graduate Teaching Assistant

PEER-REVIEWED PUBLICATIONS
*Undergraduate student; [1]Graduate student; [2]Postdoctoral associate; [3]Research faculty.

Google Scholar – *Citations*: >8800; *h-index* = 42; *i10-index (past 5 years)* = 73.
Research Gate – *Research Interest Score*: 3,445 (>98th percentile of all RG members' scores); *reads:* >36,000.

Journal papers

1. Fine, JM,[3] Mysore AS,[1] Fini ME, Tyler WJ, **Santello M** (2023). Transcranial focused ultrasound to rIFG improves response inhibition through modulation of the P300 onset latency. *eLife* https://doi.org/10.7554/eLife.86190.
2. Wu Y-H,[3] **Santello M** (2023). Distinct sensorimotor mechanisms underlie the control of grasp and manipulation forces for dexterous manipulation. *Scientific Reports* 13:12037. https://doi.org/10.1038/s41598-023-38870-8.
3. Barontini F, Van Straaten M, Catalano MG, Thoreson A, Lopez C, Lennon RJ, Bianchi M, Andrews K, **Santello M**, Bicchi A, Zhao K (2023). Evaluating the effect of non-invasive force feedback on prosthetic grasp force modulation in participants with and without limb loss. *PLoS ONE* 18(5): e0285081. https://doi.org/10.1371/journal.pone.0285081.
4. Takai, A, Fu Q,[3] Doibata Y, Lisi G, Tsuchiya T, Mojtahedi K,[1] Yoshioka T, Kawato M, Morimoto J, **Santello M.** (2023). Leaders are made: Learning acquisition of consistent leader-follower relationships depends on implicit haptic interactions. *Scientific Reports* 13, 3476. https://doi.org/10.1038/s41598-023-29722-6.
5. Smith M,[1] Hooks K, **Santello M**, Fu Q.[3] (2023). Distinct adaptation processes underlie multi-digit force coordination for dexterous object manipulation. *Journal of Neurophysiology* 129:380–39. https://doi.org/10.1152/jn.00329.2022.
6. Uehara K,[3] Fine JM,[3] **Santello M** (2023). Modulation of cortical beta oscillations influences motor vigor: A rhythmic TMS-EEG study. *Human Brain Mapping* 44:1158–1172. https://doi.org/10.1002/hbm.26149.
7. Kanzler CM, Averta G, Schwarz A, Held JPO, Gassert R, Bicchi A, **Santello M**, Lambercy O, Bianchi M (2022). Assessing the control of arm movements and grip forces post-stroke using functional principal component analysis. *Scientific Reports* 12, 7601. https://doi.org/10.1038/s41598-022-11806-4
8. Mojtahedi K,[1] Kiani K, **Santello M**, Fu Q[3] (2022). Inter-personal motor interaction is facilitated by hand pairing. *Scientific Reports* 12:545.
9. Tanzarella S, Muceli S, **Santello M**, Farina D (2021). Synergistic organization of neural inputs from spinal motor neurons to extrinsic and intrinsic hand muscles. *Journal of Neuroscience* 41:6878-6891.
10. Lee-Miller T, **Santello M**, Gordon AM (2021). Transfer and generalization of learned manipulation between unimanual and bimanual tasks. *Scientific Reports* 11:8688. doi: 10.1038/s41598-021-87988-0.
11. Theuer A, Godfrey S., Zhao K, Breighner R, Catalano M, **Santello M**, Bicchi A, Andrews, KL (2020). Case Report: Optimizing Daily Function for People with Below-elbow Limb Deficiency with the SoftHand Pro. *The Open Journal of Occupational Therapy* 8:1-7. doi: https://10.15453/2168-6408.1602.

12. Cenceschi L, Della Santina C, Averta G, Garabini M, Fu Q, **Santello M**, Bianchi M, Bicchi A (2020). Modeling previous trial effect in human manipulation through iterative learning control. *Advanced Intelligent Systems*. DOI: 10.1002/aisy.201900074.
13. Toma S,[3] Caputo V, **Santello M** (2020). Visual feedback of object motion direction influences the timing of grip force modulation during object manipulation. *Frontiers in Human Neuroscience*. https://doi.org/10.3389/fnhum.2020.00198.
14. Parikh P,[2] Fine JM,[2] **Santello M** (2020). Dexterous object manipulation requires context-dependent sensorimotor cortical interactions in humans. *Cerebral Cortex* 30: 3087-3101.
15. Del Vecchio A, Germer C, Elias LA, Fu Q,[3] Fine JM,[3] **Santello M**, Farina D (2019). Common synaptic input to distinct pools of motor neurons during the control of two mechanically independent hand muscles. *Journal of Physiology* 597:5935-5948.
16. Paek AY, Gailey A,[2] Parikh P,[2] **Santello M**, Contreras-Vidal J (2019). Regression-based reconstruction of human grip force trajectories with noninvasive scalp electroencephalography. *Journal of Neural Engineering.* 16:066030.
17. Toma S,[2] **Santello M** (2019). Motor modules account for active perception of force. *Scientific Reports* 9:8983.
18. Lee-Miller T, **Santello M**, Gordon AM (2019). Hand forces and placement are modulated and covary during anticipatory control of bimanual manipulation. *Journal of Neurophysiology* 121:2276-2290.
19. Fu Q, Shao F,* **Santello M** (2019). Inter-limb transfer of grasp force perception with closed-loop hand prosthesis. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 1-10. doi: 10.1109/TNSRE.2019.2911893
20. Davare M, Parikh P,[2] **Santello M** (2019). Sensorimotor uncertainty modulates corticospinal excitability during skilled object manipulation. *Journal of Neurophysiology* 121:1162-70.
21. Toma S,[2] Shibata D,[1] Chinello F, Prattichizzo D, **Santello M** (2019). Linear integration of tactile and non-tactile inputs mediates estimation of fingertip relative position. *Frontiers in Neuroscience* 13:68. doi.org/10.3389/fnins.2019.00068.
22. Godfrey SB, Zhao K, Theuer A, Catalano M, Bianchi M, Breighner R, Bhaskaran D, Lennon R, Grioli G, **Santello M**, Bicchi A, Andrews K (2018). The SoftHand Pro: Functional evaluation of a novel, flexible, and robust myoelectric prosthesis. *Public Library of Science ONE* 13(10):e0205653. doi: 10.1371/journal.pone.0205653.
23. Marneweck M, Barany DA, **Santello M**, Grafton ST (2018). Neural representations of sensorimotor memory- and digit position-based load force adjustments before the onset of dexterous object manipulation. *Journal of Neuroscience* 38:4724-4737.
24. Fu Q,[3] **Santello M** (2018). Improving fine control of grasping force during hand-object interactions for a soft synergy-inspired myoelectric prosthetic hand. Topic: Mapping human sensory-motor skills for manipulation onto the design and control of robots. *Frontiers in Neurorobotics* 11:71. doi: 10.3389/fnbot.2017.00071.
25. Sebastian F, Fu Q,[3] **Santello M**, Polygerinos P (2017). Soft robotic haptic interface with variable stiffness for rehabilitation of neurologically impaired hand function. *Frontiers in Robotics and AI* 4:69. doi: 10.3389/frobt.2017.00069.

26. Shibata D,[1] **Santello M** (2017). Role of digit placement control on sensorimotor transformations for dexterous manipulation. *Journal of Neurophysiology* 118:2935-2943.
27. Gailey A,[2] Godfrey SB, Breighner R, Andrews K, Zhao K, Bicchi A, **Santello M** (2017). Grasp performance of a soft synergy-based prosthetic hand: A pilot study. *Transactions on Neural Systems and Rehabilitation Engineering* 25:2407-2417.
28. Mojtahedi K,[1] Fu Q,[3] **Santello M** (2017). On the role of dyadic interactions on performance of object manipulation. *Frontiers in Human Neuroscience* 11:533. doi: 10.3389/fnhum.2017.00533
29. Valero-Cuevas F, **Santello M** (2017). On neuromechanical approaches for the study of biological and robotic grasp and manipulation. *Journal of Neural Engineering and Rehabilitation* 14:101. doi: 10.1186/s12984-017-0305-3.
30. Fine JM,[2] Moore D,[1] **Santello M** (2017). Neural oscillations reflect latent learning states underlying dual-context sensorimotor adaptation. *NeuroImage* 15:93-105. doi: 10.1016/j.neuroimage.2017.09.026.
31. Della Santina C, Bianchi M, Averta G, Ciotti S, Arapi V, Fani S, Battaglia E, Catalano MG, **Santello M**, Bicchi A (2017). Postural hand synergies during environmental constraint exploration. *Frontiers in Neurorobotics* 11:41. doi: 10.3389/fnbot.2017.00041.
32. Woolley C, Garcia AA, **Santello M** (2017). Ereptiospiration. *Bioengineering* 4, 33. doi:10.3390/bioengineering4020033.
33. Naceri A, Moscatelli A, Haschke R, Ritter H, **Santello M**, Ernst MO (2017). Multi-digit force control during unconstrained grasping in response to object perturbation. *Journal of Neurophysiology* 117:2025-2036. Issue cover.
34. Mojtahedi K,[1] Whitsell B, Artemiadis P, **Santello M** (2017). Communication and inference of intended movement direction during human-human physical interaction. *Frontiers in Neurorobotics* 11:21. doi: 10.3389/fnbot.2017.00021.
35. Parikh P,[2] **Santello M** (2017). Role of human premotor dorsal region in learning a conditional visuo-motor task. *Journal of Neurophysiology* 117:445-456.
36. Gailey A,[2] Artemiadis P, **Santello M** (2017). Proof of concept of an online EMG-based decoding of hand postures and individual digit forces for prosthetic hand control. *Frontiers in Neurology* 8:7. doi: 10.3389/fneur.2017.00007.
37. Fani S,* Bianchi M, Jain S,* Pimenta Neto SJ,* Boege S,* Bicchi A, **Santello M** (2016). Assessment of myoelectric controller performance and kinematic behavior of a novel soft synergy-inspired assistive device. *Frontiers in Neurorobotics* 10:11. doi: 10.3389/ fnbot.2016.00011.
38. Marneweck M, Lee-Miller T, **Santello M**, Gordon AM (2016). Grasp position and forces covary during anticipatory control of whole-hand manipulation. *Frontiers in Human Neuroscience* 10:461. doi: 10.3389/fnhum.2016.00461.
39. Lee-Miller T, Marneweck M, **Santello M**, Gordon AM (2016). Visual cues of object properties differentially affect anticipatory planning of digit forces and placement. *Public Library of Science ONE* 11(4):e0154033. doi: 10.1371/journal.pone.0154033.

40. **Santello M**, Bianchi M, Gabiccini M, Ricciardi E, Salvietti G, Prattichizzo D, Ernst M, Moscatelli A, Jörntell H, Kappers A, Kyriakopoulos K, Albu Schaeffer A, Castellini C, Bicchi A (2016). Towards a synergy framework across neuroscience and robotics: Lessons learned and open questions. *Physics of Life Reviews* 17:54-60.

41. **Santello M**, Bianchi M, Gabiccini M, Ricciardi E, Salvietti G, Prattichizzo D, Ernst M, Moscatelli A, Jörntell H, Kappers A, Kyriakopoulos K, Albu Schaeffer A, Castellini C, Bicchi A (2016). Hand synergies: Integration of robotics and neuroscience for understanding the control of biological and artificial hands. *Physics of Life Reviews* 17:1-23.

42. Leo A, Handjaras G, Bianchi M, Marino H, Gabiccini M, Guidi A, Scilingo EP, Pietrini P, Bicchi A, **Santello M**, Ricciardi E (2016). Encoding and decoding the "alphabet" of human hand motor acts: a kinematic-EMG-fMRI study favors the neural correlates of hand postural synergies. *eLife.* http://dx.doi.org/10.7554/eLife.13420.

43. Battaglia E,[*] Bianchi M, Altobelli A, Grioli G, Catalano MG, Serio A, **Santello M**, Bicchi A (2015). ThimbleSense: A fingertip-wearable tactile sensor for studying human and robot grasp. *IEEE Transactions on Haptics*.

44. Ratuapli SK, Ruff K, Ramirez F, Wu Q, Mohankumar D,[1] **Santello M**, Fleischer D (2015). Kinematic analysis of wrist motion during simulated colonoscopy in first year gastroenterology fellows. *Endoscopy International Open* 3:E621-6. doi: 10.1055/s-0034-1393061.

45. Marneweck M, Knelange L, Lee-Miller T, **Santello M**, Gordon AM (2015). Generalization of object manipulation is sensitive to the frame of reference in which it is learned. *Public Library of Science ONE* 10(9):e0138258. doi: 10.1371/journal.pone.0138258.

46. Mojtahedi K,[1] Fu Q,[2] **Santello M** (2015). Extraction of time and frequency features from grip force rates during dexterous manipulation. *IEEE Transactions on Biomedical Engineering* 62:1363-75. doi: 10.1109/TBME.2015.2388592.

47. Frost R, Skidmore J, **Santello M**, Artemiadis P (2015). Sensorimotor control of gait: A novel approach for the study of the interplay of visual and proprioceptive feedback. *Frontiers in Human Neuroscience* 9:14. doi: 10.3389/fnhum.2015.00014.

48. **Santello M**, Lang C (2015). Are movement disorders and sensorimotor injuries pathologic synergies? When normal multi-joint movement synergies become pathologic. *Frontiers in Human Neuroscience*. 8:1050. doi: 10.3389/fnhum.2014.01050.

49. Fu Q,[2] **Santello M** (2015). Retention and interference of learned skilled manipulation: Interaction between multiple sensorimotor processes. *Journal of Neurophysiology* 113:144-155. Issue cover.

50. Fu Q,[2] Choi JY,[1] Gordon AM, Jesunathadas M,[2] **Santello M** (2014). Learned manipulation at unconstrained contacts does not transfer across hands. *Public Library of Science ONE* 9(9):e108222. doi: 10.1371/journal.pone.0108222

51. Lambercy O, Metzger J-C, **Santello M**, Gassert R (2014). A method to study precision grip control in viscoelastic force fields using a robotic gripper. *IEEE Transactions on Biomedical Engineering* 62:39-48.

52. Shibata D,[1] Kappers A, **Santello M** (2014). Digit forces bias sensorimotor transformations underlying control of fingertip position. *Frontiers in Human Neuroscience* 8:564. doi: 10.3389/fnhum.2014.00564.

53. Parikh P,[2] Davare M, McGurrin P,[1] **Santello M** (2014). Corticospinal excitability underlying digit force planning for grasping in humans. *Journal of Neurophysiology* 111:2560-2569.

54. Fu Q,[2] **Santello M** (2014). Coordination between digit forces and positions: interactions between anticipatory and feedback control. *Journal of Neurophysiology* 111:1519-1528.

