

Curriculum Vitae:
Ronald J. Triolo, Ph.D.

CURRENT POSITIONS:

January 2005 – Present	Director, Advanced Platform Technology (APT) Center A National Center of Excellence in Rehabilitation Engineering US Department of Veterans Affairs 10701 East Blvd. Cleveland, OH 44106 (216) 791-3800 ext. 4138 (voice) (216) 231-3433 (facsimile)
July 2009 – Present	Full Professor
July 2002 - Present	Associate Professor (with Tenure)
August 1994 - June 2002	Assistant Professor (Tenure Track) Departments of Orthopaedics and Biomedical Engineering Case Western Reserve University 11100 Euclid Avenue Cleveland OH 44106
October 2007 – Present	Senior Research Career Scientist
October 2002 – 2007	Research Career Scientist Rehabilitation R&D Service US Department of Veterans Affairs
November 1999 - Present	Director, Motion Study Laboratory Louis Stokes Cleveland Department of Veterans Affairs Medical Center (LSCDVAMC)
November 1997 - Present	Bioscientific Staff Department of Orthopaedics MetroHealth Medical Center 2500 MetroHealth Drive Cleveland, OH 44109-1998 (216) 778-7877 (voice) (216) 778-4259 (facsimile)

EDUCATION:

Ph.D.	Biomedical Engineering 1986, Drexel University, Philadelphia PA
M.S.	Electrical Engineering 1985, Drexel University, Philadelphia PA
M.S.	Biomedical Engineering 1983, Drexel University, Philadelphia PA
B.S.	Electrical Engineering 1980, Villanova University, Villanova PA

HONORS AND AWARDS:

Senior Research Career Scientist Award, US Department of Veterans Affairs, 2007-present
Research Career Scientist Award, US Department of Veterans Affairs, 2002-2007

Maurice Saltzman Award for Clinical/Academic Excellence, Mount Sinai Foundation, 2004
Editorial Board, *Journal of Rehabilitation Research and Development*, 1999 - present
Associate Editor, *IEEE Transactions on Neural Systems & Rehabilitation Engineering*, 1999 - 2010
Assistant Editor, *IEEE Transactions on Rehabilitation Engineering*, 1993 - 1999
Professional Achievement Award, Villanova University, 1992
Selected to Sigma Xi, Scientific Research Society, 1984
Calhoun Fellow, Drexel University, 1981-1983
Presidential Scholar, University of Pennsylvania, 1980
Rhode's Scholarship Candidate
Summa Cum Laude Graduate, Villanova University, 1980
Who's Who in American Colleges and Universities, 1980
Dean's Award for Academic Excellence, Villanova University, 1980
Dean's Award for Meritorious Service, Villanova University, 1980
Outstanding Engineer Award, Villanova University, 1978-1980
Presidential Scholar, Villanova University, 1976-1980

RESEARCH AND RELEVANT PROFESSIONAL EXPERIENCE:

August, 1994 - June, 2002
Assistant Professor
Departments of Orthopaedics and Biomedical Engineering
Case Western Reserve University, Cleveland OH

October, 1995 - September, 1996
Director of Research, Health Hill Hospital for Children
2801 Martin Luther King Jr. Drive, Cleveland, OH
Developed independent research program in pediatric neurological rehabilitation focusing on children with central cord syndrome and spastic athetosis, cerebral palsy. Facilitated research proposal design from staff physicians, psychologists and physical/occupational therapists. Coordinated activity and administration of the Institutional Review Board. Responsible for educational programs on research design and clinical uses of functional electrical stimulation.

August, 1986 - August, 1994
Director of Research, Philadelphia Unit of Shriners Hospitals
Clinical Assistant Professor, Department of Orthopaedic Surgery
Temple University, Philadelphia PA
Responsible for conducting research in the application of functional neuromuscular stimulation to children with spinal cord injuries or cerebral palsy. Implemented and evaluated systems to control standing and walking with stimulation in children with paraplegia (or spastic diplegia), and to provide active grasp and release in children with tetraplegia (or spastic quadriplegia). Organized and coordinated interdisciplinary team of engineers and therapists to assess the physiological effects of stimulation and functional outcomes of upper and lower extremity systems. Supervised graduate students in Biomedical Engineering or Physical Therapy from local universities.

October, 1983 - August, 1986

Biomedical Engineer
Veterans Administration Medical Center
Philadelphia, PA
Responsible for the design, software realization and engineering evaluation of digital myoelectric signal processors. Developed a digital controller for an actively powered, volitional above-knee prosthesis.

September, 1981 - 1986
Biomedical Engineer and Research Assistant
Gait Analysis Laboratory
Moss Rehabilitation Hospital, Philadelphia, PA
Conceived and executed research investigating the nature of electromyographic signals and their application to prosthetic control. Successfully demonstrated several techniques to detect the direction and estimate the magnitude of motions of the lower extremity.

PROFESSIONAL SOCIETY MEMBERSHIPS:

ASIA: American Spinal Injury Association
NSCIA: National Spinal Cord Injury Association
RESNA: Rehabilitation Engineering Society of North America (Officer 1998-2000)
GCMAS: Gait and Clinical Movement Analysis Society
EMBS: Engineering in Medicine and Biology Society
IEEE: Institute of Electrical and Electronic Engineers
IFESS: International Functional Electrical Stimulation Society (Board Member 2002-2005)
Tau Beta Pi: Engineering Honor Society
Eta Kappa Nu: Electrical Engineering Honor Society
Phi Kappa Phi: National Honor Society
Sigma Xi: Scientific Research Society

GRANTS SUBMITTED OR CURRENTLY UNDER REVIEW

1. "Enhancing Neuroprosthesis Performance with Nerve Cuff Electrodes," National Institutes of Health. April 2014 – March 2019 – **Co-Principal Investigator** (with D. Tyler)– submitted.
2. "Efficacy and Safety of Implanted FES Assisted Hip Flexion in MS," Rehabilitation Research & Development Service, US Department of Veterans Affairs. June 2013 – May 2016. Co-Investigator with S. Selkirk – submitted.
3. "Engineering-Based, Patient-Desired Features for Exoskeletal Assist Systems," Rehabilitation Research & Development Service, US Department of Veterans Affairs. June 2013 – May 2016. Co-Investigator with A. Spungen – submitted.

GRANTS HELD: PENDING OR AWARDED

1. "Next-Generation High-Density Wireless Peripheral Nerve Stimulator," January 2014 – December 2016 – Co-Investigator (with D. Shire)
2. "Nerve Reshaping for Improved Electrode Selectivity," January 2014 – December 2017 – Co-Investigator with D. Durand.
3. "In-Line 32-Channel Connector for High-Density Implantable Medical Device," October 2013 – September 2015 – Co-Investigator with D. Shire.

