

Curriculum Vitae
Paul D. Marasco Ph.D.

Address*Primary*

Cleveland Clinic
Lerner Research Institute
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Secondary

Advanced Platform Technology (APT) Center of Excellence
Louis Stokes Cleveland Department of
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Positions*Primary*

Associate Staff Scientist, Department of Biomedical Engineering, Lerner Research Institute, Cleveland Clinic
(07/2013-Current)

Secondary

Research Health Scientist/ Principal Investigator, Advanced Platform Technology (APT) Center of Excellence
Louis Stokes Cleveland Department of Veterans Affairs Medical Center (09/2010-Current)
Director of Amputee Research, Department of Physical Medicine and Rehabilitation
Louis Stokes Cleveland Department of Veterans Affairs Medical Center (03/2011-Current)

Adjunct

Adjunct Professor, Department of Cognitive Science, Case Western Reserve University (06/2012-Current)
Adjunct Associate Professor, Department of Biomedical Engineering, Case Western Reserve University
(10/2012-Current)
Adjunct Assistant Professor of Molecular Medicine, Case Western Reserve University (08/2016-Current)

Research Interests

Sensory Integration with Prosthetic devices, Amputee Research, Cognitive Embodiment, Visual-Tactile
Integration, Sensory Neurophysiology, Brain Organization, Neural Plasticity, Kinesthesia, Diabetic Sensory
Neuropathy

Education

Post Doctoral Fellowship, Center for Bionic Medicine (CBM), Rehabilitation Institute of Chicago, Chicago IL, 2006-2009

Ph.D. Neuroscience, Vanderbilt Brain Institute, Vanderbilt University, Nashville TN, 2006

B.A. Biology, University of Colorado, Colorado Springs CO, 1999

Grants/Awards*Current Funding:*

Department of Veterans Affairs, Merit Review, 1 I01 RX001833-01A2 “Advanced Materials to Improve Moisture Management for Prosthetic Socket Liners”

Role: Principal Investigator (01/2017-12/2020) \$915K

Department of Defense, Congressionally Directed Medical Research Program (CDMRP) Clinical and Rehabilitative Medicine Research Program (CRM RP) Grant #MR140156 “Physiologically relevant prosthetic limb movement feedback for upper and lower extremity amputees”

Role: Principal Investigator (09/2015-10/2018) \$1.5M

National Institutes of Health (NIH) Director’s Transformative R01 Research Award, 1R01NS081710 - 01, “Restoring upper limb movement sense to amputees; a move towards natural control of prosthetic limbs”

Role: Principal Investigator (12/2013-11/2017) \$1.2M

Defense Advanced Research Project Agency (DARPA), Department of Defense, Contract # N66001-15-C-4015 “Functional Metrics for Humans with Bidirectionally Integrated Prosthetic Limbs”

Role: Principal Investigator (12/2015-01/2020) \$2.5M

Defense Advanced Research Project Agency (DARPA), Department of Defense, 61732-LS-DRP, Under P-1108-114403/DARPA-BAA-11-08 Reliable Peripheral Interfaces (RPI), “A touch feedback tactor array system for long-term implementation of physiologically relevant cutaneous touch with prosthetic limbs.”

Role: Principal Investigator (02/2012-09/2017) \$1.3M

Defense Advanced Research Project Agency (DARPA), Department of Defense, Advance Study #N66001-15-C-4038. “Natural Sensation for Lower Limb Amputees”

Role: Co-Investigator (09/2015-10/2017) \$1.7M

Previous Funding:

Advanced Platform Technology Center of Excellence, Innovation Incentive II, “Advanced Materials for Water Managing Prosthetic Socket Liners”

Role: Principal Investigator (10/2013-11/2014) \$20k

VA RR&D Career Development Award, Level-2 No. A7253W. "Proprioception in Rat Cortex to Examine Sensory Feedback for Prosthetics."

Role: Principal Investigator (06/2010-07/2013) \$475K

VA RR&D Merit Review Award “Novel modalities for assessing the cortical tissue-electrode interface”

Role: Co-Investigator (09/2010-10/2013)

National Institute on Disability and Rehabilitation Research (NIDRR), Mary E. Switzer Merit Fellowship “An investigation of percepts to touch following integration of physiologically relevant sensory feedback with artificial limbs.”