55. Mohankumar D,[1] Garner H,[1] Ruff K, Ramirez F, Fleischer D, Wu Q, **Santello M** (2014). Characterization of right wrist posture during simulated colonoscopy: An application of kinematic analysis to the study of endoscopic maneuvers. *Gastrointestinal Endoscopy* 79:480-489.

56. Crajé C,[1] **Santello M**, Gordon AM (2013). Effects of visual cues of object density on perception and anticipatory control of dexterous manipulation. *Public Library of Science ONE*. 8(10): e76855. doi:10.1371/journal.pone.0076855.

57. Jesunathadas M,[2] Laitano J,* Hamm T, **Santello M** (2013). Across-muscle coherence is modulated as a function of wrist posture during two-digit grasping. *Neuroscience Letters* 553:68–71.

58. Lukos JR,[1] Choi JY,[1] **Santello M** (2013). Grasping uncertainty: planning and execution of skilled manipulation for unpredictable object properties. *Journal of Neurophysiology* 109:2937-2946.

59. Shibata D,[1] Choi JY,[1] Laitano JC,[1] **Santello M** (2013). Haptic-motor transformations for the control of fingertip distance. *Public Library of Science ONE* 8(6): e66140. doi:10.1371/journal.pone.0066140.

60. **Santello M**, Baud-Bovy G, Jörntell H (2013). Neural bases of hand synergies. Invited contribution to Research Topic on Modularity in Motor Control, *Frontiers in Computational Neuroscience* 7:23. doi:10.3389/fncom.2013.00023.

61. Zhang W,[2] Johnston JA, Ross MA, Sanniec K, Gleason EA, Dueck AC, **Santello M** (2013). Effects of Carpal Tunnel Syndrome on dexterous manipulation are grip type-dependent. *Public Library of Science ONE* 8(1):e53751. doi: 10.1371/journal.pone.0053751.

62. Zhang W,[2] Johnston JA, Ross MA, Coakley BJ, Gleason EA, Dueck AC, **Santello M** (2012). Effects of Carpal Tunnel Syndrome on adaptation of multi-digit forces to object mass distribution for whole-hand manipulation. *Journal of NeuroEngineering and Rehabilitation* 9:83.

63. Fu Q,[1] **Santello M** (2012). Context-dependent sensorimotor memory interferes with visuomotor transformations for manipulation planning. *Journal of Neuroscience* 32:15086-15092.

64. Afifi M, **Santello M**, Johnston JA (2012). Effects of Carpal Tunnel Syndrome on adaptation of multi-digit forces to object texture. *Clinical Neurophysiology* 123:2281-2290.

65. Chattopadhyay R, Jesunathadas M,[2] Poston B,[2] **Santello M,** Panchanathan S (2012). A subject-independent method for automatically monitoring fatigue from features of the electromyogram. *Transactions in Biomedical Engineering* 59:1749-1757.

66. Zhang W,[2] Johnston JA,[2] Smith AA, Ross MA, Coakley BJ, Gleason EA, Dueck AC, **Santello M** (2011). Effects of Carpal Tunnel Syndrome on adaptation of multi-digit forces to object weight for whole-hand manipulation. *Public Library of Science ONE* 6: e27715. doi:10.1371/journal.pone.0027715.

67. Fu Q,[1] Hasan Z, **Santello M** (2011). Transfer of learned manipulation following changes in degrees of freedom. *Journal of Neuroscience* 31:13576-13584.
68. Bicchi A, Gabiccini M, **Santello M** (2011). Modeling force distribution in natural and artificial hands with soft synergies. *Philosophical Transactions of the Royal Society B* 366:3153-3161.
69. Adler CH, Crews D, Kahol K, **Santello M**, Noble B, Hentz JG, Caviness JN (2011). Are the yips a task-specific dystonia or golfer's cramp? *Movement Disorders* 26:1993-1996.
70. Aimola E, **Santello M**, La Grua G, Casabona A (2011). Anticipatory postural adjustments in reach-to-grasp: effect of object mass predictability. *Neuroscience Letters* 502:84-88.
71. Crajé C, Lukos JR,[1] Gordon AM, Ansuini C,[1] **Santello M** (2011). The effects of task and content on digit placement on a bottle. *Experimental Brain Research* 212:119-124.
72. Zhang W,[2] Gordon AM, McIsaac T,[2] **Santello M** (2011). Within-trial adaptation of anticipatory modulation of multi-digit forces to friction. *Experimental Brain Research* 211:17-26.
73. Warren W,[1] **Santello M**, Helms Tillery SI (2011). Effects of fusion between tactile and proprioceptive inputs on the cutaneous rabbit effect. *Public Library of Science ONE* 6:e18073.
74. Ganley KJ, Herman RM, **Santello M**, Willis WT (2011). Fuel oxidation at the walk-to-run transition in humans. *Metabolism* 60:609-616.
75. Danna-Dos Santos A,[2] Poston B,[2] Jesunathadas M,[2] Bobich LR,[1] Hamm TM, **Santello M** (2010). Influence of fatigue on hand muscle coordination and EMG-EMG coherence during three-digit grasping. *Journal of Neurophysiology* 104:3576-3587.
76. Johnston JA,[2] Formicone G, Hamm TM, **Santello M** (2010). Assessment of across-muscle coherence using multi-unit vs. single unit recordings. *Experimental Brain Research* 207:269-282.
77. Warren W,[1] **Santello M**, Helms Tillery SI (2010). Saltatory stimuli delivered across fingertips induce the Cutaneous Rabbit Effect. *Experimental Brain Research* 206:419-426.
78. Poston B,[2] Danna-Dos Santos A,[2] Jesunathadas M,[2] Hamm TM, **Santello M** (2010). Force-independent distribution of correlated neural inputs to hand muscles during three-digit grasping. *Journal of Neurophysiology* 104:1141-1154.
79. Fu Q,[1] Zhang W,[2] **Santello M** (2010). Anticipatory planning and control of grasp positions and forces for dexterous two-digit manipulation. *Journal of Neuroscience* 30:9117-9126.
80. Zhang W,[2] Gordon AM, Fu Q,[1] **Santello M** (2010). Manipulation after object rotation reveals independent sensorimotor memory representations of digit positions and forces. *Journal of Neurophysiology* 103:2953-2964.
81. Raghavan P,[2] **Santello M**, Gordon AM, Krakauer JW (2010). Compensatory motor control after stroke: an alternative joint strategy for object-dependent shaping of hand posture. *Journal of Neurophysiology* 103:3034-3043.
82. Johnston JA,[2] Bobich LR,[1] **Santello M** (2010). Coordination of extrinsic and intrinsic hand muscle activity as a function of wrist posture during two-digit grasping. *Neuroscience Letters* 474:104-108.
83. Lukos JR,[1] Lee D, Poizner H, **Santello M** (2010). Anticipatory modulation of digit placement for grasp control is affected by Parkinson's disease. *Public Library of Science ONE* 5: e9184. doi:10.1371/journal.pone.0009184.

84. Albert F,[2] **Santello M**, Gordon AM (2009). Sensorimotor memory of object weight distribution during multidigit grasping. *Neuroscience Letters* 463:188-93.

85. Lozano CA,[1] Kaczmarek KA, **Santello M** (2009). Electrotactile stimulation on the tongue: intensity perception, discrimination and cross-modality estimation. *Somatosensory and Motor Research* 26:50-63.

86. McIsaac T,[2] **Santello M**, Johnston JA,[2] Zhang W,[2] Gordon AM (2009). Task-specific modulation of multi-digit forces to texture. *Experimental Brain Research* 194:79-90.

87. Lukos JR,[1] Ansuini C,[1] **Santello M** (2008). Anticipatory control of grasping: independence of sensorimotor memories for kinematics and kinetics. *Journal of Neuroscience* 28:12765-12774.

88. Warren JP,[1] Bobich LR,[1] **Santello M**, Sweeney JD, Helms Tillery SI (2008). Receptive field characteristics under electrotactile stimulation of the fingertip. *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 16:410-415.

89. Winges SA,[1] Kornatz KW,[2] **Santello M** (2008). Common input to motor units of intrinsic and extrinsic hand muscles during two-digit object hold. *Journal of Neurophysiology* 99:1119-1126.

90. Muratori L,[1] McIsaac T,[2] Gordon AM, **Santello M** (2008). Impaired anticipatory control of force sharing patterns during whole-hand grasping in Parkinson's disease. *Experimental Brain Research* 185:41-52.

91. Bobich LR,[1] Warren JP,[1] Sweeney JD, Helms Tillery SI, **Santello M** (2007). Spatial localization of electrotactile stimuli on the fingertip in humans. *Somatosensory and Motor Research* 24:179-188.

92. Lukos J,[1] Ansuini C,[1] **Santello M** (2007). Choice of contact points during multi-digit grasping: effect of predictability of object center of mass location. *Journal of Neuroscience* 27:3894-3903. Issue cover.

93. Ansuini C,[1] **Santello M**, Tubaldi F, Massacesi S, Castiello U (2007). Control of hand shaping in response to object shape perturbations. *Experimental Brain Research* 180:85-96.

94. Winges SA,[1] Johnston JA,[2] **Santello M** (2006). Muscle-pair specific distribution and grip type modulation of neural common input to extrinsic digit flexors. *Journal of Neurophysiology* 96:1258-1266.

95. Ansuini C,[1] **Santello M**, Massaccesi S, Castiello U (2006). Effects of end-goal on hand shaping. *Journal of Neurophysiology* 95:2456-2465.

96. Winges SA,[1] **Santello M** (2005). From single motor unit activity to multiple grip forces: Mini-review of multi-digit grasping. *Integrative and Comparative Biology* 45:679-682.

97. Johnston JA,[2] Winges SA,[1] **Santello M** (2005). Periodic modulation of motor unit activity in extrinsic hand muscles during multidigit grasping. *Journal of Neurophysiology* 94:206-218.

98. **Santello M** (2005). Review of motor control mechanisms underlying impact absorption from falls. (Invited Review). *Gait and Posture* 21:85-94.

99. **Santello M**, Fuglevand AJ (2004). Role of across-muscle motor unit synchrony for the coordination of forces. *Experimental Brain Research* 159:501-508.

100. Winges SA,[1] **Santello M** (2004). Common input to motor units of digit flexors during multi-digit grasping. *Journal of Neurophysiology* 92:3210-3220.

101. **Santello M**, Muratori L,[1] Gordon AM (2004) Control of multi-digit grasping in Parkinson's Disease: effect of predictability of object center of mass. *Experimental Neurology* 187:517-528.
102. Schieber MH, **Santello M** (2004). Hand function: Neural control and peripheral limits to performance. (Invited Review). *Journal of Applied Physiology* 96:2293-2300.
103. Winges SA,[1] Weber DA,[1] **Santello M** (2003). The role of vision on hand pre-shaping during reach to grasp. *Experimental Brain Research* 152:489-498.
104. Rearick MP,[2] Casares A,[1] **Santello M** (2003). Task-dependent modulation of multi-digit force coordination patterns. *Journal of Neurophysiology* 89:1317-1326.
105. Rearick MP,[2] Stelmach GE, Leis B,[2] **Santello M** (2002). Coordination and control of forces during multifingered grasping in Parkinson's disease. *Experimental Neurology* 177:428-442.
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107. Rearick MP,[2] **Santello M** (2002). Force synergies for multifingered grasping. Effect of predictability in object center of mass and handedness. *Experimental Brain Research* 44:38-49.
108. **Santello M**, Flanders M, Soechting JF (2002). Patterns of hand motion during grasping and the influence of sensory guidance. *Journal of Neuroscience* 22:1426-1435.
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110. **Santello M**, Soechting JF (2000). Force synergies for multifingered grasping. *Experimental Brain Research* 133:457-467.
111. **Santello M**, Flanders M, Soechting JF (1998). Postural synergies for tool use. *Journal of Neuroscience* 18:10105-10115.
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114. **Santello M**, Soechting JF (1997). Matching object size by controlling finger span and hand shape. *Somatosensory and Motor Research* 14:203-212.

Editor-reviewed invited commentaries and editorials

115. Camponogara I, Toma S, Cuturi LF, **Santello M** (2022). Reaching and Grasping the Multisensory Side of Dexterous Manipulation. Editorial, *Frontiers in Psychology - Cognition*, DOI: 10.3389/fpsyg.2022.866608.
116. **Santello M** (2021). Pushing the boundaries of a physical approach for the study of sensorimotor control. Invited commentary of the article "Laws of nature that define biological action and perception" by Mark Latash. *Physics of Life Reviews* 37:7-9. doi: 10.1016/j.plrev.2021.02.002. Epub 2021 Mar 2.
117. **Santello M** (2015). Inference and representations of hand actions through grasp synergies. Invited commentary of the article *"Grasping synergies: A motor-control approach to the mirror neuron mechanism"* by D'Ausilio A, Bartoli E, Maffongelli L. *Physics of Life Reviews*, http://dx.doi.org/10.1016/j.plrev.2015.01.002.

118. **Santello M** (2015). Getting a grasp of theories of sensorimotor control of the hand: Identification of underlying neural mechanisms. Invited commentary of the article *"The hand: Shall we ever understand how it works?"* by Mark L. Latash. *Motor Control* 19:149-153.