4. "A Hybrid Neuromechanical Ambulatory Assist System," US Department of Defense, May 2013 – April 2015 – **Principal Investigator**.
5. "Exploiting Selective Recruitment to Prolong Standing after SCI," Rehabilitation R&D Service, US Department of Veteran Affairs. July 2013- December 2017, **Principal Investigator**.
6. "A Neuroprosthesis for Seated Posture and Balance," Rehabilitation Research & Development Service, US Department of Veterans Affairs. July 2013 – June 2017, **Principal Investigator**.
7. "Improving Walking after Paralysis," Rehabilitation R&D Service, US Department of Veteran Affairs. July 2012- July 2015, Co-Investigator with Rudi Kobetic
8. "Hybrid Neuroprosthesis with Variable Knee Control for Walking in SCI," Rehabilitation R&D Service, US Department of Veterans Affairs. January 2013 – June 2016. Co-Investigator with Rudi Kobetic
9. "Automatic Control of Standing Balance with Functional Neuromuscular Stimulation," R01, National Institutes of Health (NINDS), July 2011 – June 2016. **Co-Principal Investigator** (with M. Audu).
10. "Long-term Follow-up of Implanted Lower Extremity Neuroprostheses," Rehabilitation R&D Service, US Department of Veteran Affairs. October 2011-September 2013. **Principal Investigator**
11. "Control of Seated Balance with Functional Neuromuscular Stimulation," US Department of Defense Spinal Cord Injury Research Program. October 2010 – September 2013, **Co-Principal Investigator** (with M. Audu).
12. "Clinically Applied Rehabilitation Engineering (CARE) Project," The Ohio Department of Development Third Frontier Wright Projects Program. May 2010 – April 2013, Co-Investigator with Brian Davis.
13. "Multi-functional Neuroprosthetic System for Restoration of Motor Function," National Institutes of Health. January 2010 – December 2014, Co-Investigator with P. Hunter Peckham.
14. "Advanced Platform Technology Center of Excellence," Rehabilitation Research & Development Service, US Department of Veterans Affairs. January 2010 – December 2015, **Principal Investigator**.
15. "A Neuroprosthesis for Seated Posture and Balance," Rehabilitation Research & Development Service, US Department of Veterans Affairs. January 1 2010 – September 2013, **Principal Investigator**.
16. "Control of a Hybrid Neuroprosthesis for Walking in SCI," Rehabilitation Research & Development Service, US Department of Veterans Affairs. July 2008-September 2010, Co-investigator with Rudi Kobetic.
17. "Senior Research Career Scientist Award," Rehabilitation Research & Development Service, US Department of Veterans Affairs, October 2007 – November 2014, *Highest level Career Development Award for non-physicians in the VA system*.
18. "Enhancing Neuroprosthesis Performance with Nerve Cuff Electrodes," National Institutes of Health (NIBIB), September 2007- June 2011, **Principal Investigator**.
19. "Facilitating Ambulation after Incomplete SCI with FES," Rehabilitation Research & Development Service, US Department of Veterans Affairs. July 2007 – June 2010, **Principal Investigator**.

20. "Use of Implantable Microstimulators for Hip and Angle Control in Walking," Rehabilitation Research & Development Service, US Department of Veterans Affairs. July 2007 – June 2010. Co-Investigator with R. Kobetic.
21. "Prosthetic Arm Control Device for Amputees," Telemedicine and Advanced Technologies Research Center, US Department of Defense, W81XWH-07-2-0044 April 2007-March 2009. Co-Investigator with Robert Kirsch.
22. "The NORCIS SCI Model System Development and Impact of New Technology on the New Paradigm of Disability," US Department of Education H133N060017, October 2006 – September 2011. Co-Investigator with G. Nemunaitis.
23. "Ohio Neurostimulation and Neuromodulation Partnership Continuation," Biomedical Research and Commercialization Program, Board of Regents, State of Ohio. July 2006 – June 2009. Co-Investigator with P. Peckham
24. "Automatic Control of Standing Balance with Functional Electrical Stimulation," R01, National Institutes of Health (NINDS), April 2006 – March 2010, **Principal Investigator.**
25. "Deep Brain Stimulation and Motor Performance in Parkinson's Patients," Rehabilitation Research & Development Service, US Department of Veterans Affairs, April 2006 – March 2008. Co-Investigator with J. Alberts.
26. "Rehabilitation Platform Technology Center of Excellence," Rehabilitation Research & Development Service, US Department of Veterans Affairs, January 2005 – December 2009. **Principal Investigator**
27. "Development of a Networked Implantable Neuroprosthesis," National Institutes of Health (NIBIB), March 2005 – February 2010. Co-investigator with P. Hunter Peckham.
28. "Implanted Neuroprosthesis for Standing after SCI." US Food & Drug Administration, Office of Orphan Product Development, October 2004 – September 2007. **Principal Investigator.**
29. "A Hybrid Neuroprosthesis for Mobility after Paralysis from Spinal Cord Injury." Department of Defense Peer Reviewed Medical Research Program (PRMRP). May 2005-April 2009. **Principal Investigator.**
30. "Design of Controllable Hip Joints for Hybrid Walking Orthoses." Rehabilitation Research & Development Service, US Department of Veterans Affairs, July 2004 – June 2007, Co-investigator with R. Kobetic.
31. "Standing and Transfers after SCI with an Implanted Neuroprosthesis." Rehabilitation Research & Development Service, US Department of Veterans Affairs. April 2004 – March 2007. **Principal Investigator**
32. "BIONS[®] for Improved Tissue Health and Pressure Sore Prevention." Rehabilitation Research & Development Service, US Department of Veterans Affairs. April 2004-March 2007, Co-investigator with C. Ho.
33. "Enhancing Neuroprosthesis Performance with Nerve Cuff Electrodes." National Institutes of Health (NIBIB). September 25, 2003 – August 31, 2006, **Principal Investigator.**
34. "Implanted Neuroprostheses for Exercise, Standing & Transfers" NY State Department of Health, Spinal Cord Injury Research Board. Co-Investigator with G. Forrest
35. "Ohio Neurostimulation and Neuromodulation Partnership." State of Ohio Biomedical Research and Technology Transfer Commission (BRTT03-10) July 2003 – June 2008, Co-Investigator with P. Hunter Peckham.