Role: Principle Investigator (2010) \$65K

Advanced Platform Technology Center research support award

Role: Award Recipient (07/2009) \$25K

NICHHD NO1-HD-5-3402 HHSN27500503402C “Hyper-Reinnervation to Improve Myoelectric Prosthesis Control in Shoulder Disarticulation”.

Role: Co-Investigator (09/2006-10/2009)

VA RR&D Merit Review Award “Peripheral Interfaces in Amputees to Restore Sensation”

Role: Co-Investigator (09/2014-10/2016) \$1.2M

Awards:

Presidential Early Career Award for Scientists and Engineers (PECASE) (February 2016)
 Cleveland Clinic Caregiver Celebrations Appreciation Award (July 2015)
 International Functional Stimulation Society Travel Award sponsored by: Project SMART (September 2012)
 Globe Foundation Fellowship (September 2006-September 2007)
 Fine Science Tools Travel Award (November 2004)
 Fundamental Neuroscience Training Grant (August 2002-June 2004)
 Zaebs Memorial Fellowship (December 1998-December 1999)
 Colorado Scholars Award (August 1997-June 1998), (August 1998-June 1999)
 Most Promising Biology Student (March 1994)
 President's List (March 1997, March 1999)
 Dean's List (March 1996, November 1998)
 President, Tri Beta Biology Honor Society (August 1998-June 1999)

Publications

Schofield JS, Evans KR, Hebert JS, Marasco PD, Carey JP. (2016) The Effect of Biomechanical Variables on Force Sensitive Resistor Error: Implications for Calibration and Improved Accuracy. *J Am Chem Soc. Apr 3;135(13):5167-74.*

Hebert JS, Olson JL, Morhart MJ, Dawson MR, Marasco PD, Kuiken TA, Chan KM. (2014) Novel targeted sensory reinnervation technique to restore functional hand sensation after transhumeral amputation. *IEEE Trans Neural Syst Rehabil Eng. Jul;22(4):765-73.*

Fox JD, Capadona JR, Marasco PD, Rowan SJ. (2013) Bioinspired Water-Enhanced Mechanical Gradient Nanocomposite Films That Mimic the Architecture and Properties of the Squid Beak. *J Am Chem Soc.*

Marasco PD, Kim K, Colgate JE, Peshkin MA, Kuiken TA. (2011) Robotic touch shifts perception of embodiment to a prosthesis in Targeted Reinnervation amputees. *Brain. 134: 747-58*

Marasco PD, and Kuiken TA. (2010) Amputation with median nerve redirection (Targeted Reinnervation) reactivates forepaw barrel subfield in rats. *Journal of Neuroscience 30:16008-16014.*

Marasco PD, Schultz AE, Kuiken TA. (2009) Sensory capacity of reinnervated skin after redirection of amputated upper limb nerves to the chest. *Brain. 132(pt 6): 1441-8.*

Schultz AE, Marasco PD, Kuiken TA. (2009) Vibrotactile detection thresholds for chest skin of amputees following targeted reinnervation surgery. *Brain Research. 1251:121-9.*

Kuiken TA*, Marasco PD*, Lock BA, Harden RN, Dewald JP. (2007) Redirection of cutaneous sensation from the hand to the chest skin of human amputees with targeted reinnervation. *Proceedings of the National Academy of Sciences U S A. 104: 20061-6. (*these authors contributed equally to this work)*

Marasco PD, Tsuruda PR, Bautista DM, Catania KC. (2007) The fine structure of Eimer's organ in the coast mole (*Scapanus orarius*). *Anatomical Record. 290: 437-448.*

Marasco PD, and Catania KC. (2007) Response properties of primary afferents supplying Eimer's organ. *Journal of Experimental Biology. 210: 765-780*

Kuiken TA, Miller LA, Lipschutz RD, Lock BA, Stubblefield K, Marasco PD, Zhou P, Dumanian GA. (2007) Targeted reinnervation for enhanced prosthetic arm function in a woman with proximal amputation. *The Lancet 369: 371-380*

Marasco PD, Tsuruda PR, Bautista DM, Julius D, Catania KC. (2006) Neuroanatomical evidence for segregation of nerve fibers conveying light touch and pain sensation in Eimer's organ of the mole. *Proceedings of the National Academy of Sciences U S A. 103: 9339-9344*

Henry EC, Marasco PD, Catania KC. (2005) Plasticity of the cortical dentition representation after tooth extraction in naked mole-rats. *Journal of Comparative Neurology 485: 64-74*

Appel, B., P. Marasco, L. McClung and A.J. Latimer (2003) lunatic fringe Regulates delta-notch induction of hypochord in zebrafish. *Developmental Dynamics 228: 281-286*

Crish, S.D., C. Comer, P. D. Marasco and K.C. Catania (2003) Somatosensation in the superior colliculus of the star-nosed mole. *Journal of Comparative Neurology 464: 415-425*

In Preparation/Submitted for Review

Marasco PD, DJ Bourbeau, J Ina. A novel organizational roadmap for limb movement sensation.