Peer-reviewed conference papers

119. Godfrey SB, Bicchi A, **Santello M** (2016). Influence of force feedback on grasp force modulation in prosthetic applications: A preliminary study. *Conference Proceedings of the IEEE Engineering in Medicine and Biology Society*, Orlando, FL: August 2016:5439-5442.
120. Paek AY, Gailey A,[2] Parikh P,[2] **Santello M**, Contreras-Vidal J (2015). Predicting hand forces from scalp electroencephalography during isometric force production and object grasping. *Conference Proceedings of the IEEE Engineering in Medicine and Biology Society*: 7570-7573.
121. Naceri A, Moscatelli A, **Santello M**, Ernst M (2014). Multi-digit position and force coordination in three- and four-digit grasping. *Sixth Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems 2014*.
122. Battaglia E,[1] Grioli G, Catalano MG, **Santello M**, Bicchi A (2014). ThimbleSense: An individual-digit wearable tactile sensor for experimental grasp studies. *Proceedings of 2014 IEEE International Conference on Robotics and Automation,* 2728–2735.
123. Battaglia E,[1] Grioli G, Catalano MG, Serio A, **Santello M**, Bicchi A (2014). ThimbleSense: A new wearable tactile device for human and robotic fingers. *2014 IEEE Haptics Symposium (HAPTICS)*.
124. Naceri A, Moscatelli A, **Santello M**, Ernst MO (2014). Coordination of multi-digit positions and forces during unconstrained grasping in response to object perturbations. *2014 IEEE Haptics Symposium (HAPTICS)*.
125. Fu Q,[1] Ushani A, Jentoft L, Howe RD, **Santello M** (2013). Human reach-to-grasp with orientation uncertainty. *35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society.*
126. Paschero M, Del Vescovo G, Benucci L, Rizzi A, **Santello M**, Fabbri G, Frattale Mascioli FM (2012). A Real Time Classifier for Emotion and Stress Recognition in a Vehicle Driver. *ISIE 2012 – The 21th IEEE International Symposium on Industrial Electronics*.
127. Fu Q,[1] **Santello M** (2011). Towards a complete description of hand kinematics: robotics-inspired framework for quantifying human grasping and manipulation. *3rd Annual International IEEE/Engineering in Medicine and Biology Society Conference*, 8247-8250.
128. Fu Q,[1] **Santello M** (2010). Tracking whole hand kinematics using extended Kalman filter. *Conference Proceedings IEEE/Engineering in Medicine and Biology Society*, 4606-4609.
129. Bianchi M,[1] Grioli G,[2] Scilingo EP, **Santello M**, Bicchi A (2010). Validation of a virtual reality environment for the study of dexterous manipulation. *Fourth Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems 2010*, Part II, 136-143.
130. Ciocarlie M, Dang H, Lukos J,[1] **Santello M**, Allen P (2009). Functional analysis of finger contact locations during grasping. *Third Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems 2009*, 401-405.
131. Boccaletti C, Castrica F, Fabbri G, **Santello M** (2008). A non-invasive biopotential electrode for the correct detection of bioelectrical currents. *Biomedical Engineering, IASTED Proceedings,* 353-358.
132. Johnston JA,[2] Winges SA,[1] **Santello M** (2005). Neuromuscular determinants of force coordination during multidigit grasping. *IEEE/Engineering in Medicine and Biology Society,* 26th Annual International Conference Vol. 6: 4645-4648.

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MANUSCRIPTS IN PREPARATION OR UNDER REVIEW

134. Takai A, Fu Q,[3] Doibata Y, Lisi G, Tsuchiya T, Mojtahedi K,[1] Yoshioka T, Kawato M, Morimoto J, **Santello M**. Role specialization is a key determinant of better task performance by human dyads than individuals.
135. Noll WP,* Wu Y-H,[3] **Santello M**. Dexterous manipulation: Differential sensitivity of manipulation and grasp forces.
136. Mysore AS,[1] Blais C,[3] **Santello M**. Delay length between contextual information presentation and interference event affects utilization of proactive control.

BOOK CHAPTERS

1. Fu Q, **Santello M** (2020). Learning from the human hand: Force control and perception using a soft-synergy prosthetic hand and non-invasive haptic feedback. In: Vinjamuri, R. (eds) *Advances in Motor Neuroprostheses*. Springer, Cham. https://doi.org/10.1007/978-3-030-38740-2_4
2. Piazza C, Catalano MG, Bianchi M, Ricciardi E, Prattichizzo D, Haddadin S, Luft AR, Lambercy O, Gassert R, Jakubowitz E, Van Der Kooij H, Tonis F, Bonomo F, de Jonge B, Ward T, Zhao KD, **Santello M**, Bicchi A (2018). The SoftPro Project: Synergy-based open-source technologies for prosthetics and rehabilitation. In: Carrozza, M., Micera, S., Pons, J. (eds) *Wearable Robotics: Challenges and Trends. WeRob 2018. Biosystems & Biorobotics*, vol 22. Springer, Cham. https://doi.org/10.1007/978-3-030-01887-0_71.
3. **Santello M** (2018). Dexterous manipulation: Understanding the continuum from hand kinematics to kinetics. In: *Reach-to-grasp behavior. Brain, behavior, and modelling across the lifespan* (Eds. Corbetta D, Santello M). Taylor and Francis Group.
4. Fu Q,[2] **Santello M** (2018). Sensorimotor learning of dexterous manipulation. In: *Human Inspired Dexterity in Robotic Manipulation* (Eds. Watanabe T, Harada K, Tada M). Academic Press, Elsevier.
5. Fu Q,[2] **Santello M** (2016). Dexterous manipulation: from high-level representation to low-level coordination of digit force and position. In: *Human and Robot Hands – Sensorimotor Synergies to Bridge the Gap between Neuroscience and Robotics* (Eds. Bianchi M., Moscatelli A.). Springer, pp. 9-27.
6. Fu Q,[2] **Santello M** (2016). Learning Interference in Dynamic Manipulation with Redundant Degrees of Freedom. In: *Converging Clinical and Engineering Research in Neurorehabilitation II*, Volume 15, Biosystems & Biorobotics (Eds: Ibáñez J, González-Vargas J, María Azorín J, Akay M, Pons J-L). Springer, pp. 457-461.
7. Godfrey SB, Bianchi M, Zhao K, Catalano M, Breighner R, Theuer A, Andrews K, Grioli G, **Santello M**, Bicchi A (2016). The SoftHand Pro: Translation from Robotic Hand to Prosthetic Prototype. In: *Converging Clinical and Engineering Research in Neurorehabilitation II*, Volume 15, Biosystems & Biorobotics (Eds: Ibáñez J, González-Vargas J, María Azorín J, Akay M, Pons J-L). Springer, pp. 469-473.

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9. Zhang W,[2] **Santello M** (2014). Quantification of behavioral consequences of Carpal Tunnel Syndrome: Insights from biomechanical analysis of grasping and manipulation. In: *Carpal Tunnel Syndrome: Risk Factors, Symptoms and Treatment Options. Neuroplasticity in Chronic Pain* (Eds. H Knotkova, R A Cruciani, J Merrick), Nova Science Publishers, pp. 33-55.
10. Buneo CA, Helms Tillery SI, **Santello M**, Santos VJ, Artemiadis P (2014). Effective neural representations for brain-mediated human-robot interactions. In: *Neuro-robotics: From brain machine interfaces to rehabilitation robotics* (Ed. P. Artemiadis), Vol. 2, Springer Netherlands, pp. 207-237. Top 25% most downloaded eBooks in the relevant Springer eBook Collection in 2015.
11. **Santello M** (2014). Synergistic control of hand muscles through common neural input. In: *The Human Hand as an Inspiration for Robot Hand Development.* (Eds. R Balasubramanian, V.J. Santos), Springer Tracts in Advanced Robotics (STAR) series, vol. 95, Springer, pp. 23-48.
12. Johnston JA,[2] **Santello M** (2009). Multi-digit grasping and manipulation: effect of Carpal Tunnel Syndrome on force coordination. In: *Sensorimotor Control of Grasping: Physiology and Pathophysiology* (Eds. D. Nowak, J. Hermsdoerfer), Cambridge University Press, pp. 285-295.
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14. Lukos J,[1] Ansuini C,[1] Castiello U, **Santello M**. (2008). Planning and control of object grasping: kinematics of hand pre-shaping, contact and manipulation. In: *Routledge Handbook of Biomechanics and Human Movement Science* (Eds. Y. Hong and R. Bartlett), Routledge, pp. 105-116.
15. Jerde TE, **Santello M**, Flanders M, Soechting JF (2006). Hand movements and musical performance. In: *Music, Motor Control, and the Brain* (Eds. E. Altenmüller, M. Wiesendanger, J. Kesselring), Oxford University Press, pp. 79-90.
16. Rearick MP,[2] **Santello M**. (2001). Effect of predictability of object center of mass and handedness on the control of multifingered grasping. *From basic motor control to functional recovery II. Towards an understanding of the role of motor control from simple systems to human performance* (Ed. N. Gantchev), Academic Publishing House, pp. 177-184.

GRANTS AND SCHOLARSHIPS

Active projects supported by extramural funding (as Principal Investigator)

National Institutes of Health
"Sensorimotor control of common-goal bimanual coordination"
$749,847 (Co-PI; recognition as PI of ASU sub-award: 100%); PI: Qiushi Fu. 6/1/2024 – 5/31/2029.

National Science Foundation
Research Experiences for Undergraduates (REU) supplement to *"IUCRC Phase II ASU: Building Reliable Advances and Innovations in Neurotechnology (BRAIN)"*
$18,000 (recognition: 100%); 03/01/24-02/28/25.

National Science Foundation
International travel supplement to CNS-2137272 *"Phase II I/UCRC: Building Reliable Advances and Innovation in Neuro-technology (BRAIN)"*
$12,309; 09/01/23-10/31/24
PI (recognition: 100%).

National Science Foundation
NCS-2220677 *"A transformative approach for mapping spatial and temporal dynamics of anterior cingulate function in humans"*
$528,345; 10/1/22-9/30/25
Co-PI; PI of ASU sub-contract (recognition: 100%).

National Institutes of Health
1R21AR081636*"Coordination of human grasp and manipulation forces"*
$373,419; 02/06/23-01/31/25
PI (recognition: 50%); Co-PI: Yen-Hsun Wu.

National Science Foundation
CNS-2137272 *"Phase II I/UCRC: Building Reliable Advances and Innovation in Neuro-technology (BRAIN)"*
$240,000; 07/01/22-06/30/27
PI (recognition: 100%).

National Center for Medical Rehabilitation Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health 1R01HD102615
"Toward use of the synergy-based SoftHand Pro for activities of daily living by transradial amputees: A multi-site clinical trial"
$3,105,000; 08/12/2021 – 05/31/2026
Contact PI (recognition: 100%); Mayo Clinic PI: Kristin Zhao. Co-I: Philip Stevens (Hanger Clinic).

Pending grant proposals

National Science Foundation
"Collaborative Research: CRCNS US-French-Japanese Research Proposal: Uncovering the computational principles of information exchange during human-human physical interactions"
$539,615 (PI; recognition: 100%); 09/01/24-08/31/28.

National Science Foundation
"Movement error-based characterization of upper limb position sense and multisensory integration"
$665,349 (Co-PI; recognition: 20%); 09/01/24-08/31/27. PI: Christopher Buneo.

National Science Foundation
"Collaborative Research: Sensorimotor Control of the Hand during Manipulation of Real-World Objects"
$634,453 (recognition: 100%); 01/01/25-12/31/2027.

Dignity Health-St. Joseph's Hospital-BNI: Barrow Neurological Foundation (BNF)
"Identification of parameters of transcranial focused ultrasound for safe neuromodulation in clinical population"
$104,487 (recognition: 50%); 07/01/24-6/30/25.

Completed projects supported by extramural funding (as <u>Principal Investigator</u>)

National Science Foundation
CNS-1650566 *"I/UCRC: Building Reliable Advances and Innovation in Neurotechnology (BRAIN)"*
$750,000 (recognition: 100%); 03/15/17-02/28/22 (no-cost extension through 06/30/22)
Co-PIs: William Tyler, Jeffrey Kleim.

National Science Foundation
BCS-1827752 *"Collaborative Research: Effector and Task Neural Representations of Hand-Object Interactions"*
$449,383; 09/01/18-08/31/22 (no-cost extension through 08/31/23).
PI (recognition: 50%); Co-I: Justin Fine.

WearTech, Phoenix Economic Initiative
"Validation of Repetitive Motion Injury Warning System"
$40,000; PI: Marco Santello.

Phoenix Children Hospital
"Effects of dystonia on resting state connectivity in children"
$50,000; 05/20/19-05/19/20
PI (recognition: 100%); sub-contract PI: Varina Boerwinkle.

Adidas
"Correlation between sensorimotor performance and emotions in e-Sports"
$56,366; 06/15/19-06/14/20
PI (recognition: 100%)

National Science Foundation
BCS-1455866 *"Collaborative Research: Sensorimotor Control of Hand-Object Interactions"*
$360,000 (recognition: 100%); 09/01/15-08/31/18 (no-cost extension through 08/31/19)

Defense Advanced Research Projects Agency (DARPA), Department of Defense
W911NF-17-1-0049 *"Sensorimotor control of grasping and manipulation through a soft-synergy prosthetic hand and peripheral neural interface system"*
$817,276 (recognition: 50%); 02/01/17-07/31/18
Co-PIs: Qiushi Fu; James Abbas. Sub-contract PI: Ranu Jung, Florida International University.

The Grainger Foundation
"The prosthetic Pisa/IIT SoftHand: A novel engineering design approach based on robotics and neuroscience"
$390,147 (ASU portion recognition: 100%); 05/16/2014 - 05/15/2018
ASU subcontract PI: M. Santello. PI: K. Andrews, Mayo Clinic.

Virginia G. Piper Foundation
Piper Health Solutions, *"Intelligent Robotics for Assessing, Rehabilitating, and Assisting Motor Impairments"*
$1,000,000 (recognition: 100%); 07/01/12-06/30/17

Eunice Kennedy Shriver National Institute Of Child Health and Human Development, National Institutes of Health
R21 HD081938 *"Soft Synergy-Based Artificial Hand for Prosthetic applications"*
$398,834 (recognition: 100%); 08/31/14-07/31/16 (no-cost extension through 07/31/17)
Co-PIs: K. Andrews (Mayo Clinic), A. Bicchi, S.B. Godfrey (University of Pisa, Italian Institute of Technology)

National Science Foundation
1539979 *"Planning Grant: Collaborative Research: I/UCRC for Building Reliable Advances and Innovation in Neurotechnology (BRAIN)"*
$25,986 (recognition: 55%); 07/15/15-06/30/16
Co-Investigator: Jose Contreras-Vidal, University of Houston

Google, Inc.
"Biomechanical analysis of handwriting dynamics and tools"
$127,422 (recognition: 100%); 08/14/15-06/30/16

Columbia Care
"Determining medical oil properties before and after vaporization"
$91,965 (recognition: 50%); 09/01/15-12/31/16
Co-PI: Antonio Garcia.

National Science Foundation
BCS-1153034 *"Collaborative Research: Sensory Integration and Sensorimotor Transformations for Dexterous Manipulation"*
$320,401 (recognition: 100%); 03/15/12-02/28/15 (no-cost extension through 02/28/16)

Eunice Kennedy Shriver National Institute Of Child Health and Human Development, National Institutes of Health
1R01 HD057152 *"Sensorimotor Integration Underlying Hand Control in Carpal Tunnel Syndrome"*
$1,434,898 (recognition: 80%); 09/30/08-07/31/13 (no-cost extension through 07/31/15)
Co-Investigators: J.A. Johnston, University of Calgary; M. Ross, Mayo Clinic.