36. "User-based Control of a FES-based Standing Neuroprosthesis." Rehabilitation Research and Development Service, US Department of Veterans Affairs. July 2003-June 2006. Co-Investigator with R. Kirsch.
37. "Realtime Interface for Implanted FNS Systems with StimGym II" a subcontract to the Phase II SBIR grant entitled: "Customized Electrical Stimulation for SCI Rehabilitation," customKYnetics, Inc. October 2003 – May 2004.
38. "Facilitating Ambulation after Incomplete SCI with FES," Rehabilitation Research and Development Service, US Department of Veterans Affairs. October 2002 – September 2005. **Principal Investigator.**
39. "Research Career Scientist Award," Rehabilitation Research and Development Service, US Department of Veterans Affairs, October 2002 – September 2007.
40. "Effects of Trunk Stimulation on Seated Wheelchair Function after SCI," Rehabilitation Research and Development Service, US Department of Veterans Affairs. July 2002 – June 2004. **Principal Investigator.**
41. "Implantable FES for Control of the Extremities in Spinal Cord Injury," Rehabilitation Research and Development Service, US Department of Veterans Affairs. January 2002 – December 2004. Co-investigator with P. Hunter Peckham.
42. "Development of a Networked Implantable Neuroprosthesis," National Institutes of Health (NINDS), September 2001-August 2004. Co-investigator with P. Hunter Peckham
43. "Pressure Sore Prevention Using Neuromuscular Electrical Stimulation," Rehabilitation Research and Development Service, US Department of Veterans Affairs. April 2001 – March 2004. **Principal Investigator.**
44. "Collaborative Evaluation of an Implanted Neuroprosthesis for Standing Transfers," Rehabilitation Research and Development Service, US Department of Veterans Affairs. April 2001 – March 2003. **Principal Investigator.**
45. "Design and Performance Considerations for Using Stimulating Nerve Cuff Electrodes in Motor System Neuroprostheses," CWRU Presidential Research Initiative. January 2001 – December 2002. Co-Investigator with J.A. Davis Jr., M.D. and J. Thomas Mortimer, Ph.D.
46. "Automatic Control of Standing Balance with Functional Electrical Stimulation," R01, National Institutes of Health (NINDS), September 2000 – July 2003. **Principal Investigator.**
47. "Preparatory Adjustments for Improved Standing with FNS," R01, National Institutes of Health (NCHHD), June 2000 – May 2003. Co-Investigator with J. Abbas, University of Kentucky.
48. "Improving Tissue Viability of Paralyzed Muscle with NMES," Spinal Cord Research Foundation/Paralyzed Veterans of America, March 2000 – February 2001, **Principal Investigator.**
49. "Individualizing the Design and Use of a FES-based Standing Neuroprosthesis," Rehabilitation Research and Development Service, US Department of Veterans Affairs, April 2000 – March 2003. Co-Investigator with R. Kirsch.
50. "Implantable FNS Systems for Standing and Transfers," US Food and Drug Administration Office of Orphan Product Development, October 1999 – September 2002. **Principal Investigator.**

51. "Exercise, Standing and Ambulation with Implanted FES Systems," Rehabilitation Research and Development Service, US Department of Veterans Affairs. January 1999 – December 2001. **Principal Investigator.**
52. Paraplegic Walking Made Practical with FNS and Orthoses," R01, National Institutes of Health (NINDS/NCHHD), June 1998 – May 2001. Co-investigator with E.B. Marsolais.
53. "Improving Tissue Viability of Paralyzed Muscle Using Neuromuscular Electrical Stimulation," Spinal Cord Research Foundation/Paralyzed Veterans of America, March 1997 – May 1999, **Principal Investigator.**
54. "Unassisted Standing by Functional Neuromuscular Stimulation," National Institutes of Health, NINDS Neural Prosthesis Program, October 1996 – September 2001. **Principal Investigator.**
55. "Implantable FNS Systems for Standing Transfers," Food and Drug Administration Office of Orphan Product Development, October 1996 – September 1999. **Principal Investigator.**
56. "FES Mobility in Paraplegia: RF Controlled Implanted System," Research and Development Service, Department of Veteran Affairs, April 1995 – March 1998. Co-investigator with E.B. Marsolais
57. "Paraplegic Walking Made Practical with FNS & Orthoses," R01, National Institutes of Health (NINDS/NCHHD), April 1994 – May 1997. Co-Investigator with E.B. Marsolais.
58. "Restoration of Standing Pivot Transfer for Quadriplegic Patients Using a Totally Implanted FNS System," Research and Development Service, US Department of Veterans Affairs, April 1993 – March 1996. **Principal Investigator.**
59. "Development of Grasp and Upper Extremity Control with Functional Neuromuscular Stimulation in Children," Shriners Hospitals, January 1992 – December 1994. **Principal Investigator.**
60. "Functional Neuromuscular Stimulation of the Lower Extremities in Children with Spinal Cord Injuries," Shriners Hospitals, January 1992 – December 1994. **Principal Investigator.**
61. "Application of Artificial Neural Networks to Control FNS-Generated Walking in Children with Spinal Cord Injuries," Shriners Hospitals, January 1992 – December 1994. Co-Investigator with J. Abbas.
62. "Voluntary Postural Responses During FNS-Induced Standing," Shriners Hospitals 1990-1993. Co-Investigator with M. Moynahan.
63. "Development of Grasp and Upper Extremity Control with Functional Neuromuscular Stimulation in Children," Shriners Hospitals 1989-1991. **Principal Investigator.**
64. "Functional Neuromuscular Stimulation of the Lower Extremities in Children with Spinal Cord Injuries," Shriners Hospitals 1989-1991. **Principal Investigator.**
65. "Functional Neuromuscular Stimulation of the Lower Extremities in Children with Spinal Cord Injuries," Shriners Hospitals 1986-1989. Co-investigator with R. Betz.
66. "Myoelectrically Controlled Above-Knee Prosthesis," Veterans Administration, 1984-1986. Co-investigator with G. Moskowitz and H. Hillstrom.
67. "Adaptive Spatial Pattern Recognition and Time Series Signal Analysis Techniques for Myoelectric Control of Lower Limb Prostheses," National Science Foundation 1984-1986. Co-investigator with G. Moskowitz and H. Hillstrom.

PUBLICATIONS:

Peer-Reviewed Papers (Submitted)

1. "Posture Dependent Control of Stimulation in a Standing Neuroprosthesis: A Simulation Feasibility Study," M. Audu, S. Gartman, R. Nataraj, **R. Triolo**, *Journal of Rehabilitation Research and Development* – (submitted September 2013).
2. "Hip flexion power assist system for use in hybrid neuroprostheses," K. Foglyano, R. Kobetic, C. To, T. Bulea, J. Schnellenberger, M. Audu, M. Nandor, R. Quinn, **R. Triolo**, *Applied Bionics and Biomechanics* – (submitted October 2013).
3. "Intrinsic and extrinsic contributions to seated balance in the sagittal and coronal planes: implications for trunk control after spinal cord injury," M.L. Audu, **R. Triolo**, *IEEE Transactions on Biomedical Engineering* – (submitted October 2012).