Paul D. Marasco, Jacqueline S. Hebert, Jon W. Sensinger, Courtney E. Shell, Jonathon S. Schofield, Zachary C. Thumser, Raviraj Nataraj, Dylan T. Beckler, Michael R. Dawson, Dan H. Blustein, Satinder Gill, Jason P. Carey, Beth M. Orzell. Engineered perception of complex bionic hand movements via kinesthetic illusions

Book Chapters

Marasco PD., “Targeted Sensory Reinnervation”, chapter 8, in: *Targeted Muscle Reinnervation*, Kuiken and Schultz, Eds. CRC Press Taylor & Francis Group, Boca Raton, 2014 ISBN 978-1-4398-6080-9

Capadona, JR and PD Marasco “Brain Response to Neural Prostheses”, chapter 6, in: *The Textbook of Neural Repair*, Volume 1, Seltzer et al. Eds, 2nd Edition. Cambridge University Press, Cambridge , 2014 ISBN 978-1-1398-9832-4

Marasco, PD, JS Hebert and BM Orzell “Artificial limbs for upper extremity amputation”, chapter 51, in: *Technological Advances in Surgery, Trauma, and Critical Care*, Latifi, Rhee and Gruessner Eds, Springer Science + Business Media, 2015 ISBN 978-1-4939-2670-1

Abstracts

Hebert JS and Marasco PD, (2016) Prosthetic limbs that feel: Advances in clinical translation through bi-directional multi-modality perceptual integration. First International Symposium on Innovations in Amputation Surgery and Prosthetic Technologies (IASPT). (platform presentation).

Marasco PD, Hebert JS, Schofield JS, Thumser ZC, Dawson MR, Carey JP, Orzell BM (2015) Engineering perceptual illusions of hand movement to sense the activity of bi-directionally integrated bionic limbs Society for Neuroscience 45th annual meeting. (platform presentation).

Marasco, PD, JS Hebert and JS Schofield (2014) Vibration of reinnervated muscle induces perceptual illusion of joint movement in upper limb amputees with targeted sensory reinnervation. 79th Cold Spring Harbor Laboratories Symposium: Cognition

Marasco PD, DJ Bourbeau, J Ina. (2014) Kinesthesia: neural substrates, cortical organization and mechanistic insight into the kinesthetic illusion. 79th Cold Spring Harbor Laboratories Symposium: Cognition

Santos-Munné, J., P.D. Marasco (2014) A multi-digit tactor array system for physiologically relevant sensory feedback for prosthetic limbs. MEC’14: Myelectric Controls Symposium

Thumser, Z.C., R. Lim, P.D. Marasco (2014) Applying a fitts’ law inspired approach to quantifying performance Improvement in a touch-feedback equipped prosthesis. MEC’14: Myelectric Controls Symposium

Lim, R., Z.C. Thumser, P.D. Marasco (2014) The application of optimal foraging theory to the quantitative evaluation of somatosensory feedback systems in prosthetic Limbs. MEC’14: Myelectric Controls Symposium

Marasco, P.D., J.S. Hebert (2013) Vibration of reinnervated muscle induces perceptual illusion of joint movement in an upper limb amputee with targeted sensory reinnervation. 2013 NIH Common Fund High Risk-High Reward Research Program Symposium

Marasco, P.D., (2012) An electrophysiological investigation of the neural substrates of limb movement feedback. International Functional Electrical Stimulation Society 2012; “Smart Machines-Neural Evolution”

Marasco, P.D., A.S. Ianni (2011) Electrophysiological examination of peripheral response properties and cortical organizational characteristics of kinesthesia in a rat model: Steps towards providing limb position feedback for prosthetic limbs. Society for Neuroscience 39th annual meeting

Harris, J.P., P.D. Marasco, D.J. Tyler (2011) Lipopolysaccharide-induced response degrades intracortical Recordings. Society for Neuroscience 39th annual meeting