National Science Foundation
IIS-0904504 *"Collaborative Research. Robotic Hands: Understanding and Implementing Adaptive Grasping"*
$236,003 (recognition: 100%); 07/01/09-06/30/12 (no-cost extension through 06/30/13)

National Institute of Arthritis, Musculoskeletal and Skin Diseases, National Institutes of Health
2R01 AR47301-05 *"Neural Control of Grasping"*
$1,429,432 (recognition: 100%); 09/1/07-06/30/12 (no-cost extension through 06/30/13)

National Science Foundation
BCS-0819547 "*Collaborative Research: Dexterous Control of Multi-Digit Grasping"*
$122,000 (recognition: 100%); 09/01/08-08/31/11 (no cost extension through 08/31/12)

National Science Foundation
Supplement BCS-0829488 *"Motion Capture of Upper Limb: Reaching and Grasping"*
$30,000 (recognition: 100%); 09/01/08-08/31/09

National Science Foundation
BCS-0519152 *"Collaborative Research: Coordination of Multi-Digit Forces During Grasping"*
$150,000 (recognition: 100%); 09/01/06-08/31/08 (no-cost extension through 05/31/11)

National Institute of Arthritis, Musculoskeletal and Skin Diseases, National Institutes of Health
1R01 AR 47301 *"Neural Control of Grasping"*
$583,000 (recognition: 100%); 04/01/02-08/31/07

National Science Foundation
"Neural Control of Grasping"
$334,935 (recognition: 100%); 04/01/02-03/31/06
Approved for funding (withdrawn when NIH proposal was also funded.)

Extramural Funding (as Co-Investigator on research grant; as Training Faculty or Co-Investigator on graduate training grants) – Active and Completed

National Science Foundation
CMMI-1944883 *"CAREER: Facilitating human interaction with assistive robots through intent signaling and inference"*
$391,222.00 **(**09/01/20-08/31/25
Co-I (recognition: 10%). PI: Wenlong Zhang.

The Kern Family Foundation
"Transforming engineering education through student and faculty mindset development: Establishing a national engineering faculty training collaborative"
$ 2,860,039 (recognition: 5%); 01/01/16-12/31/17
PI: A. McKenna (Co-PIs: J. Collofello, A. Carberry, J. London, S. Brunhaver, J. Bekki, M. Santello, J. LaBelle).

National Science Foundation, Integrative Graduate Education and Research Traineeship #1069125
"IGERT: Person-centered Technologies and Practices for Individuals with Disabilities"
$2,990,159 (recognition: 10%); 08/01/11 - 07/31/16
PI: S. Panchanathan; Co-Investigators: F. Goulshani, C. Miller, S. Pavri, M. Santello.

National Institutes of Health Bioengineering Research Partnership R01-EB008578
"Neural-Enabled Prostheses with Sensorimotor Integration"
$3,182,124 (recognition: 10%); 09/30/07- 12/31/10
PI: R Jung; Co-PIs: J. Abbas, K. Horch, S. Phillips, M. Santello

National Institutes of Health Bioengineering Research Partnership R01-NS050256
"Cortical Control of a Dexterous Prosthetic Hand"
$1,130,000 (recognition on subcontract: 50%); 09/15/06-09/14/11
PI: A.B. Schwartz; ASU subcontract PI: S.I. Helms Tillery
Allergan
"Yips: A Focal, Task-Specific Dystonia"
$193,462 (recognition: 10%); 9/01/06-8/31/08
PI: CH Adler, Mayo Clinic; Co-Investigators: J. Caviness, D. Crews, M. Santello

National Science Foundation, Integrative Graduate Education and Research Traineeship #9987619
IGERT *"Musculoskeletal and Neural Adaptations in Form and Function"*
$2,987,000; 07/01/00-06/30/07
PI: J. He; Co-Investigators: G. Stelmach, M. Marztke (M. Santello: Training faculty)

Intramural Funding (as Principal Investigator or co-Investigator) – Active and Completed

ASU Learning Enterprise
Career Catalyst Learner Offering, *"Introduction to remote human-centric data collection and processing"*
$47,500; 12/01/22-06/30/23
Principal Leads: Marco Santello, Aurel Coza, Jason Siegler, Thomas Sugar

ASU/Mayo Seed Grant
"Impaired hand function after stroke: A pilot study of hand dysfunction in stroke with pure motor or sensorimotor deficits and implications for hand functional rehabilitation post stroke"
$50,000 (recognition: 50%); 01/01/18-12/31/18
ASU PI: Marco Santello. Mayo PI: Maria Aguilar.

Mayo Clinic-Arizona State University Team Science Grants
"A multi-disciplinary approach to optimize integration of sensory feedback for prosthetic applications in persons with upper limb loss"
$900,000 (recognition: 50%); 07/01/16-06/30/19
ASU PI: Marco Santello, ASU Co-I: Rosalind Sadleir. Mayo PI: Kristin Zhao, Mayo Co-I: Karen Andrews.

ASU-Mayo Clinic Seed Grant
"*Design and Implementation of a Soft Synergy-Based Hand for Prosthetic Applications*"
$40,000 (% recognition: 75%); 01/01/14-12/31/14
M. Santello (ASU PI); C Terzic (Mayo Clinic PI); A. Bicchi (University of Pisa).
Approved for funding; application withdrawn due to overlap with Grainger grant

The Mayo Clinic, Center for Regenerative Medicine 2013 Accelerated Regenerative Medicine Awards Program
"Effects of carpal tunnel release surgery on recovery of sensorimotor hand function"
$93,000; 7/1/13-12/31/13
M. Santello (ASU PI); M. Ross (Mayo Clinic PI).

Ira A. Fulton Infrastructure Seed Grant
"3-D projection system for virtual reality applications"
$24,000; May 2012
C. Buneo C (PI), M. Santello, S.I. Helms Tillery, V. Santos, P. Artemiadis.

Ira A. Fulton Infrastructure Seed Grant
"Paired pulse transcranial magnetic stimulation"
$24,000; May 2012
J. Kleim (PI), M. Santello, S.I. Helms Tillery, N. Bhardwaj, D. Adelson.Ira A. Fulton Infrastructure Seed Grant

Ira A. Fulton Infrastructure Seed Grant
"Solidscape 3D printers"
$44,000; May 2012
D. Frakes (PI), V. Pizziconi, M. Caplan, J. La Belle, R. Adrian, V. Santos, M. Santello, S.I. Helms Tillery, B. Vernon.

Ira A. Fulton Schools of Engineering Grand Challenges Seed Funding program
"Cooperative neural control of real and virtual devices: Toward metamonkeys, metamen and metawarfighters"
$100,000; September 2011
C. Buneo C (PI), M. Santello, S.I. Helms Tillery, V. Santos, P. Artemiadis P.

ASU-Mayo Clinic Innovation Technology Fund
"Optimization of design of gastrointestinal endoscopes and accessories based on quantitative assessment of arm-hand coordination."
$20,500 (% recognition: 50%); 01/01/09-31/12/09
M. Santello (PI); Mayo Clinic collaborator: D. Fleischer.

ASU-Mayo Clinic Seed Grant
"Sensorimotor integration in carpal tunnel syndrome"
$40,000 (% recognition: 50%); 01/01/05-12/31/05
M. Santello (PI); A. Smith (Mayo Clinic PI).

Bioengineering Whitaker Seed Grant, ASU
$20,000 (% recognition: 100%); 02/01/01-01/31/02
Research Incentive Award, Office of the Vice Provost for Research, ASU
$8,000; 12/01/00-11/30/01

Grant Award to Advance the Quality of Undergraduate Education
$13,700; 07/01/01-06/30/02.
College of Liberal Arts and Sciences, Arizona State University.

Faculty Seminar Series Award
Support for Seminar Speakers; 09/01/00-12/15/2000
College of Liberal Arts and Sciences, Arizona State University.

"Sir Richard Fenwick" PhD Scholarship
6 months; 1995
The University of Birmingham, Birmingham, U.K.

Grant EMRA NNR/2027/4
Equipment and travel expenses; 01/01/94-12/31/94
Ministry of Defense, U.K.

Travel Grant
£600; Summer 1994
The Physiological Society, London, U.K.
Summer School Grant "Multisensory Control of Movement", Trieste, Italy (1994), NATO

Ph.D. Scholarship
09/01/93-04/01/95
The University of Birmingham, Birmingham, U.K.

Funding as Sponsor on Awards and Fellowships to Pre-/Post-Doctoral Trainees and Undergraduate students

School of Biological and Health Systems Engineering Grad Slam Award
Pre-doctoral trainee: Archana Mysore
$2,000 (Spring 2023)

EOP Graduate Student Fellowship
Pre-doctoral trainee: Archana Mysore
$500 (Spring 2023)

ASU Graduate and Professional Student Association (GPSA) Travel Grant
Pre-doctoral trainee: Archana Mysore
$950 (Fall 2022)

ASU School of Biological and Health Systems Engineering (SBHSE) Merit Award
Pre-doctoral trainee: Archana Mysore
$500 (Spring 2022)

SBHSE Graduate Excellence award
Pre-doctoral trainee: Archana Mysore
$1,000 (2020-21)

National Science Foundation
Research Experience for Undergraduates Supplement
CNS-1650566 *"I/UCRC: Building Reliable Advances and Innovation in Neurotechnology (BRAIN)"*
Avinash Puppala, Dalia Khaled, Catherine Nunez, Alexander Sadleck; $32,000 (recognition: 100%); 03/15/17-02/28/22
Co-PIs: William Tyler, Jeffrey Kleim.

National Science Foundation
Research Experience for Undergraduates Supplement
BCS-1827752 *"Collaborative Research: Effector and Task Neural Representations of Hand-Object Interactions"*
Michael Ruta, Jacob Schuler; $16,000 (recognition: 100%); 03/15/17-02/28/22
PI (recognition: 50%); Co-I: Justin Fine.

National Science Foundation
Research Experience for Undergraduates Supplement
CNS-1650566 *"I/UCRC: Building Reliable Advances and Innovation in Neurotechnology (BRAIN)"*
Avinash Puppala, Dalia Khaled; $16,000 (recognition: 100%); 03/15/17-02/28/22
Co-PIs: William Tyler, Jeffrey Kleim.

National Science Foundation
Research Experiences for Undergraduates (REU)
BCS-1827752 *"Collaborative Research: Effector and Task Neural Representations of Hand-Object Interactions"*
$17,000 (recognition: 100%); 07/21/19-07/20/20

National Science Foundation
Research Experiences for Undergraduates (REU)
Supplement to BCS-1455866 *"Collaborative Research: Sensorimotor Control of Hand-Object Interactions"*
$20,000 (recognition: 100%); 08/01/16-08/31/18

ASU Graduate College Travel Award
$500 (Fall 2017)
Pre-doctoral trainee: Patrick McGurrin

National Science Foundation
IGERT *"Person-centered Technologies and Practices for Individuals with Disabilities"*
$47,500; 08/01/16-07/31/18
Pre-doctoral trainee: Kaycee Glattke

Travel Grant, ASU Graduate and Professional Student Association (2016, 2017)
$950
Pre-doctoral trainee: Keivan Mojtahedi

Achievement Rewards for College Scientists, Phoenix Chapter (2016)
$7,000
Pre-doctoral trainee: Patrick McGurrin

Travel Grant, ASU Graduate and Professional Student Association
$950
Pre-doctoral trainee: Patrick McGurrin

National Science Foundation
IGERT *"Person-centered Technologies and Practices for Individuals with Disabilities"*
$47,500; 08/01/13-07/31/15
Pre-doctoral trainee: Patrick McGurrin

Flinn Foundation Internship, summer 2014
Undergraduate Intern: Kaleia Kramer

Chinese Government Award for Outstanding Self-Financed Students Abroad, China Scholarship Council (2013)
$6000
Pre-doctoral trainee: Qiushi Fu

Best Student Paper (1st place), IEEE Phoenix Section Student Paper Contest 2013
$300
Undergraduate Intern: Nathan Gaw
Flinn Foundation Internship, summer 2013
Undergraduate Intern: Juan Laitano

Travel Fellowship, Society for Neural Control of Movement
$800, 19th Neural Control of Movement 2009 Meeting, Kona, Hawaii
Pre-doctoral trainee: Jamie Lukos

Achievement Rewards for College Scientists, Phoenix Chapter (2009)
$7,000
Pre-doctoral trainee: Jamie Lukos

Douglas L. Conley Memorial Scholarship, Department of Kinesiology, ASU (2008)
$1,000
Pre-doctoral trainee: Jamie Lukos

Conacyt (Mexico)/ASU
$45,000; 08/01/05-07/31/08
Pre-doctoral trainee: Cecil Lozano

National Science Foundation
IGERT *"Musculoskeletal and Neural Adaptations in Form and Function"*
$47,500; 09/01/04-07/31/06
Pre-doctoral trainee: Lisa Raleigh

National Institutes of Health, National Institute of Arthritis, Musculoskeletal and Skin Diseases
Pre-doctoral Kirschstein-NRSA Fellowship (F31)
"Modulation of Motor Unit Synchrony Strength in Grasping"
$54,000; 08/01/2005-07/31/2006
Pre-doctoral trainee: Sara A Winges

National Science Foundation
IGERT *"Musculoskeletal and Neural Adaptations in Form and Function"*
$47,500; 09/01/02-07/31/05
Pre-doctoral trainee: Sara A Winges

National Institutes of Health, National Institute of Arthritis, Musculoskeletal and Skin Diseases
"Perturbation to Force Sharing Patterns in Five-Digit Grasps"
$77,000; 08/01/2005-07/31/2007
Post-doctoral trainee: Jamie A Johnston

National Institutes of Health, T32 Statewide Training Program in Movement Neuroscience
$50,000; 10/15/00-07/31/02
Post-doctoral trainee: Matthew P Rearick

SCHOLARLY PRESENTATIONS

Invited Presentations (n = 140+)

Grasping and dexterous manipulation: Sensorimotor control and neural mechanisms. International Conference Motor Control 2024, Wisla, Poland: September 2024.

Sensorimotor control mechanisms for dexterous manipulation. Department of Kinesiology, University of Michigan: March 2024.

NSF Industry-University Cooperative Research Centers: A successful model for supporting partnerships between industry and universities. International Technology Health Conference, Hanoi University of Science and Technology, Hanoi, Vietnam, virtual presentation: December 2023.

Neuroscience and robotic approaches for the study of dexterous manipulation. Behavioral Neuroscience and Comparative Psychology seminar series Department of Psychology, Arizona State University: October 2023.

Neuroscience and robotic approaches for the study of dexterous manipulation. Speech and Hearing Sciences, Arizona State University: October 2023.

Synergistic approaches for the study of human motor control: Insights and applications. Italian Institute of Technology, Genova, Italy: October 2023.

A synergy-based design approach for hand prosthetics: Experimental and clinical considerations. Hand and Wrist Biomechanics International, World Congress of Biomechanics, Taipei, Taiwan: July 2022.

Sensorimotor function of the human hand: Control mechanisms and clinical applications. Division of Biokinesiology, University of Southern California: May 2022

Neural control of dexterous manipulation. Progress in Motor Control XIII, Virtual conference, University of Auckland, New Zealand: August 2021.

Neural control of the hand: Multidisciplinary approaches and clinical translation. Virtual research presentation, Neuromechanics Laboratories, University of Florida: April 2021.