Peer-Reviewed Papers (Published or Accepted for Publication)

1. "Feasibility of a closed-loop controller for righting seated posture after spinal cord injury," J. Murphy, M. Audu, L. Lombardo, K. Foglyano, **R. Triolo**, *Journal of Rehabilitation Research and Development* – (in press).
2. "Sensor-based hip control for walking in paraplegia with orthosis and FNS," C. To, R. Kobetic, T.C. Bulea, M.L. Audu, **R. Triolo**, *Journal of Rehabilitation Research and Development* – (in press).
3. "Selective activation of the human tibial and common peroneal nerves with a flat interface nerve electrode," M.A. Schiefer, M. Freeberg, G.J.C. Pinault, J. Anderson, H. Hoyen, D.J. Tyler, **R.J. Triolo**, *Journal of Neural Engineering* – (in press).
4. "Stance phase knee flexion improves stimulation driven walking after spinal cord injury," T.C. Bulea, R. Kobetic, M.L. Audu, J.R. Schnellenberger, G. Pinault, **R.J. Triolo**, *Journal of NeuroEngineering and Rehabilitation* - (in press). DOI: 10.1186/1743-0003-10-68, PMID: 23826711, PMCID: PMC3708761
5. "Trunk acceleration for neuroprosthetic control of standing – a pilot study," R. Nataraj, M. Audu, R. Kirsch, **R. Triolo**, *Journal of Applied Biomechanics* – (in press). PMID: 21975251, PMCID: PMC3577928
6. "Effects of trunk stimulation on manual wheelchair propulsion mechanics after spinal cord injury," **R.J. Triolo**, L.M. Lombardo, S. Nogan-Bailey, M. Miller, K. Foglyano, M.L. Audu, *Archives of Physical Medicine & Rehabilitation* 94(10):1997-2005, 2013
DOI:10.1016/j.apmr.2013.04.010, PMID: 23628377.
7. "Optimization of selective stimulation parameters for multi-contact electrodes," L. Fisher, D. Tyler, **R. Triolo**, *Journal of NeuroEngineering and Rehabilitation* 10:25, 2013 - (in press). DOI: 10.1186/1743-0003-10-25, PMID: 23442372, PMCID: PMC3599334
8. "Effects of stimulating hip and trunk muscles on seated stability, posture and reach after spinal cord injury," **R. Triolo**, L. Lombardo, M. Miller, S. Nogan-Bailey, M. Audu, *Archives of Physical Medicine & Rehabilitation* 94(9):1766-75, 2013. DOI: 10.1016/j.apmr.2013.02.023, PMID: 23500182
9. "The effects of combined trunk and gluteal neuromuscular electrical stimulation on posture and tissue health in spinal cord injury," G.A. Wu, L. Lombardo, **R. Triolo**, KM Bogie, *Physical Medicine & Rehabilitation Journal* 5(8): 688-696, 2013. DOI: 10.1016/j.pmrj.2013.03.025, PMID: 23542776

10. "Reflections on 'Bioengineering Evaluation and Field Test of the Stand-Alone Therapeutic Aid'," R. Triolo, *Journal of Rehabilitation Research & Development*, 50(4): xvii, 2013. DOI: 10.1682/JRRD.2013.02.0046
11. "A convertible spinal orthosis for controlled torso rigidity," N. Kern, **R.J. Triolo**, R. Kobetic, M. Audu, R.D. Quinn, *Applied Bionics and Biomechanics*, 10(1):57-73, 2013. DOI 10.3233/ABB-2012-0069
12. "Finite state control of a variable impedance hybrid neuroprosthesis for locomotion after paralysis," T.C. Bulea, R. Kobetic, M.L. Audu, J.R. Schnellenger, **R.J. Triolo**, *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 21(1):141-151, 2013. DOI: 10.1109/TNSRE.2012.2227124, PMID: 23193320
13. "Design and experimental evaluation of a vertical lift walker for sit-to-stand transition assistance," T. Bulea, **R. Triolo**. *ASME Journal of Medical Devices* 6(0145041):1-5, March 2012. PMID: 23904904, PMCID: PMC3707190
14. "A variable impedance knee mechanism for controlled stance flexion during pathological gait," T.C. Bulea, R. Kobetic, C.S. To, M. Audu, J. Schnellenger, **R.J. Triolo**, *IEEE Transactions on Mechatronics* 17(5):822-832, 2012. DOI: 10.1109/TMECH.2011.2131148
15. "Center of mass acceleration feedback control of standing balance by functional neuromuscular stimulation against external postural perturbations," R. Nataraj, M. Audu, **R. Triolo**, *Journal of Rehabilitation Research & Development* 49(6): 889-912, 2012. DOI: 10.1109/TBME.2012.2218601, PMID: 22987499, PMCID: PMC3578290
16. "Sensor-based stance control with orthosis and functional neuromuscular stimulation for walking after spinal cord injury," C. To, R. Kobetic, T.C. Bulea, M.L. Audu, J.R. Schnellenger, G. Pinault, **R.J. Triolo**, *Journal of Prosthetics and Orthotics*, 24(3):124-132, 2012. DOI: 10.1097/JPO.0b013e3182627a13
17. "Comparing joint kinematics and center of mass acceleration for feedback control of standing by functional neuromuscular stimulation," R. Nataraj, M. Audu, **R. Triolo**, *Journal of NeuroEngineering and Rehabilitation*, 9:25, 2012. DOI:10.1186/1743-0003-9-25, PMID: 22559852, PMCID: PMC3484032
18. "An exploratory study of perceived quality of life with implanted standing neuroprostheses," L. Rohde, B. Bonder, **R. Triolo**. *Journal of Rehabilitation Research & Development* 49(2):265-278, 2012. PMID: 22773528
19. "Longitudinal performance of a surgically implanted neuroprosthesis for lower extremity exercise, standing, and transfers after spinal cord injury," **R.J. Triolo**, S.N. Bailey, M.E. Miller, L. Rohde, J. Anderson, J.A. Davis, J.J. Abbas, L.A. Diponio, G.P. Forrest, D.R. Gater, L.J. Yang, *Archives of Physical Medicine and Rehabilitation*. 93(5):896-904, 2012. DOI: 10.1016/j.apmr.2012.01.001, PMID: 22541312
20. "Center of mass acceleration feedback control for standing by functional neuromuscular stimulation – a simulation study," R. Nataraj, M. Audu, R. Kirsch, **R. Triolo**, *Journal of Rehabilitation Research & Development* 49(2): 279-296, 2012. PMID: 22773529, PMCID: PMC3586940
21. "Human distal sciatic nerve fascicular anatomy: implications for ankle control utilizing nerve cuff electrodes," K. Gustafson, Y. Grinberg, S. Joseph, **R. Triolo**. *Journal of Rehabilitation Research & Development*. 49(2):309-322, 2012. PMID: 22773531
22. "Probabilistic modeling of selective stimulation of the human sciatic nerve with a flat interface nerve electrode," M. Schiefer, **R. Triolo**, D. Tyler, *Journal of Computational*