Koppaka, S.S., A.E. Hess, P.D. Marasco, D.J. Tyler (2011) Insertion mechanics of the perineurium and epineurium. Biomedical Engineering Society annual meeting

Marasco, P.D., A.E. Schultz, K. Kim, J.E. Colgate, M.A. Peshkin, T.A. Kuiken. (2010) Direct sensory feedback for prosthetics: neural mechanisms of function, plasticity, and ownership. Biomedical Engineering Society

- annual meeting October 2010 (platform presentation)
- Ko, J.H., M. de la Garza, P.D. Marasco, G.A. Dumanian, T.A. Kuiken (2010) The effects of targeted reinnervation on neuroma formation in a novel rat hindlimb model. Plastic Surgery Research Council 55th annual meeting (platform presentation)
- Marasco, P.D., K. Kim, J.E. Colgate, M.A. Peshkin, and T.A. Kuiken (2009) Mechanical touch interface applied to redirected sensory nerves drives perceptual shift towards embodiment of a prosthetic arm in a Targeted Reinnervation amputee. Society for Neuroscience 38th annual meeting (platform presentation)
- Marasco, P.D and T.A. Kuiken (2008) Median nerve redirection (Targeted Reinnervation) following forelimb amputation reactivates the forepaw barrel subfield in the somatosensory cortex of adult rats; with correlations to Targeted Reinnervation in human amputees to provide physiologically relevant sensory feedback for prosthetic limbs. Society for Neuroscience 38th annual meeting (platform presentation)
- Marasco, P.D., A.E. Schultz, J.S. Sensinger, and T.A. Kuiken (2008) Investigation of sensation in amputees who have undergone Targeted Reinnervation. 38th Neural Interfaces Conference (platform presentation)
- Marasco, P.D., A.E. Schultz and T.A. Kuiken (2008) Tactile and spatial acuity in amputees with Targeted Reinnervation. Society for Neuroscience, Chicago chapter annual meeting
- Marasco, P.D., B.A. Lock and T.A. Kuiken (2007) Restoring somatic sensation of the hand in human amputees Society for Neuroscience 37th annual meeting
- Marasco, P.D., and K.C. Catania (2005) An investigation of the mechanosensory Eimer's organ in the Coast Mole using the fluorescent cationic styryl dye AM1-43. Society for Neuroscience 35th annual meeting
- Marasco, P.D., and K.C. Catania (2004) The response properties of primary afferents innervating mechanosensory Eimer's organs; clues to the functional organization of a putative texture detecting array. Society for Neuroscience 34th annual meeting
- Marasco, P.D., and K.C. Catania (2003) The anatomical organization of the brainstem trigeminal complex in the star-nosed mole. Society for Neuroscience 33rd annual meeting
- Henry, E.C., P.D. Marasco and K.C. Catania (2003) Plasticity of the oral-facial cortical representation after tooth extraction in the naked mole-rat: a possible mechanism for phantom tooth pain? Society for Neuroscience 33rd annual meeting

Other Publications

- Marasco, PD, JS Hebert, J Sensinger. (2015) Developing a New Generation of Objective Functional Metrics for Advanced Upper Limb Prosthetics. Frontiers in Rehabilitation, A Newsletter for Physicians, Cleveland Clinic Department of Physical Medicine and Rehabilitation.
- Marasco, P.D. (2012) The Turn (haiku poetry and photo project). The Great Lakes Courier, Volume 1 Issues 1 (March, 2012), 4 (August 2012), Volume 2 Issue 1 (May 2013), Volume 2 Issue 1 (May 2013), Volume 2 Issue 5 (September 2013)
- <http://greatlakescourier.com/read/2012/03/13/the-turn>
- <http://www.greatlakescourier.com/read/2012/08/17/the-turn>
- <http://www.greatlakescourier.com/read/2013/05/03/the-turn>
- <http://greatlakescourier.com/read/2013/07/30/the-turn>
- <http://greatlakescourier.com/read/2013/09/04/the-turn>

Invited Lectures

- Invited Speaker: Department of Veterans Affairs, Extremity Trauma and Amputation Center of Excellence (EACE) / Amputee System of Care (ASoC), National Grand Rounds, August 2016
- Invited Speaker: Universidad de Ingeniería y Tecnología (UTEC), Lima Peru, June 2016
- Featured Speaker: Department of Veterans Affairs Office of Research and Development, Presidential Early Career Research Award, Washington DC, February 2016
- Featured Speaker: NIH Common Fund 2015 High-Risk, High-Reward Research Symposium, National Institutes of Health, Bethesda, MD, December 2015
- Invited Speaker: Association of Medical Illustrators (AMI), July 2015