Neuromuscular function of the human hand and clinical applications. GET2EXCEL webinar: August 2020.

Sensorimotor integration and neural control of the hand: Behavioral, psychophysical and imaging approaches. 16th (Virtual) Motor Control Summer School: May 2020.

Sensorimotor control and neural mechanisms of dexterous manipulation. Action Club, Department of Kinesiology, Pennsylvania State University, State College, PA: September 2019.

Sensorimotor hand function: Control and neural mechanisms. Graduate seminar: IMT School of Advanced Studies, Lucca, Italy: August 2019.

Sensorimotor learning of manipulation: Task and effector representations. Graduate seminar: IMT School of Advanced Studies, Lucca, Italy: August 2019.

Control strategies and neural mechanisms underlying human physical interaction. Workshop: Human movement science for physical human-robot collaboration. IEEE International Conference on Robotics and Automation, Montreal, Canada: May 2019.

Sensorimotor hand function: Control mechanisms and clinical translation. Panel: Multi-dimensional dexterous hand function and recovery. 29th Annual Meeting of the Society for the Neural Control of Movement, Toyama, Japan: April 2019.

Sensorimotor hand function: Translating insights about sensorimotor control mechanisms into clinical applications. Department of Neurological Surgery, The Miami Project, University of Miami, Miami, FL: December 2018.

Sensorimotor control of the hand: Integration of haptics and memory. Oculus, Facebook Reality Labs, Redmond, VA: December 2018.

Sensorimotor hand function: Bridging the gap between control mechanisms and clinical translation. International Conference on Neurorehabilitation, Keynote Speaker, Pisa, Italy: November 2018.

Neural control of the hand: Insights from research on dexterous manipulation. Advanced Telecommunication Research Institute International, Kyoto, Japan: August 2018.

Sensorimotor control of the hand: Theoretical frameworks and biomedical applications. Graduate School of Engineering Science, Osaka University, Osaka, Japan: August 2018.

Integration of memory and sensory feedback for dexterous manipulation. Institute of Innovative Research, Tokyo Institute of Technology, Tokyo, Japan: August 2018.

Neural control of the hand: Integration of experimental approaches to study sensorimotor control and learning. 15th Motor Control Summer School, Olomouc, Czech Republic: May 2018.

A new model of sensorimotor control of dexterous manipulation. Seminar Series, Department of Biomechanics and Center for Research in Human Movement Variability, University of Nebraska, Omaha, NE: January 2018.

Control of grasping and manipulation: Bridging behavior and neural mechanisms. "Dexterity: A problem for robotics and biology" Panel. Human Winter Conference on Brain Research, Whistler, Canada: January 2018.

Hand synergies: Theoretical frameworks and robotics applications. Department of Biomedical Engineering, Chemistry, and Biological Sciences, Vice Provost Research Talk Series, Stevens Institute of Technology, Hoboken, NJ: October 2017.

Cortical mechanisms underlying the integration of memory and sensory feedback for dexterous hand-object interactions. IDG/McGovern Institute for Brain Research, School of Psychological and Cognitive Sciences, Peking University. Beijing, China: May 2017.

Dexterous manipulation as a model to study sensorimotor learning and function. "Neural control of the hand and translation to active prostheses/orthoses" Symposium. 8th International IEEE EMBS Neural Engineering Conference, Shanghai, China: May 2017.

Linking sensorimotor behavior to neural mechanisms and clinical applications. Brainstorming workshop on clinical and computations approaches to stroke and rehabilitation. Tata Consulting Services, India (via webinar): April 2017.

The US National Science Foundation "Industry-University Cooperative Research Center" model for industry-university collaborations in Vietnam. Science-Technology Engineering-Math Conference (STEMCON), Hanoi, Vietnam: March 2017.

Complementary research approaches to investigate neural control of the hand and clinical applications. Department of Biomedical Engineering, International University - Vietnam National Universities, Ho Chi Minh City, Vietnam: February 2017.

Dexterous manipulation: Cortical correlates of sensorimotor learning. Action Club, Department of Kinesiology, Pennsylvania State University, State College, PA: September 2016.

Sensorimotor learning and transfer of grasping and manipulation: Neural mechanisms and clinical applications. "Embodied-Brain Systems Science and Neurorehabilitation" Workshop, 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS 2016), Orlando, FL: August 2016.

Dexterous manipulation: Understanding the continuum from neural representations to sensorimotor control. Biomechanics and Neural Control of Movement (BANCOM) 2016, Sterling, OH: June 2016.

How do we control dexterous manipulation of objects? Interaction between biomechanics and neural mechanisms. School of Life Sciences, University of Nevada Las Vegas, NV: April 2016.

Neural mechanisms underlying success and failure to transfer learning of dexterous hand-object interactions. "The origins and future of pattern processing and intelligence: From brains to machines" Workshop, Tempe, Arizona State University: March 2016.

Myoelectric control of grasping and manipulation through a synergy-based hand prosthesis (SoftHand Pro). "Robot-assisted assessment and therapy of hand function" Workshop, IEEE International Conference on Rehabilitation Robotics (ICORR 2015), Singapore: August 2015.

Neural control of the hand: From hand kinematics and dynamics to high-level representations of learned hand-object interactions. Keynote Speaker. "New approaches to complex musculoskeletal systems", International Symposium on Hand Movement and Muscle Synergy, Tokyo, Japan: July 2015.

Dexterous manipulation: Sensorimotor integration and cortical mechanisms. "The Hand: New Approaches for Elucidating its Sensorimotor Function" Symposium. 38th Annual Meeting of the Japan Neuroscience Society, Kobe, Japan: July 2015.

Control and adaptation of dexterous manipulation: Integration of predictive and reactive sensorimotor mechanisms. Keynote Speaker. Adaptive Motions in Animals and Machines (AMAM) 2015 Meeting, Massachusetts Institute of Technology, Cambridge, MA: June 2015.

Role of digit force-to-position modulation for dexterous manipulation. The 9th Triennial Symposium of Hand and Wrist Biomechanics International (HWBI 2015), Milan, Italy: June 2015.

Kinematics and dynamics of skilled manipulation: behavior and neural mechanisms. Division of Basic Biomedical Sciences, Sanford School of Medicine, University of South Dakota, Vermillion, SD: March 2015.

Perception and action: Sensorimotor learning of dexterous manipulation. Keynote Speaker, Arizona State University and University of Arizona (ASUofA) Cognitive Science and Cognitive Neuroscience Conclave, Tempe, Arizona: December 2014.

Neural control of dexterous manipulation. Graduate Seminar, University of Minnesota, Minneapolis, MN: September 2014.

BioMedical Engineering Device Innovation Consortium: A binational partnership to foster innovation, entrepreneurship, and economic development in Vietnam. Saigon Hi-Tech Park Annual International Conference, "Advancing biomedical engineering through semiconductor technology applications", Ho Chi Minh City, Vietnam: September 2014.

Sensorimotor mechanisms for control and learning of dexterous manipulation. "Hand, Brain, and Technology" International Conference, Ascona, Switzerland: September 2014.

Sensorimotor learning and transfer of dexterous manipulation. Robotics Research Jam Session 2014, "Of robots and men", Centro Interdipartimentale "E. Piaggio", University of Pisa, Pisa, Italy: July 2014.

Neural mechanisms underlying learning and control of grasping and manipulation. "Workshop on Human versus Robot Grasping and Manipulation − How can we close the gap?", Robotics Science and Systems, University of California, Berkeley, CA: July 2014.

Control of dexterous manipulation: biomechanics and neural mechanisms. "Motor Control in Biomechanics Symposium", World Congress of Biomechanics, Boston, MA: July 2014.

Hand prostheses: Challenges and current approaches. The 5th International Conference on the Development of Biomedical Engineering in Vietnam, Ho Chi Minh City, Vietnam: June 2014.

Biomedical device design centers: Opportunities for collaborations between Arizona State University and Vietnamese universities. 2014 Vietnam Engineering Education Conference: Ho Chi Minh City, Vietnam: March 2014.

Sensorimotor learning of dexterous manipulation. Graduate Colloquium, Department of Kinesiology, Pennsylvania State University, State College, PA: February 2014.

Neural mechanisms underlying anticipatory and feedback-driven control of object manipulation. Action Club, Department of Kinesiology, Pennsylvania State University, State College, PA: February 2014.

Dexterous manipulation: Sensorimotor learning and control of force and position. Bioengineering Department Seminar Series, University of Pittsburgh: February 2014.

Dexterous manipulation: sensorimotor integration, learning, and motor equivalence. Graduate seminar, School of Engineering, Istituto Tecnologico Monterrey, Mexico: November 2013.

Control of dexterous manipulation: Integration of feedback and feedforward mechanisms. Department of Psychology, University of Pisa, Pisa, Italy: October 2013.

Semplice non e' facile. Mani umane e robotiche, tra cultura, scienza, e tecnologia. (Simple is not easy. Culture, science, and technology of human and robotic hands). Co-presented with Dr. Antonio Bicchi. Festival of Science, Genova, Italy: October 2013.

Neural control of the hand: Interactions between feedback and feedforward mechanisms. Center for Intelligent Systems and Machine Learning, University of Tennessee, Knoxville, TN: October 2013.

Neural control of the hand: Experimental approaches and clinical applications. International Convention on Rehabilitation Engineering and Assistive Technology (i-CREATe 2013), Gyeonggi, Korea: August 2013. Plenary speaker.

Sensorimotor control of the hand: Mechanisms and clinical applications. 4th U.S.-Turkey Advanced Study Institute on Global Healthcare Challenges, Antalya Turkey: June 2013. Plenary speaker.

Sensorimotor transformations and representations for learning and generalization of dexterous manipulation. Excellence Center "Cognitive interaction technology" (CITEC) Symposium: Manual Intelligence, Bielefeld, Germany: May 2013.

Biomedical engineering at Arizona State University. 2014 Vietnam Engineering Education Conference, Can Tho City: March 2013.

Neural control of the hand: from sensorimotor memory to execution of dexterous manipulation. Department of Electrical and Computer Engineering, University of Houston, Houston, TX: February 2013.

Sensory-to-motor synergies: manipulation task versus effector representations. Workshop "Hand synergies - how to tame the complexity of grasping", 2013 IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Germany: May 2013.

Neural control of the hand: Mechanisms and clinical applications. Engineers Club of the West Valley, Sun City West, AZ: April 2013.

Sensorimotor transformations for learning dexterous manipulation: memory, feedback, and high-level representations. University of Florida, Gainesville, FL: March 2013.

Force-to-position mapping in grasping and manipulation: considerations for BMI applications. International Workshop on Clinical Brain-Machine Interface Systems, Houston, TX: February 2013.

Sensorimotor memory for anticipatory dexterous object manipulation. Cognitive Neuroscience Robotics Workshop, IEEE/RSJ International Conference on Intelligent Robots and Systems 2012, Vilamoura, Portugal: October 2012.

Effects of carpal tunnel syndrome on dexterous control of manipulation. 4th ASU-BNI Neuroscience Research Symposium, The Barrow Neurological Institute. Phoenix, AZ: September 2012.

Learning dexterous manipulation: sensorimotor memory, visuomotor transformations, and high-level representations. Scientific Retreat on Grasping, Fraueninsel, Germany: August 2012.

Learning and control of dexterous manipulation. Grand Rounds Series, Phoenix Children's Hospital, Phoenix, AZ: September 2012.

Understanding sensorimotor function of the hand: mechanisms and applications to rehabilitation. Upper limb robot-assisted rehabilitation and assessment workshop, International Convention on Rehabilitation Engineering and Assistive Technology (iCREATe 2012), Singapore: July 2012.

Sensorimotor transformations for learning dexterous manipulation. VI Brazilian Motor Behavior Congress, San Paulo, Brazil: July 2012.

Anticipatory control of manipulation: sensorimotor integration, learning, and motor equivalence. The 2nd Robotics and Neuroscience workshop, University of Siena, Italy: May 2012.

Finger force compensation for variable hand position: implications for aim in golf. World Scientific Congress of Golf VI, Scottsdale, Arizona: March 2012.

Multi-level representations of dexterous manipulation: digits, objects, and tasks. Institute of Robotics and Intelligent Systems, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland: December 2011.

Grasping the brain: Unlocking the mysteries of the human hand. Dean's Lecture Series, Arizona State University, Tempe, AZ: November 2011.

Neural control of upper limb: Mechanisms and clinical Applications. Orthopedics and Biomechanics Group, The Mayo Clinic, Rochester, Minnesota: November 2011.

Sensorimotor integration for the control of grasp kinematics and kinetics: Potential applications to brain-machine interfaces. Brain-Machine Interface Special Session, 15th International Graphonomics Society, Cancun, Mexico: June 2011.

Sensorimotor integration for learning dexterous manipulation. Sobell Department of Motor Neuroscience and Movement Disorders, University College London, Institute of Neurology, London, UK: May 2011.

Neural control of the hand: Physiology and applications to ergonomics and active safety for automotive design. Polo Mobilitá Sostenibile, Universitá della Sapienza, Rome, Italy: April 2011.

Sensorimotor integration for the coordination of digit positions and forces for dexterous manipulation. 'The systems neuroscience of primate hand function: models, mechanisms, rehabilitation and mirror systems.' HERTIE FENS-IBRO Winter School (organizers: Roger Lemon and Giacomo Rizzolatti), Obergurgl, Austria: January 2011.

Learning and learning transfer of dexterous manipulation. Department of Information Engineering, University of Siena, Italy: December 2010.

Learning dexterous manipulation: Adaptation, sensorimotor bias, and motor equivalence. School of Sport and Exercise Sciences, University of Birmingham, Birmingham, UK: December 2010.

Dexterous manipulation: Sensorimotor memories, learning, and learning transfer. Department of Psychology, Arizona State University, Tempe, AZ: October 2010.

Visuo-haptic integration for manipulation: Learning, transfer, and motor equivalence. Keynote Speaker, IEEE Symposium on Haptic Audio-Visual Environments and Games, Arizona State University, Tempe, AZ: October 2010.

Learning and learning transfer of dexterous manipulation. Action Club, Northeastern University, Boston, MA: October 2010.

Sensorimotor control and learning of dexterous manipulation. Biomedical Engineering Seminar Series, Biomedical Engineering, University of Arizona, Tucson, AZ: October 2010.

Coordination between digit forces and positions for dexterous manipulation: Sensorimotor memories, learning, and anticipatory control. 'Bridging Human Hand Research and the Development of Robotic Technology for Hands' Workshop. IEEE BioRob Conference, Tokyo, Japan: September 2010.

Neural control of the hand: Coordination of muscles, forces, and manipulation. School of Biological and Health Systems Engineering, Arizona State University, AZ: September 2010.