- Neuroscience*33(1): 179-190, 2012 DOI: 10.1007/s10827-011-0381-5, PMID: 22222951, PMCID: PMC3357453
23. “An objective method for selecting command sources for myoelectrically controlled lower extremity neuroprostheses,” A. Dutta, R. Kobetic, **R. Triolo**, *Journal of Rehabilitation Research and Development*. 48(8): 935-948, 2011. PMID: 22068372
 24. “Stance control knee mechanism for lower extremity support in a hybrid neuroprosthesis,” C.S. To, R. Kobetic, T. Bulea, M. Audu, J. Schnellenger, Pinault G, **R.J. Triolo**, *Journal of Rehabilitation Research and Development*. 48(7):839-850, 2011. PMID: 21938668
 25. “Posture shifting after spinal cord injury using functional neuromuscular stimulation – a computer simulation study,” M. Audu, R. Nataraj, S. Gartman, **R. Triolo**. *Journal of Biomechanics*. 44: 1639-1645, 2011. DOI: 10.1016/j.jbiomech.2010.12.020, PMID: 21536290, PMCID: PMC3617559
 26. “Comprehensive joint-feedback control for standing by functional neuromuscular stimulation – a simulation study,” R. Nataraj, M. Audu, R. Kirsch, **R. Triolo**. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 18(6): 646-657, 2010. DOI: 10.1109/TNSRE.2010.2083693, PMID: 20923741, PMCID: PMC3570823
 27. “Gait evaluation of a novel hip constraint orthosis with implication for walking in paraplegia,” M.L. Audu, C. To, R. Kobetic, **R. Triolo**. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 18(6): 610-618, 2010. DOI: 10.1109/TNSRE.2010.2047594, PMID: 20378478
 28. “Neuroprosthetic and neurotherapeutic effects of implanted electrical stimulation for ambulation after incomplete spinal cord injury.” S.N. Bailey, E. Hardin, R. Kobetic, L. Boggs, G. Pinault, **R. Triolo**, *Journal of Rehabilitation Research & Development*47(1): 7-16, 2010. DOI:10.1682/JRRD.2009.03.0034
 29. “Selective stimulation of the common human femoral nerve with a flat interface nerve electrode,” M.A. Schiefer, K.H. Polasek, **R.J. Triolo**, G.C. Pinault, and D.J. Tyler, *Journal of Neural Engineering*, 7(2010): 1-9; 026006, 2010. DOI: 10.1088/1741-2560/7/2/026006, PMID: 20208125, PMCID: PMC2915830
 30. “Intraoperative evaluation of the spiral nerve cuff electrode on the femoral nerve trunk.” K.H. Polasek, M.A. Schiefer, G.C.J. Pinault, **R.J. Triolo**, D.J. Tyler, *Journal of Neural Engineering*6 (2009) 066005 (6pp). DOI: 10.1088/1741-2560/6/6/066005, PMID: 19901448, PMCID: PMC2927973
 31. “Fascicular anatomy of the human femoral nerve: implications for standing neural prostheses utilizing nerve cuff electrodes,” Gustafson KJ, Pinault GCJ, Neville J, Syed I, Davis JA, Jean-Claude J, **Triolo RJ**. *Journal of Rehabilitation Research & Development*, 46(7):973-984, 2009. PMID: 20104420, PMCID: PMC2967182
 32. “A musculoskeletal model of the trunk and hips for the development of a seated posture-control neuroprosthesis,” J. Lambrecht, M. Audu, **R. Triolo**, R. Kirsch, *Journal of Rehabilitation Research & Development* 46(4): 5:15-528, 2009. PMID: 19882486, PMCID: PMC3594999
 33. “Biomechanical analysis of surface electrical stimulation on the trunk musculature during wheelchair propulsion,” Y. Yang, A. Koontz, **R. Triolo**, J. Mercer, S. Fitzgerald, R. Cooper, M. Boninger, *Neurorehabilitation and Neural Repair*23(7):717-25, 2009. (Epub 2009 Mar 4). DOI: 10.1177/1545968308331145, PMID: 19261768
 34. “Development of a hybrid orthosis for standing, walking and stair climbing after spinal cord injury,” R. Kobetic, C. To, J. Schnellenger, M. Audu, T. Bulea, R. Gaudio, S. Tashman,

- R.J. Triolo**, *Journal of Rehabilitation Research & Development* 46(3):447-462, 2009. PMID: 19675995
35. "Chronic stability and selectivity of four-contact spiral nerve-cuff electrodes in stimulating the human femoral nerve," L.E. Fisher, D.J. Tyler, J.S. Anderson, **R.J. Triolo**, *Journal of Neural Engineering* 6(2009) 046010. DOI: 10.1088/1741-2560/6/4/046010, PMID: 19602729, PMCID: PMC2928075
 36. "Implanted electrical stimulation of the trunk for seated postural stability and functional mobility after cervical SCI: A single case study," **R.J. Triolo**, L. Boggs, M. Miller, J. Nagy, G. Nemanitis, S. Nogan-Bailey, *Archives of Physical Medicine & Rehabilitation* 90(2): 340-347, 2009. DOI: 10.1016/j.apmr.2008.07.029, PMID: 19236990, PMCID: PMC2648134
 37. "Gait initiation with electromyographically triggered electrical stimulation in people with partial paralysis," A. Dutta, R. Kobetic, **R. Triolo**, *ASME Journal of Biomechanical Engineering* 131(8); 081002: 1 – 9, 2009. DOI: 10.1115/1.3086356, PMID: 19604014
 38. "A locking compliant device inspired by the anatomy of the spine," N.I. Kern, T.J. Majewski, R. Kobetic, **R.J. Triolo**, R.D. Quinn, *ASME Journal of Mechanical Design* 131(1): 14501-1 – 3, 2009. DOI: 10.1115/1.2991143
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PROFESSIONAL ACTIVITIES:

- Reviewer, Joint Warfighters Program, US Department of Defense, 2013.
- External IRB Reviewer, NIH Rehabilitation Medicine Department Scientific (RMD), 2013
- Reviewer, *Neuromodulation*, 2013.
- Reviewer, International Conference on Rehabilitation Robotics (ICORR), 2013.