Featured Speaker: Cleveland Clinic Partners in Philanthropy annual meeting, June 2015
 Featured Speaker: Cleveland Clinic Alumni Association Board of Directors annual meeting, April 2015
 Guest Lecturer: University Heights senior adult network, University Heights Public Library, April 2015
 Invited Speaker to General Assembly: Ohio Chapter of the American Academy of Orthotists & Prosthetists (AAOP) March 2015
 Keynote Speaker: MEC Symposium, Institute of Biomedical Engineering, University of New Brunswick, Engineered Perception: “Sensation, Cognition and Prosthetics”, August 2014
 Guest Lecturer: Biomechanics and Prosthetics, EBME 307, Bolu Ajiboye, Ph.D., Dept. of Biomedical Engineering, Case Western Reserve University, April 2014
 Invited Speaker: Integrated Bioscience Seminar Series, “Kinesthesia, embodiment and artificial limbs: A neuro-cognitive perspective on biomimicry”, University of Akron, April 2014
 Invited Speaker: Defense Advanced Research Projects Agency (DARPA) Sensorimotor Prosthetics Workshop, Doug Weber Ph.D., Program Officer. “Sensory Neurophysiology, Embodiment and Prosthetics”, February 2014.
 Guest Lecturer: Basic Cellular and Molecular Neuroscience, MMED 415, Dawn Taylor Ph.D. Neuroscience, Lerner Research Institute, Cleveland Clinic, October 2013
 Guest Lecturer: Biomechanics and Prosthetics, EBME 307, Bolu Ajiboye, Ph.D., Dept. of Biomedical Engineering, Case Western Reserve University, April 2013
 Invited Speaker: Case Western Reserve University Biology Department Seminar, “An electrophysiological investigation of the neural substrates of limb movement feedback”, March 2013
 Invited Speaker: Case Western Reserve University Department of Biomedical Engineering Seminar Series “An Electrophysiological investigation of the neural substrates of limb movement feedback”, February 2013
 Invited Speaker: International Functional Electrical Stimulation Society (IFESS) Somatosensory Prostheses, September 2012
 Invited Speaker: International Functional Electrical Stimulation Society (IFESS) Using a Novel Targeted Sensory Reinnervation Technique and Machine Learning Algorithms to Enhance Control and Improve Function of Myoelectric Prostheses after Upper Limb Amputation, September 2012
 Invited Speaker/Contributor: TATRC LEGS Integrated Research Team Summit, August 2012
 Invited Speaker: Dept of Cognitive Science Colloquium Series, Case Western Reserve University, April 2012
 Invited Speaker: Targeted Muscle Reinnervation – Current Approaches and Future Directions, October 2011
 Guest Lecturer: Performance and the Embodied Mind, Cogs 329, Yanna Popova D.Phil. Dept of Cognitive Science Case Western Reserve University, September 2011
 Invited Speaker: Biomedical Engineering Society annual meeting, October 2010
 Featured Speaker: American Orthotic and Prosthetic Association National Assembly, September 2008
 Invited Speaker: Dupage Area Engineer’s Week public outreach event, February 2007

Service

Program Lead: Prosthetics and Orthotics Program of the Advanced Platform Technology Center of Excellence 2014-Ongoing
 Member: Advanced Platform Technology Center of Excellence Leadership Committee. 2012-Ongoing
 Scientist Reviewer: Department of Defense, U.S. Army Medical Research and Materiel Command, Congressionally Directed Medical Research Programs (CDMRP), 2015 Orthotics and Prosthetics Outcomes Research Program (OPORP)
 Scientific Review Group: Peer Reviewed Medical Research Program (PRMRP), Congressionally Directed Medical Research Program (CDMRP)
 Scientific Review Group: VA Rehabilitation Research and Development (RR&D) Merit Review
 Scientific Review Group: VA Rehabilitation Research and Development (RR&D) SPiRE.
 Scientific Review Group: US Army Medical Research and Materiel Command (USAMRMC), American Institute of Biological Sciences (AIBS).
 Scientific Member: Louis Stokes Cleveland Department of Veterans Affairs Medical Center Institutional