Sensorimotor integration for learning dexterous manipulation: Anticipatory control of digit placement and forces. Keynote Speaker, 'Hand and Finger Coordination' Symposium, 6th World Congress on Biomechanics, Singapore: August 2010.

Learning dexterous manipulation: Sensorimotor integration for the coordination of digit placement and forces. Radboud University Nijmegen, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, The Netherlands: July 2010.

Neural control of the hand: Insights from EMG, kinematics, and kinetics of object grasping and manipulation. College of Health Sciences, University of Delaware, DE: May 2010.

Control of the human hand: Experimental approaches. Department of Orthopedics, Banner Health, Phoenix, AZ: January 2010.

Neural control of the hand: Learning and control. Institute of Advanced Biomedical Technologies, University Foundation "G. D'Annunzio", University of Chieti, Chieti, Italy: December 2009.

Neuromuscular control of the hand: Physiology, biomechanics, and cognition. Department of Human and General Physiology, University of Bologna, Bologna, Italy: December 2009.

The human hand: Control of a complex system. Department of Human and General Physiology, University of Bologna, Bologna, Italy: December 2009.

Learning object manipulation: Biological control principles and applications to robotics. Scuola Superiore Sant'Anna, Pisa, Italy: December 2009.

Motor learning transfer in grasping. Graduate Colloquium, Department of Kinesiology, Pennsylvania State University, State College, PA: November 2009.

Coordination of multiple hand muscles during grasping: effect of task, force and fatigue. Action Club, Department of Kinesiology, Pennsylvania State University, State College, PA: November 2009.

Learning object manipulation: Sensorimotor bias, anticipatory control and feedback mechanisms. Max Planck Institute for Biological Cybernetics, Tübingen, Germany: July 2009.

Neuromuscular control of the hand. Italian Institute of Technology, Genoa, Italy: July 2009.

Synergistic control of hand muscles through common neural input. Understanding the Human Hand Workshop, Robotics: Science and Systems 2009 Conference, Seattle, WA: June 2009.

The effect of vision on the learning of object manipulation. ASU-BNI 3rd Annual Neuroscience Symposium, Barrow Neurological Institute, Phoenix, AZ: February 2009.

Biological strategies for object manipulation and applications. Centro Interdipartimentale di Ricerca E. Piaggio, School of Engineering, University of Pisa, Italy: December 2008**.**

Grasping uncertainty: Planning and learning contact points for multi-digit grasping. Soechting Symposium, Vienna, Austria: October 2008**.**

Neuromuscular control of the hand: Basic research and clinical applications. Centro Interdipartimentale di Ricerca E. Piaggio, School of Engineering, University of Pisa, Italy: June 2008.

Effect of explicit vs. implicit knowledge of object properties on anticipatory grasp control. Colloquium Series, Department of Speech and Hearing Sciences, Arizona State University, Tempe, AZ: April 2008.

Grasping uncertainty: Effects of procedural and declarative knowledge of object properties on manipulation. School of Medicine, University of Louvain, Brussels, Belgium: January 2008.

Hand motor control strategies: Research approaches to a complex system. Department of Physiological Sciences, University of Catania, Italy: December 2007.

Neural control of the hand: ASU-Mayo collaborations. Grand Rounds, The Mayo Clinic, Scottsdale, AZ: October 2007.

Grasping uncertainty: Planning contact points and forces in multi-digit object manipulation. Mathematics and Cognition Seminar, Department of Mathematics and Statistics, Arizona State University, Tempe, AZ: September 2007

Choice of contact points in multi-digit object manipulation. Federal University of Rio de Janeiro, Rio de Janeiro, Brazil: August 2007.

Grasping uncertainty: Choice of contact points in multi-digit object manipulation. Barrow Neurological Institute, Phoenix, AZ: May 2007.

Control mechanisms for multi-digit grasping: From hand shaping to choice of contact points. Université de la Méditerranée and CNRS, Marseille, France: April 2007.

Hand function: complementary experimental approaches to understanding motor control and implications for functional rehabilitation. Physical Disabilities Branch, National Institutes of Health, Bethesda, MD: December 2006.

Muscle-specific distribution of common neural input to motor units of hand muscles. Center for Neurobiology and Behavior, Mahoney Center for Brain and Behavior, Columbia University, New York, NY: November 2006.

Central and peripheral constraints to hand function. Human Neuroscience Lecture, The Harrington Department of Bioengineering, Arizona State University, Tempe, AZ: November 2006.

Neural common input to hand muscles: Insights and open questions on the coordination of motor unit activity during grasping. Third Motor Control Graduate Summer School, Pennsylvania: July 2006.

Neural control of the hand: From single motor units to multi-digit grasping. Mathematics and Cognition Seminar, Department of Mathematics and Statistics, Arizona State University, Tempe, AZ: January 2006.

Muscle pair-specific distribution of neural common input to hand muscles. Department of Neuromotor Physiology, IRCSS Fondazione Santa Lucia, Rome, Italy: December 2005.

Applications of electro-tactile stimulation for sensory substitution. Centro Interdipartimentale di Ricerca E. Piaggio, University of Pisa, Italy: December 2005.

Principles of grasping. Summer School on Neural Networks Models of Perception, Action and Embodied Knowledge, University of Bologna, Bologna, Italy: July 2005.

Neural mechanisms for the control of grasping: synchrony of motor units across digit flexors. Department of Physiology, University of Arizona, Tucson, AZ: April 2005.

Neural mechanisms for the control of grasping: synchrony of motor units across digit flexors. Rehabilitation Institute of Chicago, Chicago, IL: March 2005.

Neural mechanisms for the control of grasping: synchrony of motor units across digit flexors. Teacher's College, Columbia University, New York, NY: February 2005.

Control of complex motor system: experimental evidence from hand kinematics, kinetics and EMG studies. Department of Physiology, University of Parma, Italy: December 2004.

The hand: How to control many muscles through a few strategies. Department of Psychology, University of Padova, Italy: December 2004.

Neural and anatomical determinants of force coordination during multidigit grasping. 26th Annual International IEEE Engineering in Medicine and Biology Society, San Francisco, CA: September 2004.

Motor unit synchrony between compartments of finger flexors and force coordination during multi-digit grasping. 20th Congress of the International Primatological Society, Turin, Italy: August 2004.

Coordination of hand muscle activity for multi-digit grasping. Motor Control: Trends and Perspectives, Tempe, AZ: May 2004.

Central and peripheral 'constraints' for hand control. Barrow Neurological Institute, Phoenix, AZ: February 2004.

Control of the hand: coordination of multiple variables in the kinematic, kinetic and EMG domain. Recent Developments in Neurobiology, Society for Integrative and Comparative Biology, New Orleans, LA: January 2004.

Control of the hand: biomechanical and neural factors. Department of Physiology, Universidad Nacional Autonoma de México, México City, México: May 2003.

Neural strategies for the control of multi-digit grasping. Colloqium and Action Club, Department of Kinesiology, Pennsylvania State University, State College: March 2003.

Controlling the hand: a complex journey from motor cortex to finger movement. Chair of Panel and Presenter. Meeting of the Society for the Neural Control of Movement. Naples, FL: April 2002.

Coordination patterns of hand shaping during reach to grasp. Brainerd 2001: Reunion and rededication of the 1969 Brainerd Conference on Systems Analysis in Neurophysiology. Brainerd, MN, USA: September 2001.

Effect of predictability of object center of mass and handedness on the control of multifingered grasping. From Basic Motor Control to Functional Recovery II. Varna, Bulgaria: September 2001.

The control of hand shape and grip forces: Evidence for kinematic and kinetic synergies. 11th Annual Spring Brain Conference. Sedona, AZ, USA: March 2000.

Postural synergies for tool use. Progress in Motor Control II. Structure-Function Relations in Voluntary Movements. The Pennsylvania State University, University Park, USA: July 1999.

Shaping the hand to object features: Interaction between mechanical and neural factors for the control of hand posture. Inter-University Congress of Computation, Electronic and Electrical Engineering. Durango, Mexico: April 1998.

Presentations at Professional Meetings (n = 140+)

William P. Noll, Yen-Hsun Wu, and Marco Santello. Dexterous manipulation: Selective modulation of grasp and manipulation forces to task requirements. *Progress in Motor Control XIV*, Rome, Italy: September 2023.

Marco Santello. Multimodal approaches for uncovering sensorimotor and cognitive control mechanisms. *Progress in Motor Control XIV*, Rome, Italy: September 2023.

Emmanuella Tagoe, Yen-HsunWu, Marco Santello. Improving finger force independence through visuomotor training. Program #/Poster #: 215.07. 2022 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2022. Online.

Chris Blais, Yen-Hsun Wu, Justin Fine, Marco Santello. Context-dependent brain dynamics during planning and execution of dexterous manipulation. Program #/Poster #: 215.08. 2022 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2022. Online.

Yen-Hsun Wu, Marco Santello. Performance of dexterous object manipulation is enhanced by grasp force modulation. Program #/Poster #: 215.11. 2022 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2022. Online.

Archana Mysore, Christopher Blais, Marco Santello. Investigating neural dynamics of proactive control in a standard AX-CPT using high density electroencephalography. Program #/Poster #: 736.06. 2022 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2022. Online.

Archana Mysore, Christopher Blais, Marco Santello. Investigating the neural correlates of proactive inhibition during a contextually-driven response task using high-density electrical mapping. *International Society of Electrophysiology and Electromyography (ISEK) 2020*, Nagoya, Japan *(Virtual meeting).*

Beatriz Barragan B, Uehara K, Jiao Y, Berisha V, Santello M, Liss J. Shared neural substrates for speech production and second-language word recognition in human motor cortex. *Soc. Neurosci. Abst*. (TBA)*, 48th Meeting of the Society for Neuroscience*, San Diego, USA: November 2018.

Fine JM, Fini M, Tyler WJ, Santello M. Transcranial focused ultrasound over right inferior frontal gyrus improves response inhibition. *Soc. Neurosci. Abst*. (TBA)*, 48th Meeting of the Society for Neuroscience*, San Diego, USA: November 2018.

Fine JM, Uehara K, Santello M. M1 beta oscillation control over learning rates in sensorimotor adaptation. *Soc. Neurosci. Abst*. (TBA)*, 48th Meeting of the Society for Neuroscience*, San Diego, USA: November 2018.

Tsuchiya T, Fine JM, Santello M. Neural oscillatory correlates of effort-based influences on proactive inhibition. *Soc. Neurosci. Abst*. (TBA)*, 48th Meeting of the Society for Neuroscience*, San Diego, USA: November 2018.

Barragan B, Uehara K, Miller M, Tauchi Y, Santello M, Liss J. The role of primary motor cortex in second language word recognition. *Annual Meeting of the Society for the Neurobiology of Language*, Quebec City, Canada: August 2018.

Shibata D, Toma S, Chinello F, Prattichizzo D, Santello M. Tactile and non-tactile signals are linearly integrated for the estimation of fingertip distance. *Meeting of Society for Neural Control,* Santa Fe, New Mexico: April 2018.

Santello, M. Experimental framework for identifying neural mechanisms underlying control of dexterous manipulation. Presenter at panel: *"Dexterity: A Problem for Robotics and Biology.* 51st Meeting of the Winter Conference on Brain Research, Whistler, BC January 2018.

Uehara K, Fine J, Santello M. On the causal role of cortical beta oscillation for voluntary force control using rhythmic TMS. *Soc. Neurosci. Abst*. 739.11*, 47th Meeting of the Society for Neuroscience*, Washington DC, USA: November 2017. Oral presentation (Kazumasa Uehara).

Fu Q, Santello M. Improving myoelectric controller of a soft-synergy based prosthetic hand for feedback-driven grasp force control. *Soc. Neurosci. Abst*. 642.11*, 47th Meeting of the Society for Neuroscience*, Washington DC, USA: November 2017. Oral presentation (Qiushi Fu).

Lee-Miller T, Gordon AM, Santello M. Hand position and forces covary during anticipatory control of bimanual manipulation. *Soc. Neurosci. Abst*. 1522.15*, 47th Meeting of the Society for Neuroscience*, Washington DC, USA: November 2017. Poster presentation.

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Santello M, Soechting JF. Hand shaping during reach to grasp remembered, virtual and real objects. *10th Meeting of the Society for the Neural Control of Movement*, Seville, Spain: March 2001. Poster presentation.

Santello M, McDonagh MJN, Challis JH. Control of landing movement with and without vision. *10th Meeting of the Society for the Neural Control of Movement*, Seville, Spain: March 2001. Poster presentation.

Santello M, Soechting JF. The coordination of forces in multifingered grasping. *Arizona Chapter Society for Neuroscience Meeting*, Flagstaff, AZ, USA: November 1999. Poster presentation.

Santello M, Soechting JF. The coordination of forces in multifingered grasping. *Soc. Neurosci. Abst.* 25:114. *29th Meeting of the Society for Neuroscience*, Miami, FL, USA: October 1999. Poster presentation.

Santello M. The coordination of forces in multifingered grasping. *Flinn Foundation Meeting.* Tucson, AZ, USA: September 1999. Poster presentation.

Santello M, Flanders M, Soechting JF. Taxonomies of hand postures for grasping objects? *Soc. Neurosci. Abst.* 24:2110. *28th Meeting of the Society for Neuroscience*, Los Angeles, USA: November 1998. Poster presentation.

Santello M, Soechting JF. Postural synergies for grasping. *Human Frontier Group Meeting*, ATR Human Information Processing Research Laboratories, Kyoto, Japan: October 1998. Oral presentation.

Santello M, Soechting JF. The control of hand posture as a function of object shape. *27th Meeting of the Society for Neuroscience*, New Orleans, USA: November 1997. Poster presentation.

Santello M, Soechting JF. Matching object size by controlling finger span and hand shape. *Soc. Neurosci. Abst.* 22:428. *26th Meeting of the Society for Neuroscience*, Washington DC, USA: November 1996. Poster presentation.

Santello M, Soechting JF. The control of hand posture as a function of object shape. *Conference on Vision for Reach and Grasp*, Minneapolis, USA: October 1996. Poster presentation.

Santello M, McDonagh MJN, Harakis M. Control of human leg muscles prior to landing from falls. *J. Physiol.* 473:212P. *Physiological Society Meeting*, Southampton, UK: September 1993. Oral presentation.

Santello M, Miller J, McDonagh MJN. Activation pattern of human leg muscles during landing from a jump onto low and high compliance surfaces. *J. Physiol.* 459: 504P. *Physiological Society Meeting*, Cambridge, UK: September 1992. Poster presentation.

Cook CS, McDonagh MJN, Santello M, Nicholls S. Mechanical responses to controlled stretch in human muscle-tendon complex. *Animal and related cell abst. Meeting of the Society for Experimental Biology*, Lancaster, UK: April 1992. Poster presentation.

TEACHING

Internships Mentoring: High School Students
G Buness, Srihari Iyer, N Kulkarni, A LLave, A Narla, J Sullivan.