- Reviewer, Career Development Award Panel, VA Rehabilitation Research & Development Service, February 2013.
- Grant Reviewer, Spinal Cord Injury Merit Review Panel, VA Rehabilitation Research & Development Service, August 2011, March 2012.
- Co-Chair, Neuromuscular Stimulation Session, IEEE Engineering in Medicine & Biology Conference (EMBC), Boston MA, August 30 – September 3, 2011.
- Reviewer, *Journal of NeuroEngineering and Rehabilitation*, 2011.
- External Reviewer, Promotion & Tenure Committee, University of Pittsburgh (Department of Rehabilitation Science and Technology, School of Health and Rehabilitation Sciences), 2011.
- Reviewer, *Disability and Rehabilitation: Assistive Technology*, 2010.
- Reviewer, National Institute for General Medical Sciences (NIGMS) for Support of Competitive Research (SCORE) program study section ZGM1 MBRS-0 (NP), July 2010.
- Reviewer, National Institutes of Health study section 2ZRG1 MOSS-F, March 2010.
- Reviewer, *American Journal of Physical Medicine and Rehabilitation*, 2008.
- External reviewer – Committee on Promotions & Tenure, University of Pittsburgh, Pittsburgh PA, 2008.
- Panelist and Reviewer, NSF RAPID (Research to Aid Persons with Disabilities) CAREER Program, National Science Foundation Alexandria, VA - October 3-4, 2007.
- External reviewer – Committee on Promotions & Tenure, Iowa State University, Ames IA, 2007.
- Participant, National Academies Keck Futures Initiative Conference: Smart Prosthetics: Exploring Assistive Devices for the Body and Mind, Irvine CA, November 9-11, 2006.
- Co-Chair, Rehabilitation Technology Session, American Spinal Injury Association (ASIA) annual meeting, Boston MA - June 27, 2006.
- External reviewer – Committee on Promotions & Tenure, Worcester Polytechnic Institute, Worcester MA. – 2006.
- External reviewer - Department of Biomedical Engineering University of Alberta, Edmonton Canada, “Control Strategies and FES Paradigms for Restoring Standing and Stepping after SCI.” – Ph.D. Proposal, 2006.
- Reviewer, *Gait and Posture*, 2006
- Reviewer, *Archives of Physical Medicine & Rehabilitation*, 2006.
- Organizing Committee: XXth Congress of the International Society of Biomechanics (ISB) & 20th American Society of Biomechanics (ASB) , Cleveland OH - August 2005.
- Chair, Functional Electrical Stimulation platform session, XXth Congress of the International Society of Biomechanics, Cleveland OH – August 2005.
- Organizing Committee, 7th Symposium on Footwear Biomechanics (Technical Interest Group of the International Society of Biomechanics), Cleveland OH, August 2005.
- Reviewer, International Conference on Robotics and Automation, Barcelona Spain, 2005.
- Recipient, 2004 Maurice Saltzman Award for Clinical Excellence (with the Cleveland FES Center), Mt. Sinai Foundation.
- Function, Integration and Rehabilitation Science Subcommittee, Division of Scientific Review, National Institute of Child Health and Human Development, National Institutes of Health, 2004.

- External Reviewer, Motor Accidents Authority of New South Wales, Australia (Injury Management Project Grants), 2004.
- Chair, Stimulation Technology Session, International FES Society Annual Scientific Meeting, 2004.
- Reviewer, *IEEE Transactions on Robotics and Automation*, 2002.
- Board of Directors, International FES Society (IFESS) 2002-2005.
- Reviewer, *Neuromodulation*, 2002.
- Grant Reviewer/Consultant, Whitaker Foundation, 2002.
- Conference Chair, IFESS 2001: 6th Annual Scientific Meeting of the International Functional Electrical Stimulation Society, Cleveland Ohio, 2001.
- Guest Editor, *Journal of Rehabilitation Research & Development* special issue on Functional Electrical Stimulation, Winter 2001.
- Guest Editor, *Neuromodulation* special issue on Functional Electrical Stimulation, Fall 2001
- Reviewer, *Neurorehabilitation and Neural Repair*, December 2000.
- Guest Editor, *Assistive Technology* special issue on Functional Electrical Stimulation, Spring, 2000.
- Editorial Board, *Journal of Rehabilitation Research and Development*, 1999 - present
- Associate Editor, *IEEE Transactions on Rehabilitation Engineering*, 1999 - present
- Special Scientific Grant Reviewer, Spinal Cord Research Foundation/Paralyzed Veterans of America, 1999-2000.
- External Reviewer, Louisiana Board of Regents Health Excellence Fund (HEF) program, 2000
- Chair, Functional Electrical Stimulation Special Interest Group, Rehabilitation Engineering Society of North America (RESNA), 1999-00.
- Chair, Functional Electrical Stimulation Scientific Session, Rehabilitation Engineering Society of North America (RESNA), Annual Meeting, June 1999.
- Chair, Functional Electrical Stimulation Special Interest Group, Rehabilitation Engineering Society of North America (RESNA), 1998-99.
- Session Chair, Physiologic Motor Systems (Rehabilitation Engineering Track), Biomedical Engineering Society Meeting, Cleveland OH, October 12, 1998.
- CWRU representative and exhibitor, Bioengineering Conference (BECON), National Institutes of Health, February 1998.
- Proposal Reviewer, *Spinal Cord Research Foundation*, 1998.
- Co-chair, Functional Electrical Stimulation Special Interest Group, Rehabilitation Engineering Society of North America (RESNA), 1997-98.
- Ad hoc reviewer, *Proceedings, Rehabilitation Engineering Society of North America*, 1996
- Organizing Committee, First Conference of the International FES Society. Cleveland OH, 1995-96.
- Organizing Committee, NIH Conference on Gait Analysis and Rehabilitation Medicine. Baltimore MD, 1995-96.
- Proposal Reviewer, *Ministry of Science and Technology, Republic of Slovenia*. 1995.
- Reviewer, *Medical and Biological Engineering & Computing*, 1995
- Editorial Board, *Journal of Electromyography and Kinesiology*, 1994 - present

- Program Organizing Committee, IEEE Engineering in Medicine and Biology Conference, Baltimore, MD. October 1994. Session Chair: Neuromuscular Systems and Fatigue.
- Program Organizing Committee, Engineering Foundation Conference - Neural Prostheses: Motor Systems IV. Deer Creek, OH. July 1994. Session Chair: Clinical Applications - Upper Extremity.
- Program Organizing Committee, IEEE Engineering in Medicine and Biology Conference, San Diego, CA. October, 1993. Session Chair: Functional Electrical Stimulation.
- Special Faculty, Shriners Workshop on Human Motion Analysis, San Diego, CA. October, 1993. Lecturer: “Standing and Walking with Functional Neuromuscular Stimulation: Technical and Clinical Challenges.”
- National Science Foundation (NSF) Study Section, Biological and Engineering Systems. June 1993.
- Assistant Editor, *IEEE Transactions on Rehabilitation Engineering*, 1993 – 1999
- Proposal Reviewer, *National Science Foundation*, 1991
- Reviewer, *IEEE Transactions on Biomedical Engineering*, 1990 - present
- Program Organizing Committee, IEEE Engineering in Medicine and Biology Conference, Philadelphia, PA, October, 1990. Session Chair: EMG.
- Special Faculty, Combined Sections of the American Physical Therapy Association Annual Meeting, Philadelphia, PA October, 1990. Lecturer: “Upper and Lower Extremity Applications of Functional Neuromuscular Stimulation.”
- Reviewer, *CRC Press, Inc.*, 1986.