Animal Care and Use Committee. 2010-2013
 IACUC Representative: Subcommittee on Research Safety (SRS), Louis Stokes Cleveland Department of Veterans Affairs Medical Center. 2009-2013
 Scientific Reviewer for: Journal of Neural Engineering, Ongoing
 Scientific Reviewer for: Transactions on Neural Systems & Rehabilitation Engineering, Ongoing
 Scientific Reviewer for: Journal of NeuroEngineering and Rehabilitation, Ongoing
 Scientific Reviewer for: IEEE Transactions on Human-Machine Systems, Ongoing
 Scientific Reviewer for: Journal of Orthotics and Prosthetics, Ongoing
 Scientific Reviewer for: Journal of Morphology
 Scientific Reviewer for: Science Translational Medicine, Ongoing
 Scientific Reviewer for: Neurorehabilitation and Neural Repair, Ongoing
 Scientific Reviewer for: IEEE Transactions on Neural Systems & Rehabilitation Engineering, Ongoing
 Scientific Reviewer for: Biomedical Signal Processing and Control, Ongoing
 Scientific Reviewer for: Disability and Rehabilitation: Assistive Technology, Ongoing
 Scientific Reviewer for: Transactions on Biomedical Engineering, Ongoing
 Scientific Reviewer for: Expert Reviews of Medical Devices, Ongoing
 Scientific Reviewer for: Restorative Neurology and Neuroscience
 Invited as the host editor for a *Frontiers in Neuroscience* Research Topic: The current state of embodied prosthetic limbs
 Community Outreach: Science Fair Judge, 5th and 6th grades, Menlo Park Academy, Cleveland School District, January 2015
 Community Outreach: Guest Lecturer: University Heights senior adult network, University Heights Public Library, April 2015
 Community Outreach: Science Fair Judge, 3rd grade, Menlo Park Academy, Cleveland School District, January 2014
 Community Outreach: “From the Earliest Human Technology to the Latest” Demonstration of flintknapping and advanced prosthetic limbs to the 3rd grade Discovery Classroom, Emerson Elementary, Lakewood Ohio, January 2013

Other Service

Race Mechanic and Neurophysiologist, Team Cleveland, Spinal Cord Injury Functional Electrical Stimulation Bicycle Racing Team, Ron Triolo PhD (Lead), Gold Medal Winning Team, Cybathlon Cybernetic Olympics, Zurich/Kloten Switzerland (October 2016).
<https://vimeo.com/183688652>
<https://www.youtube.com/watch?v=d4ruXKNVDyQ>

Popular Press

Article on current work: Karina Valencia & Miguel Yovera, “Paul Marasco: La tecnología debe ser práctica y fácil de aplicar.” **Correo**, July 2016,
<http://diariocorreo.pe/miscelanea/paul-marasco-la-tecnologia-debe-ser-practica-y-facil-de-aplicar-684691/>
 Article on current work: Diego Suárez-Bosleman, “Hacemos que el cerebro acepte a una máquina” **El Comercio**, June 2016
<https://acceso360.imedia.pe/llorenteycuencia/es-PE/?mod=TrackingPressViewer&task=default&external=1&companyNewsId=38824894&newsDate=1465966800&sig=485ae679c2ff80d050da69448655ddcf4d27876e8e4bfcaacaece00eea5e5da9>
 Article on current work and Presidential Award: Brian Albrecht “Like something out of ‘Star Wars’: Prosthetic hand that restores touch makes science fiction a reality. **The Plain Dealer** (Cleveland) print and online feature, May 2016 http://www.cleveland.com/metro/index.ssf/2016/05/local_va_researcher_honored_fo.html
 White House Press Release: Office of the Press Secretary, “President Obama Honors Extraordinary Early-

Career Scientists” February 18 2016 <https://www.whitehouse.gov/the-press-office/2016/02/18/president-obama-honors-extraordinary-early-career-scientists>

Article on current work: Timothy Magaw, “Cleveland Clinic research team lands \$2.5 million contract”

Crain’s Cleveland Business, February 9 2015

<http://www.craincleveland.com/article/20150209/FREE/150209867/cleveland-clinic-research-team-lands-2-5-million-contract>

Description of current work: Brie Zeltner, “At Clinic, CWRU, better prosthetics not out of reach” **Cleveland Plain Dealer, Print Edition, Health Technology**, February 15, 2015

Article on recent work; Report: “Cleveland researchers awarded \$2.5 million to evaluate prosthetic devices”