Internships Mentoring: Undergraduates
Kinesiology: B Baerstch, J Bailey, A Casares, G Chesteeen, A Chu, H Garner, M Grace, H Gretarsdottir, A Hayes, E Hernandez, A Isaac, E Kaine, T Lambert, S Lim, A Lizaneck, P Mimnaugh, L Mollenhauer, J Pham, L Platero, D Redinger, A Reinert, C Tolentino, Y Na, S Zavaremi.

Fulton Undergraduate Research Initiative: M Cisneros, T DeSilva, N Gaw, M Huerta, D Ingraham
Biomedical Engineering: C Bessert, D Callahan, A Dbeis, L Franquemont, Kramer K, J Laitano, R McLemore, G Nitescu, R Rich.
Barrett Honors Thesis Chair: D Abelev, N Gaw, J LeBeau, S Chayrez, D Moore, S Hasan, M Smith
Barrett Honors Thesis Reader: T Dawson, R Manis, B Teplitzky, R Shear
Mechanical Engineering: K Screws
Psychology: L Kennedy
Barrett Honors Thesis Director: Michael Ruta

Undergraduate Courses
Neural Bases of Motor Control (BME 494/598)
Neuromuscular Control Systems (BME 494/598)
Multisensory Integration (BME 494/598) (co-taught with Drs. C Buneo and SI Helms Tillery)
BME 122: Statistics for Biomedical Engineers
ASU 101-BME The ASU Experience
ASU 101-FSE The ASU Experience
Motor and Developmental Learning (KIN 345)
Reflex and Voluntary Control of Movement (KIN 494)
Adaptations in Biological Form and Function (KIN 494)

Introduction to Research Methods in Physical Activity and Health (KIN 494)

Graduate Courses

Human System Neuroscience (BME 598) (co-taught with Dr. C. Buneo)
The Neurophysiological Bases of Motor Control (KIN 598)
Neurophysiology and NeuroBioengineering (KIN 598)
NSF-IGERT: Motor Neurophysiology (KIN 598)
Neuromuscular Control Systems (BME 521) (co-taught with Drs. C Buneo and SI Helms Tillery)
Multisensory Integration (BME 598) (co-taught with Drs. C Buneo and SI Helms Tillery)
NSF-IGERT: Human Factors (BME 598) (co-taught with Drs. T McDaniel, C Buneo, and SI Helms Tillery)
Neural Bases of Motor Control (BME 598)

Online Courses

Working group member, Biomechanics (BME 316); 2023-2024
Course co-developer, *Introduction to remote human-centric data and processing certificate*; 2023

GRADUATE THESIS AND DISSERTATION COMMITTEES, POSTDOCTORAL MENTORING

Committee Chair - Master students (n = 34)

Sara Winges, Kinesiology (spring 2002)
Thesis title: *"The role of vision on hand preshaping during reach to grasp"*
Giridhar Hegde, Kinesiology (summer 2008)
Thesis title: *"Partitioning of movement among upper limb segments in reaching to and rotating an object: effect of direction of and resistance to the rotation"*
Jason Choi, Biomedical Engineering (spring 2011)
Applied Project title: *"Effects of visual feedback during object lift on global object grasp"*
Michael Cooperhouse, Biomedical Engineering (fall 2011)
Thesis Project title: *"Characterizing feedback and feedforward grasp control mechanisms in early phases of manipulation"*
Chase Thompson, Biomedical Engineering (fall 2011)
Applied Project title: *"Designing an interface for validation of a virtual reality environment"*
Austin Jones, Biomedical Engineering (spring 2012)
Thesis Project title: *"In-parallel haptic object for hand motion sensing and measurement"*
Megha Chaudhary, Biomedical Engineering (fall 2012)
Applied Project title: *"Design and validation of quantitative device for hand function for Parkinson's disease"*
Deepika Mohankumar, Biomedical Engineering (spring 2013)
Applied Project title: *"Musculoskeletal injuries in endoscopists – A kinematic analysis"*
Snidgha Khanna, Biomedical Engineering (spring 2013)
Applied Project title: *"Review on the state-of-the-art of prosthetic hands"*
Jane Lacson, Biomedical Engineering (spring 2013)
Applied Project title: *"Multiplexed EMG grip selection"*
Hunter Garner, Biomedical Engineering (spring 2013)
Applied Project title: *"An Inexpensive Upper-Limb Prosthetic for Developing Countries"*
Nathan Gaw, Biomedical Engineering (fall 2013)
Thesis Project title: *"The role of tactile information in transfer of learned manipulation following changes in degrees of freedom"*

Juan Laitano, Biomedical Engineering (fall 2013)
Applied Project title: *"Quantifying upper likb kinematics"*
Manasa Parthasharathy, Biomedical Engineering (summer 2015)
Thesis Project title: *"Human-human joint action: Effects of transcranial direct current stimulation over posterior parietal cortex on physical cooperation"*
Dalton Moore, Biomedical Engineering (summer 2016)
Thesis Project title: *"Neural dynamics underlying failure to transfer between opposite physical perturbations"*
Christina Zamorano, Biomedical Engineering (summer 2016)
Applied Project title: *"Optimal parameters of motor practice for learning motor skills"*
Jess Tsui, Biomedical Engineering (summer 2016)
Applied Project Title: *"Biomimetic trans-radial prosthetic with autonomous grip response"*
Jiyao Hu, Biomedical Engineering (fall 2016)
Applied Project title: *"The study of position control vs. velocity control in accuracy of EMG signal-controlled system"*
Michael Smith, Biomedical Engineering (summer 2017)
Thesis Project title: *"Visual behavior and planning for object manipulation: Gaze patterns for altered center of mass"*
Matthew Daley, Biomedical Engineering (fall 2017)
Applied Project title: *"Visual behavior and planning for object manipulation: Gaze patterns for altered center of mass"*
Toshiki Tsuchiya, Biomedical Engineering (summer 2018)
Thesis Project title: *"Effort discounted decision-making in proactive inhibitory control"*
Scott Boege, Biomedical Engineering (spring 2019)
Thesis Project title: *"Reward-based sensorimotor decision making"*
Archana Shashidhar Mysore, Biomedical Engineering (summer 2020)
Thesis Project title: *"Assessment of mechanisms underlying proactive inhibition and switching"*
Lovein Thomas, Biomedical Engineering (spring 2021)
Thesis Project title: *"Conventional vs. robotic stroke therapy: Designing a pilot study"*
Jacob Perrine, Biomedical Engineering (spring 2021)
Thesis Project title: *"Investigation of Tactile and Proprioceptive Components for Object Manipulation and Perception"*
Nicholas Sora, Biomedical Engineering (spring 2021)
Applied Project title: *"Creation of a mathematical model for the purposes of treating motor diseases using VR"*
Chase Frailey, Biomedical Engineering (spring 2021)
Applied Project title: *"High-density surface EMG analysis of individual motor unit activation in multi-finger force production"*
Patience Yeboah, Biomedical Engineering (spring 2021)
Applied Project title: *"Dexterous finger force control"*
Angelica Gutierrez, Biomedical Engineering (fall 2021)
Applied Project title: *"Effects of fixation on the strength of an illusory artifact for clinical and medical device applications"*
Spencer Cobb, Biomedical Engineering (fall 2021)
Applied Project title: *"Motor unit analysis through the decomposition of EMG measurements of the forearm during isometric finger forces"*

Emmanuella Tagoe, Mastercard Foundation Scholar, Biomedical Engineering (spring 2022)
Applied Project title: *"Investigating how training improves dexterous finger force control"*
Emily Glagolev, Biomedical Engineering (fall 2022)
Applied Project title: *"Effects of force-velocity curves on sprint times of collegiate lacrosse players"*
Aishwarya Haradanahalli Krishna Murthy, Biomedical Engineering (fall 2022)
Applied Project title: *"Probing the causal role of Anterior Cingulate Cortex (ACC) in economic decision making"*
Lohita Mallavarapu, Biomedical Engineering (fall 2022)
Applied Project title: *"Electromyographic (EMG) characteristics of digit force generation during dexterous object manipulation*"
Anagha Devulapalli, Biomedical Engineering (fall 2024)
Applied Project title: TBD

Committee Chair - PhD students (n = 8)
Sara Winges, Kinesiology (fall 2005; Assistant Professor, Louisiana State University)
Dissertation title: *"Across-muscle common neural input during object hold"*
Jamie Lukos, Kinesiology (spring 2010; Postdoctoral Associate, Army Research Laboratory, Aberdeen Ground, MD)
Dissertation title: *"Choice of digit placement for grasping"*
Cecil Lozano, Kinesiology (spring 2010; Postdoctoral Associate, Arizona State University)
Dissertation title: *"Psychophysics of tongue electrical stimulation"*
Qiushi Fu, Biomedical Engineering (summer 2013; Postdoctoral Associate, Arizona State University)
Dissertation title: *"Dexterous manipulation: Sensorimotor learning and control"*
Daisuke Shibata, Kinesiology (summer 2014; Assistant Professor, University of New Mexico)
Dissertation title: *"Sensory-motor integration for control of digit position in grasping and manipulation"*
Patrick McGurrin, Neuroscience (fall 2017; Postdoctoral Associate, Medical Neurology Branch, National Institute of Neurological Disorders and Stroke, National Institutes of Health)
Dissertation title: *"Cortical sensorimotor mechanisms for neural control of skilled manipulation"*
Keivan Mojtahedi, Biomedical Engineering (Fall 2017; Senior Systems Engineer, Acutus Medical Inc.)
Dissertation title: *"Assessing performance, role sharing, and control mechanisms in human-human physical interaction for object manipulation"*
Archana Mysore, Biomedical Engineering
Dissertation title: TBD

Committee Co-Chair - PhD students
Lisa Bobich (spring 2010; Medtronic, Tempe, AZ)
Dissertation title: *"Cutaneous and motor connections in precision grasp"*

Mentored postdoctoral fellows (n = 16) and positions attained after their postdoctoral training
Matt P Rearick (2000 − 2002); Assistant Professor, Roanoke College, Roanoke, PA
Jamie A Johnston (2003 − 2007); Assistant Professor, University of Calgary, Canada
Tara McIsaac (2006 − 2008); Assistant Professor, Columbia University, NY
Kurt Kornatz (2007 − 2008); Assistant Professor, University of North Carolina at Greensboro, NC

Brach Poston (2008 − 2009); Postdoctoral Associate, National Institutes of Health, Bethesda, DC
Alessander Danna-Dos-Santos (2008-2010); Assistant Professor, University of Montana, MT
Mark Jesunathadas (2009 − 2011); Quality Assurance Analyst, DPT Labs, San Antonio, TX
Wei Zhang (2008 − 2012); Assistant Professor, Department of Physical Therapy, College of Staten Island, NY
Pranav Parikh (2012 − 2015); Assistant Professor, Department of Kinesiology, University of Houston, TX
Alycia Gailey (2013 − 2015); Robotics Engineering Intern, Fetch Robotics
Qiushi Fu (2013 − 2015); Assistant Research Professor, School of Biological and Health Systems Engineering, Arizona State University, AZ
Justin Fine (2015 − 2017); Assistant Research Professor, School of Biological and Health Systems Engineering, Arizona State University, AZ
Kazumasa Uehara (2016 – 2018); RIKEN Center for Brain Science, Tokyo, Japan
Simone Toma (2016 – 2019); Assistant Research Professor, School of Biological and Health Systems Engineering, Arizona State University, AZ
Yen-Hsun Wu (2017 – 2022)
Simone Fani (2022 – present)

Research Professors at Neural Control of Movement Laboratory, positions attained after leaving ASU
Qiushi Fu (2015 − 2017), Tenure track Assistant Professor, University of Central Florida
Justin Fine (2017), Assistant Research Professor, Indiana University, Bloomington
Christopher Blais (2019 to date).
Simone Toma (2020-2021), Senior Behavioral Scientist, Adidas-ASU Center of Engagement Science
Yen-Hsun Wu (2022 – present)

Visiting undergraduate, graduate, and postdoctoral trainees (n = 28)
Tatsuki Yamada, Toyohashi University of Technology, Japan
Sara María Chávez Gómez, Instituto Tecnologico de Monterrey, Mexico
David Alejandro Cantuña Patiño, Instituto Tecnologico de Monterrey, Mexico
Pedro Garza Arenas, Instituto Tecnologico de Monterrey, Mexico
Patricia Capsi-Morales, Italian Institute of Technology, Italy (2022)
Francesca Simonelli, IMT School of Advanced Studies, Lucca, Italy (2020)
Veronica Caputo, University of Bologna, Italy (2018)
Magdalena Gajek Piccoli, Politecnico di Milano, Italy (2018)
Yuto Taichi, Okayama University (2017)
Alessandra Fiore, Universita' della Sapienza, Italy (2017)
Ilaria Borghi, Universita' della Sapienza, Italy (2017)
Jorge Cisneros, Instituto Tecnologico de Monterrey, Monterrey, Mexico (2016)
Roshini Koppala, People's Education Society (PES) University, Bangalore, India (2016)
Sonal Jain, People's Education Society (PES) University, Bangalore, India (2016)
Simone Fani, University of Pisa (2015)
José Simões Pimenta Neto, State University of New York at Stony Brook (2015)
José Micael Delgado Barbosa, Mercer University (2015)
Ryuji Kamei, Okayama University (2015)
Hirofumi Shimamura, Okayama University (2015)
Anais Brygo, Italian Institute of Technology, Genoa, Italy (2015)
Riyuta Kitani, Okayama University (2014)

Takahiro Tanaka, Okayama University (2014)
Edoardo Battaglia, University of Pisa, Italy (2013)
Francesco Chinello, University of Siena, Italy (2013)
Marinella Coco, University of Catania, Italy (2013)
Akinori Kunita, Okayama University (2012)
Kohei Nakahashi, Okayama University (2012)
Annalisa Bosco, University of Bologna, Bologna, Italy (2011)
Liu Yang, Beijing Sport University (2011)
Azzurra Chiri, Scuola Superiore Sant'Anna, Pisa, Italy (2010)
Nicola Carbonaro, University of Pisa, Italy (2008)
Luca Laudani, University of Catania, Catania, Italy (2007)
Caterina Ansuini, University of Padova, Padova, Italy (2006)

Master and Doctoral Committee Member

K Abishek, E Adjei, A Adjoudani (University of Pisa, Italy), M Afifi, J Alberts, D Arias, M Armenta Salas, S Balaji, B Bartels, A Bayro, C Barton, M Bhowmik-Stoker, X Cai, R Chattopadhyay, A Chiri (Scuola Superiore Sant'Anna, Italy), N Chinello (University of Siena, Italy), K Csavina, K Espinoza, J Fan, T Flink, A Fronczyk, J Goble, Grapp M, T Hayes, A Hsia, M Jacofsky, C Ketcham, Y-K Kim, Lee J (Georgia Tech), Lowor G, S McCauley, T McDaniel, D Meller, L Moussallem, S Mulligan, V Nalam, PH Nguyen, R Obeng, S Padmanaban, Pal A, M Paluck, E Petersen, P Phataraphruk, M Qiao, L Rincon Gonzalez, T Sasaran, Y Shi, C Spalding (University of Pittsburgh), A Stock, B Szymik, J Tanner, Y Tufail, N Vitiello (Scuola Superiore Sant'Anna, Italy), Y Yuan, J Wang, W Wang, Z Warraich, B Whitsell (MS and PhD committees).