SERVICE ACTIVITIES:

- IEEE EMBS Technical Committee on Clinical Engineering, May 2012 – present
- Program/Steering Committee, NSF Workshop on Medical Device Innovation and Cyber-Physical Systems, Boston MA, November 2012.
- At-Large Representative, Faculty Council, CWRU School of Medicine, January 2011 – June 2013.
- Member, Field Research Advisory Committee (FRAC), VA Research & Development, US Department of Veterans Affairs, 2010-2013.
- Scientific Advisory Board, Pittsburgh Wheelchair and Associated Rehabilitation Engineering (WARE) Center of Excellence, Rehabilitation R&D Service, US Department of Veterans Affairs. 2008- present.
- Steering Committee, Integrated Engineering and Rehabilitation Training, National Institutes of Health – NIBIB T32 (R. Kirsch, Director), July 2009 – June 2014.
- Member, Professional Standards Board (for benchmarking Hybrid Title 38 Occupations (Biomedical Engineering) within the VA system. Agent for the Under Secretary for Health.
- Executive Committee, NIDRR SCI Model System Center at MetroHealth Medical Center October 2006 – September 2011
- Case Medical School Appointment, Promotion & Tenure Committee - MetroHealth System 2006 – 2009.

- Chair, Amputation, Prosthetics & Rehabilitation Engineering Review Panel, US Department of Veterans Affairs Rehabilitation R&D Service, February 2006.
- Steering Committee, Training Program in Musculoskeletal Research, National Institutes of Health - NIAMS T32 (E. Greenfield Ph.D. - Director), July 2006 – June 2011.
- Working Group, Clinical Translational Science Award (CTSA), National Institutes of Health (R. Ruddick M.D. and R. Horowitz M.D. - Directors), December 2005 – June 2006.
- Chair, Biomedical Engineering & Prosthetics Review Panel, US Department of Veterans Affairs Rehabilitation R&D Service, 2005.
- Dean's Search Committee for Assistant Chief of Staff for Research (ACOS-R), Louis Stokes Cleveland Department of Veterans Affairs Medical Center, 2005.
- Steering Committee, Neuromusculo-Skeletal Training Grant. CWRU Department of Orthopaedics. 2005.
- Member, White House/VA Commission on Emerging Technologies in Support of the New Freedom Initiative. October, 2004.
- Chair, Rehabilitation Engineering & Prosthetics Review Panel, US Department of Veterans Affairs Rehabilitation R&D Service, 2004.
- Member, Research Committee, CWRU Department of Physical Medicine & Rehabilitation. April 2003 – present
- Judge, St. Ann Grade School Science Fair (2003)
- Judge, Craftsman/NSTA Young Inventors Awards, Cleveland Municipal School District Instructional Technology, Science and Mathematics Education Office (2002, 2003).
- Board of Directors, "RePlay for Kids" (a nonprofit organization for the repair of therapeutic toys and assistive technologies for children with disabilities), May 2001 – present.
- Dean's Committee Representative, Research & Development Committee, Cleveland VA Medical Center, 1998-2003.
- Member, Executive Committee, Cleveland VA Center of Excellence in FES. 1998-present
- Member, Research Committee, CWRU Department of Orthopaedics. June 1995 - present.
- Organizing Committee, CWRU Orthopaedics Research Day, June 22-23, 2001.
- CWRU Biomedical Engineering Research Day and Open House – Student Scientific Paper Judge, February 2001.
- Professional Advisory Committee, Matching Persons with Technology (MPT) Training and Evaluation Program (R43 HD38220-01A1 to The Institute for Matching Person & Technology, Inc.), October – December 2000.
- Organizing Committee, CWRU Orthopaedics Research Day, January 28-29, 2000.
- Interviewer, CWRU Biomedical Engineering Open House (screening prospective graduate students). February 1999.
- Member, Research Advisory Committee, Department of Physical Medicine and Rehabilitation, MetroHealth Medical Center. November 1997 – 1999.
- Member and coordinator, Institutional Review Board (IRB) Health Hill Hospital for Children, 1995 – 1999.
- Member, Community Advisory Board, FES Resource Guide, Cleveland FES Center. 1994-1995.

- Faculty Advisor, Case Engineering Service Group (student rehabilitation engineering organization). 1996.

EDUCATIONAL ACTIVITIES:

University Courses

- **EBME 318/319:** *Biomedical Engineering Laboratory*, Fall 2013.
Conceived, organized and conducted a laboratory experience for 10 undergraduate students on the *biomechanics of manual wheelchair propulsion* and the effects of stroke cadence and wheel resistance on activity of the shoulder muscles.
- **IBMS 500:** *On Being a Professional Scientist*, Spring 2013
Facilitated small discussion groups on topics ranging from the human subject research, data safety, privacy, informed consent and protecting personal health information to the role of the scientist in the community including social media, communications and the political process (CWRU Department of Bioethics).
- **CWRU School of Law:** *Patent Prosecution 263*, Spring 2013.
Presented lectures on the need, underlying concept and operation of new rehabilitation aids. Guided discussions on their unique features in relation to conventional alternatives and the implications for intellectual property protection.
- **EBME 318/319:** *Biomedical Engineering Laboratory*, Spring 2011.
Conceived, organized and conducted a laboratory experience for 10 undergraduate students on the *biomechanics of manual wheelchair propulsion* and the effects of trunk stabilization on shoulder torque and mechanical efficiency.
- **EBME 440:** *Translational Research for the Biomedical Engineer*, Spring 2010.
Lectured on process for organizing and conducting clinical trials of neuroprosthetic technology.
- **EBME 105:** *Introduction to Biomedical Engineering*, Fall, 2008-2009.
Lectured on design considerations for neuroprostheses for standing and walking after paralysis to approximately 50 first year undergraduates. Reviewed fundamentals of excitation-contraction coupling and skeletal muscle biomechanics as they relate to the restoration of motor function via electrical activation of the peripheral nerves and provided a historical review of the work in the field before summarizing current research activities to restore standing balance, design and verify new neural interfaces, and facilitate ambulation and seated stability (Dr. Gerald Sidel, course coordinator).
- **Surgical Anatomy 515:** *Advanced Musculoskeletal Anatomy*, Fall 2006-2010.
Constructed and presented framing lecture on biomechanics of locomotion and human bipedal gait as core course faculty for this elective for 10 fourth year medical students, first year residents and students in the Advanced Masters in Applied Anatomy program in the Case Department of Anatomy. Organized and conducted laboratory experiences in kinematic and kinetic data capture and analysis of normal and pathological walking. (Dr. Shana Miskovsky, course coordinator)
- **CWRU USNA 239:** *The Musculoskeletal Machine*, Spring 2008.
Lectured on the biomechanical principles underlying the operation of neuroprostheses for standing, stepping and seated posture. Reviewed clinical manifestations of spinal cord injury, excitation of peripheral nerves, myoelectric control, mechanisms to regulate balance, gait and movement analysis and orthotic design. (Drs. Joe Mansour and Dwight Davy, course coordinators)