Healio Orthotics and Prosthetics News, February 13, 2015 [http://www.healio.com/orthotics-](http://www.healio.com/orthotics-prosthetics/news/online/%7B470d5c54-bd7c-476b-a626-c3bd9cb3a830%7D/cleveland-researchers-awarded-25-million-to-evaluate-prosthetic-devices)

[prosthetics/news/online/%7B470d5c54-bd7c-476b-a626-c3bd9cb3a830%7D/cleveland-researchers-awarded-25-million-to-evaluate-prosthetic-devices](http://www.healio.com/orthotics-prosthetics/news/online/%7B470d5c54-bd7c-476b-a626-c3bd9cb3a830%7D/cleveland-researchers-awarded-25-million-to-evaluate-prosthetic-devices)

Article on recent work; Report: “Cleveland Clinic researcher receives up to \$2.5 million to evaluate prosthetic limb technology”. **Physio.org**, February 9, 2015 [http://phys.org/wire-news/184933855/cleveland-clinic-](http://phys.org/wire-news/184933855/cleveland-clinic-researcher-receives-up-to-25-million-to-evaluat.html)

[researcher-receives-up-to-25-million-to-evaluat.html](http://phys.org/wire-news/184933855/cleveland-clinic-researcher-receives-up-to-25-million-to-evaluat.html)

Article on recent work; Report: “\$2.5m contract to help further prosthetic research at Cleveland Clinic’s Lerner Research Institute”. **Freshwater Cleveland**, February 9, 2015

<http://www.freshwatercleveland.com/innovationnews/prostheticgrant020915.aspx>

Article on recent work; Report: “Cleveland Clinic research team lands \$2.5 million contract” **Crains**

Cleveland, February 9, 2015 <http://www.craincleveland.com/article/20150209/FREE/150209867/cleveland-clinic-research-team-lands-2-5-million-contract>

Interview, description of current work: Josh Fischman, “Revolution in Artificial Limbs Brings Feeling Back to Amputees” **National Geographic, Daily News**, February 24, 2014

<http://news.nationalgeographic.com/news/2014/02/140222-artificial-limbs-feeling-prosthetics-medicine-science>

Perspective: Casey Murphy, Motor remapping after targeted reinnervation. **O&P Business News**, January 2014. [http://www.healio.com/orthotics-prosthetics/prosthetics/news/print/o-and-p-business-](http://www.healio.com/orthotics-prosthetics/prosthetics/news/print/o-and-p-business-news/%7B19709dc8-741f-47ff-a635-abdd3ac59d8b%7D/targeted-reinnervation-helps-remap-motor-representations-after-amputation)

[news/%7B19709dc8-741f-47ff-a635-abdd3ac59d8b%7D/targeted-reinnervation-helps-remap-motor-representations-after-amputation](http://www.healio.com/orthotics-prosthetics/prosthetics/news/print/o-and-p-business-news/%7B19709dc8-741f-47ff-a635-abdd3ac59d8b%7D/targeted-reinnervation-helps-remap-motor-representations-after-amputation)

Perspective: Laura Sanders, “Electrodes dupe brain into feeling touch” **Science News**, November 16, 2013

<https://www.sciencenews.org/article/electrodes-dupe-brain-feeling-touch>

Interview, description of current work: John Mangels, “Cleveland research team’s creation of squid-like material could lead to better prosthetics and implants” (Front Page Article) **The Plain Dealer** (Cleveland), June 2013

http://www.cleveland.com/science/index.ssf/2013/06/cleveland_teams_creation_of_sq.html

Interview, description of earlier work: Kurt de Swaaf, “When man and machine merge” (Article) **Der Standard** (Austria), October 2012.

<http://derstandard.at/1350259863837/Wenn-Mensch-und-Maschine-verschmelzen>

Interview, comments and description of current and past work: Megan Scudellari, “Missing Touch” (feature article); Kenneth Catania, “A Nose for Touch” (cover story), **The Scientist**, (Making Sense of Touch) September 2012.