External PhD thesis reader

Afiz Hafzal, University of New South Wales (2022)
Michele Xiloyannis, Nanyang Technological University (2019)
Sara Contu, Nanyang Technological University (2018)
Antuvan Chris Wilson, Nanyang Technological University (2018)
Atesh Koul, Italian Institute of Technology (2017)
Maria Laura D'Angelo, Italian Institute of Technology, University of Genova (2017)
Ian Bullock, Yale University (2016)
Alessandro Altobelli, University of Pisa (2015)
Matteo Bianchi, University of Pisa (2013)

ACADEMIC SERVICE – DEPARTMENT/COLLEGE/UNIVERSITY

Co-organizer,1st Annual ASU/BNI Neuro-Engineering & Computational Neuroscience Symposium, March 15, 2024.
Internal Advisory Committee member, Biodesign Institute, Arizona State University (2016-2022)
Member, NSF-IGERT Student Affairs and Admissions Committee (2011-2016)
Chair, Organizing Committee of Piper Health Solutions Rehabilitation Robotics Workshop, Arizona State University, Tempe, AZ: February 2013, 2014, 2015, 2016
Committee member, Study Group on Biomimetic and Bioinspired Research and Education Initiative, (2012)

Chair, Medical Electronics Symposium, MicroElectronics Packaging & Test Engineering Council, "Business growth in the medical electronics industry", Arizona State University, Tempe, AZ: September 2012
Interim Director, SBHSE (2011-2012)
Director, SBHSE (2012-2022)
Participant, Increasing Women in Neuroscience National Science Foundation/Society for Neuroscience Workshop, Tucson, AZ: May 2011
SBHSE webpage Committee, School of Biological and Health Systems Engineering (2011)
Chair, Promotion and Tenure Committee, School of Biological and Health Systems Engineering (Jan-June 2011)
Reviewer, ASU-Mayo Seed Grants: October 2010
Member, Promotion and Tenure Committee, School of Biological and Health Systems Engineering (2010)
Chair, Systems Neuroscience Panel, ASU-BNI Neuroscience Symposium (2006, 2008)
Director of PhD Program in Kinesiology (2004 - 2009)
Member of Self-Study Committee (Spring 2005)
Director of Master's Program in Kinesiology (2002 - 2004)
Member of Bioengineering Search Committee for Biomechanics Faculty (2004)
Member of Bioengineering Search Committee for Motor Learning Faculty (2004)
Organizer of 1st Annual Meeting of the Statewide Training Program in Movement Neuroscience, ASU, Tempe, AZ, USA: March 2003
Program Committee Member, 11th International Graphonomics Society Conference, November 2003, Scottsdale, Arizona, USA
Chair of Kinesiology Search Committee for Motor Control Faculty (2003-2006)
Member of Kinesiology Search Committee for Department Chair (2003; 2004)
Poster Judge at "Life and Earth Science Graduate Research Symposium", ASU (2002)
Member of Graduate Program Sub-Committee (2002)
Member of Bioengineering Search Committee Biomechanics/Clinical Rehabilitation Faculty (2002)
Chair of the NSF IGERT Seminar Committee (2001-2005)
Member of NSF IGERT Steering Committee and Faculty Advisory Committee (2001-2003)
Member of Exercise Science Search Committee for Department Chair (2001)
Junior faculty mentor (2004 - 2009)
Coordinator of revisions of Motor Control/Motor Development Masters Packet available online through the Department Web Page (2001)
Graduate College Representative, PhD Defense, Doug Weber, Department of Bioengineering (2001)
Member of Exercise Science Search Committee for Exercise Physiologist (2000)
Member of Committee in charge of organizing laboratory tours by Dr. Bruce McEwen (2000)
Co-organizer of Brain Day Symposium, ASU, Tempe, AZ, USA: March 2000
Host to CASE Media Fellowship visit (2000) and Discovery Tour of ESRI, ASU (1999)

PROFESSIONAL AFFILIATIONS

Society for Neuroscience (1996 − present)
Society for Neural Control of Movement (1996 − present)
International Society of Motor Control (1999 − present)
Institute of Electrical and Electronics Engineers (IEEE), (2011 – present)
International Society for Electrophysiology and Electromyography (ISEK), (2020 – present)

PROFESSIONAL ASSIGNMENTS

Editorial service

Journal of Assistive, Rehabilitative and Therapeutic Technologies, member of the Editorial Board (2013 − present)

Book Co-Editor, *"Reach-to-Grasp Behavior: Brain, Behavior, and Modeling Across the Life Span"*, (2018), Routledge, Taylor and Francis Group

Neuroscience and Biomedical Engineering, Associate Editor (2012 − 2018)

IEEE Transactions on Haptics, member of the Editorial Board (2014 − 2017)

Scientifica, member of the Editorial Board for Physiology (2012 − 2015)

Robotica, special issue on Rehabilitation Robotics, Guest editor (2013)

Conferences

Symposium Chair, "Integration of neuromodulation, neuroimaging, and behavioural approaches for shedding new light on sensorimotor cortical networks", Progress in Motor Control XIV, Rome, Italy: September 2023.

Co-Organizer and Co-Chair Workshop Co-Organizer and Co-Chair, "Multidisciplinary approaches to quantify sensorimotor control and adaptation of skilled and pathological hand movements", International Society of Electrophysiology and Electromyography (ISEK) 2020 Virtual Congress: July 2020.

Co-organizer, IEEE BRAIN Neurotech Entrepreneurs Workshop, Arizona State University, Tempe, AZ: December 2019

Session Chair, Technical track, STEMCON 2018
"Actualizing Industry 4.0: Pursuits in Commerce", Ho Chi Minh City, Vietnam: March 2018

Award Committee Member, 2018 International Conference in Neurorehabilitation, Pisa, Italy: October 2018.

Member of Scientific Advisory Committee, 2017 International Symposium of Wearable and Rehabilitation Robotics (WeRob2017), Houston, TX: November 2017.

Session Chair, *"Robot-Aided Rehabilitation"*: IEEE International Conference on Rehabilitation Robotics (ICORR 2015), Singapore: August 2015.

Scientific Program Committee member, IEEE International Conference on Rehabilitation Robotics (ICORR 2015), Singapore: August 2015.

Chair of Workshop, *"Neuromuscular rehabilitation of hand function: basic and applied research"*, International Convention on Rehabilitation Engineering and Assistive Technology (i-CREATe 2013), Gyeonggi, Korea: August 2013.

Chair of Nanosymposium *"Finger and Grasp Control"*, 40th Meeting of the Society for Neuroscience, San Diego, CA, USA: November 2010.

Chair of Nanosymposium *"Getting a Grip: Neural Control of Grasping"*, 39th Meeting of the Society for Neuroscience, Chicago, IL, USA: October 2009.

Reviewer, Federal Grants

Regular member of Motor Function, Speech, and Rehabilitation Study Section National Institutes of Health (NIH) (2011 − 2015)

National Science Foundation (NSF), College of Reviewers (2013 − present)

Ad Hoc Reviewer, Federal Grants

NIH, NIAMS AMSC Special Emphasis Panel (2022, 2023)

NSF, I/UCRC, Division of Computer and Network Systems (2017)

NSF, Division of Behavioral and Cognitive Sciences: Perception, Action, and Cognition (2012, 2015)
NIH Scientific Review Group Motor Function, Speech, and Rehabilitation Sciences (2011)
NSF, Division of Integrative Organismal Systems: Biological Sciences (2010)
Pre-review, NIH ARRA grant (PI: W Murray, Northwestern University, 2009)
NIH Scientific Review Group Musculoskeletal Rehabilitation Sciences (2008, 2009, 2010)
NIH Bioengineering Sciences and Technologies Internal Review Group (2008)
NSF, Division of Behavioral and Cognitive Sciences: Perception, Action and Cognition (2007)
NIH Scientific Review Group ZAR1 EHB-H (2007)
NIH Panel MOSS G53, Musculoskeletal Tissue Engineering Study Section (2006)
NIH Biobehavioral and Behavioral Processes Internal Review Group (2005, 2004)

Ad Hoc Reviewer: International funding agencies
Qatar National Research Fund (2011, 2012)
Biotechnology and Biological Sciences Research Council, UK (2012, 2016)
The Netherlands Organisation for Scientific Research, the Agence Nationale de la Recherce, the Deutsche Forschungsgemeinschaftm, and the Economic and Social Research Council (2015)

Ad Hoc Reviewer: Journals, and Conferences
Acta Psychologica
Advanced Robotics
Annals of Biomedical Engineering
Biological Cybernetics
BioRobotics (2012)
Brain
Brain Research
Cell Reports
Cerebral Cortex
Current Biology
eLife
eNeuro
Engineering in Medicine and Biology
Experimental Brain Research
Frontiers in Computational Neuroscience
Human Movement Sciences
15th International Graphonomics Society (2011)
13th International Conference on Rehabilitation Robotics (2013)
IEEE Biomedical Robotics and Biomechatronics
IEEE Engineering in Medicine and Biology Society
IEEE Haptics Symposium (2016)
IEEE International Conference on Robotics and Automation (2010, 2013)
IEEE International Conference on Intelligent Robots and Systems 2013
IEEE Robotics and Automation Magazine
IEEE Transactions on Biomedical Engineering
IEEE Transactions on Graphics
IEEE Transactions on Human-Machine Systems
IEEE Transactions on Neural Systems & Rehabilitation Engineering
IEEE Transactions on Robotics
International Conference on Applied Bionics and Biomechanics

International Conference on Rehabilitation Robotics Conference 2005
Journal of Applied Biomechanics
Journal of Applied Physiology
Journal of Experimental Biology
Journal of Experimental Psychology
Journal of Motor Behavior
Journal of Neurophysiology
Journal of Neuroscience
Journal of Vision
Motor Control
Movement Disorders
Nature Communications
Nature Neuroscience Reviews
Nature Machine Intelligence
Neuron
Neurorehabilitation and Neural Repair
Neuroscience
Neuroscience and Biomedical Engineering
Neuroscience Letters
Pediatric Research
Proceedings of the National Academy of Sciences
Progress in Motor Control VII (2009)
Public Library of Science ONE
Psychonomic Bulletin
Robotica
Science Robotics
Science Advances
Scientific Reports, Nature
SIGGRAPH (2005)
Somatosensory and Motor Research
Transactions on Robotics
World Haptics (2013, 2015)
Invited faculty at "Third Motor Control Graduate Summer School", July 2007, Ligonier, PA
Invited faculty at "HERTIE FENS-IBRO Winter School", January 2011, Obergurgl, Austria

Textbook reviewer

"Lifelong Motor Development" (Gabbard, C. P., Allyn and Bacon, 2000)

"Motor Learning - Concepts and Applications" (R. A. Magill, McGraw-Hill, 2001)

Pre-publication reviewer (4 books): SpringerBrief, Springer, Cambridge University Press
External reviewer for Promotion to Associate Professor and Tenure, 2006 to date: 16 faculty
External reviewer for Promotion to Full Professor, 2014 to date: 11 faculty

ENTREPRENEURIAL ACTIVITY

Patents

1. US 11,707,583- *Medical vaporization cartridge for waxes, solid or highly viscous oils, and cannabinoids.*
   Inventors: Antonio Garcia, Marco Santello, Christine Woolley.
   Patent granted: 07/25/2023.

2. US 11,446,545 - *Soft robotic haptic interface with variable stiffness for rehabilitation of sensorimotor hand function.*
   Inventors: Panagiotis Polygerinos, Frederick Sebastian, Qiushi Fu, Marco Santello.
   Patent granted: 09/20/2022.

3. US 11,419,524 - *Repetitive motion injury warning system and method.*
   Inventor: Marco Santello
   Patent granted: 08/23/2022.
4. US 10,932,688 - *EEG-based decoding and closed-loop neuromodulation system for assessing and enhancing sensorimotor learning.*
   Inventors: Justin Fine, Marco Santello.
   Patent granted: 03/02/2021.

5. US 10,849,532 - *Computer vision based clinical assessment of upper extremity movement.*
   Inventors: Yezhou Yang, Qiushi Fu, Marco Santello
   Patent granted: 12/01/2020.

6. US 14/939,695 - *Device for training a perfect posture during normal walking and for re-educative purposes.*
   Inventors: Sandro Marzetti, Caterina Germani, Marco Santello
   Patent granted: 07/07/2020.

7. US 11,701,496 - *Adjustable guidewire.* Inventors: Jeffrey LaBelle, Julio Morera, Marco Santello.
   Patent granted: 07/18/2023.

8. US 62/398,733 - *2-DOF wearable fingertip cutaneous display for normal and shear forces.*
   Inventors: Francesco Chinello, Daisuke Shibata, Domenico Prattichizzo, Marco Santello
   Patent granted: 02/11/2020.

CONSULTING

Expert Institute, April 2022
Adaption Institute, December 2020
Microsoft, October 2018-19
Columbia Care, Inc., October 2015-December 2016
Google Advanced Technology and Project (ATAP), January-June 2016

MEDIA COVERAGE

Broadening borders and minds: Three biomedical engineering students from Mexico conduct research to boost brain science at ASU.
Press release about the research experience in my laboratory by visiting students from Instituto Tecnologico de Monterrey, Mexico.
https://fullcircle.asu.edu/fulton-schools/broadening-borders-and-minds/

Tech Hubs grant puts ASU at ground zero for medical device manufacturing.
Press release about a grant from the U.S. Department of Commerce's Economic Development Administration to put Arizona State University at the forefront of medical device manufacturing, with Marco Santello serving in a leadership November 28, 2023
https://news.asu.edu/20231127-arizona-impact-tech-hubs-grant-puts-asu-ground-zero-medical-device-manufacturing

Within reach: Integrating robotics and biology improves functionality of prosthetic hand.
Press release about NIH-funded clinical trial led by Marco Santello in collaboration with the Mayo Clinic, MN, February 9, 2022
https://news.asu.edu/20220209-within-reach-integrating-robotics-and-biology-improves-functionality-prosthetic-hand

Articles about neurotechnology entrepreneurship workshop for graduate students sponsored by IEEE and the NSF-supported I/UCRC BRAIN, December 16, 2019
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