<http://the-scientist.com/2012/09/01/missing-touch/>

<http://the-scientist.com/2012/09/01/a-nose-for-touch/>

Science news of the year: Body and Brain. Editors and writers survey of the top news from the world of science in 2011. “Rerouted for feeling” **Science News**, December 31, 2011; Vol. 180 #14 (p. 29)

http://www.sciencenews.org/view/feature/id/337014/title/2011_Science_News_of_the_Year_Body_%2B_Brain

Comment in: Ferris Jabr, “Monkeys ‘feel’ texture of virtual objects” **New Scientist** (online), October 5, 2011

<http://www.newscientist.com/article/dn21008-monkeys-feel-texture-of-virtual-objects.html>

News Highlight: “Study: Amputees Who Undergo TMR Perceive Limb as Part of Their Body” **O&P Edge**, February 9, 2011 http://www.oandp.com/articles/NEWS_2011-02-09_02.asp

Article on recent work; Interview: Laura Sanders, “Prosthetics that feel: Amputees with rerouted ‘sense of touch’ view limbs as part of body.” **Science News**, February 26, 2011; Vol. 179 #5 (p. 10)

http://www.sciencenews.org/view/generic/id/69296/title/Prosthetics_that_feel

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<http://www.oandpbusinessnews.com/view.aspx?rid=79641#perspective>

Interview: Duncan Graham-Rowe "How to rewire the nervous system" **The Economist** (Technology Quarterly), September 2, 2010 <http://www.economist.com/node/16909945>

Interview: **ABC Primetime "Medical Mysteries"**, September 9, 2008

<http://abcnews.go.com/Health/MedicalMysteries/story?id=5715902&page=1>

Interview: **ABC News, Good Morning America**, September 9, 2008

Interview: Stephanie Lecci, Our World with Art Chimes, **NPR, Voice of America Radio**, December 2007

<http://voanews.com/english/science/ourworld.cfm>

Interview: Tom Randall, **Bloomberg News**, December 2007

Interview: Jim Ritter, "Artificial arm might feel like real thing," **Chicago Sun-Times**, November 29, 2007

Interview: Ben McGrath, A Reporter at Large, "Muscle Memory," **The New Yorker**, July 30, 2007, p. 40

http://www.newyorker.com/reporting/2007/07/30/070730fa_fact_mcgrath

Appearance in: The Beauty of Ugly, **Nature PBS**, November 2007

<http://www.pbs.org/wnet/nature/beautyofugly/>

Students

Current:

Morgan Gabbert (MS Candidate) Experimental Research (Psychology), Cleveland State University, Cleveland Ohio (10/2015-Current)

Hala Osman (PhD Candidate) Applied Biomedical Engineering, Cleveland State University, Cleveland Ohio (04/2014-Current)

Previous:

Neha Reddy (National Science Foundation *Research Experience for Undergraduates* Fellow) Cleveland Clinic, Cleveland Ohio (5/27/2015-8/1/2015)

Noble Jones (Medical Student) Lerner College of Medicine of Case Western Reserve University, Cleveland Clinic, Cleveland Ohio (12/2013-Current)

Briana Prager (Medical Student) Lerner College of Medicine of Case Western Reserve University, Cleveland Clinic, Cleveland Ohio (12/2013-02/2016)

Andrew Bowen (Medical Student) Lerner College of Medicine of Case Western Reserve University, Cleveland Clinic, Cleveland Ohio (12/2013-08/2014)

Megan Morisada (Medical Student) Lerner College of Medicine of Case Western Reserve University, Cleveland Clinic, Cleveland Ohio (12/2013-08/2014)

Eric Anderson (National Science Foundation *Research Experience for Undergraduates* Fellow) Cleveland Clinic, Cleveland Ohio (05/27/2014-08/01/2014)

Memberships/Professional Experience

Society for Neuroscience, Member

International Functional Electrical Stimulation Society, Member (2012)

Biomedical Engineering Society, Member (2010)

Research Assistant 1 (developmental molecular genetics), August 2000–August 2001

Vanderbilt University

Bruce Appel Ph.D.

Lab Instructor (Staff Position), Anatomy & Physiology, August 1998-May 2000.

University of Colorado, Colorado Springs

Jon Pigage Ph.D.

Science Learning Center Tutor, August 1998-December 1999.

University of Colorado, Colorado Springs

Barbara Gaddis Ph.D.

Lab Instructor, Biology 106, June 1998-August 1998.

University of Colorado, Colorado Springs

Jon Pigage Ph.D.

Workshops and Continuing Education

Workshop through the Searle Center for Teaching Excellence, Northwestern University: "Setting Your Students Up to Succeed: Designing a Learner-Centered Course". Completed: October 2008

Workshop through Office of Continuing Education, Northwestern University: "Grantsmanship for Research Professionals". Completed: March 2008

Amputee Peer Visitor Training, Amputee Coalition, Voluntary Service US Department of Veterans Affairs, Louis Stokes Cleveland VA Medical Center. Audited/Completed: January 2012