- **CWRU EBME 307:***Advanced Biomechanical Prosthetic Systems*, Spring 2002 - 2008. Lectured on human gait analysis, biomechanics of bipedal walking, and principles of lower extremity neuroprostheses. Organized and conducted two hands-on data collection and analysis experiences with VICON 700 motion capture system for assessing the effects of *velocity* on kinematics and kinetics of gait. (Dr. Robert Kirsch, course coordinator)
- **CWRU EBME 318:***Biomedical Engineering Laboratory*, Fall 2007. Conceived, organized and conducted a laboratory experience for 15 undergraduate students on the *biomechanical effects of prophylactic knee bracing* and risk factors that could predispose a brace wearer to injuries of the ankle syndesmotom ligament.
- **CWRU EBME 313:***Biomedical Engineering Laboratory*, Fall 2004. Conceived, organized and conducted laboratory experience for 12 undergraduate students on *myoelectric signal processing* for the control of assistive devices. Included signal acquisition, analog and digital filtering and relationship between processed EMG and developed joint torque. Special attention was paid to the effects of stimulus artifact and amplifier blanking on signal-to-noise ratio.
- **CWRU EBME 314:***Biomedical Engineering Laboratory*, Spring 2004. Conceived, organized and conducted laboratory experience for 12 undergraduate students on *substitute sensory feedback* of center of pressure on standing balance. Involved LabView acquisition of COP data and modulation of amplitude, frequency and symmetry of an audio tone while standing with eyes open or closed. Students were introduced to just-noticeable-differences, and posturography in terms of COP path length, area and velocity metrics.
- **CWRU EBME 507:** *Motor Systems Neuroprostheses*, Spring 2003-2008. Organized and taught series of lectures on lower extremity FES systems, bracing and gait analysis for graduate level course. (Dr. Robert Kirsch, course coordinator)
- **CWRU EBME 314:***Biomedical Engineering Laboratory*, Spring 2003. Conceived, organized and conducted laboratory experience for 15 undergraduate students on the *ergonomics of the seated operator* and coupling between hip and trunk motion during forward reaching in the sagittal plane. Involved kinematic data and EMG signal analysis. Participated in a second laboratory section this semester with Dr. Musa Audu dealing with standing posture and balance.
- **CWRU EBME 313:***Biomedical Engineering Laboratory*, Fall 2001. Conceived, organized and conducted 3 day laboratory experience for 15 students on the *effects of foot placement on balance* using force platform (COP) and EMG signal analysis.
- **CWRU EBME 307:***Advanced Biomechanical Prosthetic Systems*, Spring 2000-2001. Lectured on human gait analysis, biomechanics of bipedal walking, and principles of lower extremity neuroprostheses. Introduced concepts of kinematic and kinetic measurements. Organized and conducted hands-on data collection and analysis experiences with VICON 700 motion capture system for measuring *seated work volumes*. (Dr. Robert Kirsch, course coordinator)
- **CWRU REHAB 5001:***Intro to Rehab Medicine*, Fall & Spring 1997-1999, 2001. Conducted lecture and interactive demonstrations regarding rehabilitative and functional applications of electrical stimulation after spinal cord injury and stroke for exercise, standing and ambulation. (Dr. John Chae, course coordinator)

- **CWRU EBME 313:***Biomedical Engineering Laboratory*, Fall 2000.
Conceived, organized and conducted 3 day laboratory experience for 12 students on the effects of *lumbar spine mobility* on seated workspace in three dimensions using quantitative motion capture instrumentation.
- **CWRU EBME 314:***Biomedical Engineering Laboratory*, Spring 2000.
Organized, conducted and graded an undergraduate laboratory on the biomechanics of the lower extremities, specifically the measurement of *passive joint properties* and the effects of biarticular muscles.
- **CWRU EBME 105:** *Special Topic Report in Biomedical Engineering*, Fall 1999.
Advised undergraduate students preparing research papers on neuroprostheses and applications of functional neuromuscular stimulation. (Dr. P. Hunter Peckham, course coordinator)
- **CWRU EBME 507:** *Motor Systems Neuroprostheses*, Spring 1996 - 1999.
Organized and taught series of lectures on lower extremity FES systems, bracing and gait analysis for graduate level course. (Dr. Patrick Crago, course coordinator)
- **CWRU EBME 313:** *Biomedical Engineering Laboratory*, Fall 1998.
Organized, conducted and graded undergraduate laboratory dealing with *posturography* and biomechanics of human standing and balance.
- **CWRU EBME 313:***Biomedical Engineering Laboratory*, Fall 1997.
Organized, instructed and moderated undergraduate laboratory on computer-aided modeling and *biomechanical simulations* for surgical decision making.
- **CWRU EBME 307:** *Biomechanical Prosthetic Systems*, Spring 1995-1998.
Developed and conducted new Senior-level undergraduate course of study in motor prosthesis design. Capstone course in undergraduate curriculum. Reviewed principles of assistive technology, clinical aspects of spinal cord injury and stroke, outcome assessment, regulatory procedures and related design criteria for devices to assist upper and lower extremity function. (Dr. P. Hunter Peckham, course coordinator)
- **CWRU EBME 313:***Biomedical Engineering Laboratory*, Fall 1995.
Organized, instructed and moderated undergraduate laboratory on *contractile properties* of stimulated muscle.

Primary Research Advisor: Current Students or Projects in Progress

- K. Tepe (M.S.), Department of Biomedical Engineering, CWRU (APT)
- M. Freeberg (M.D./Ph.D.), Department of Biomedical Engineering, CWRU (APT)
- S. Chang (Ph.D.), Department of Biomedical Engineering, CWRU (APT)
- J. Murphy (Ph.D.), Department of Biomedical Engineering, CWRU (APT)

Primary Research Advisor: Completed Doctoral Dissertations

- T. Bulea (Ph.D.), “A Variable Impedance Knee Mechanism for Improvement of FNS-Driven Gait,” Department of Biomedical Engineering, CWRU, 2012
- L. Fisher (Ph.D.), “Improving Neuroprosthesis-Assisted Standing with Nerve-Based Stimulating Electrodes,” Department of Biomedical Engineering, CWRU, 2012.
- R. Nataraj (Ph.D.), “Feedback Control of Standing Balance using Functional Neuromuscular Stimulation Following Spinal Cord Injury” Department of Biomedical Engineering, CWRU, 2011.

- C. To, “Closed-Loop Control And Variable Constraint Mechanisms of a Hybrid Neuroprosthesis to Restore Gait After Spinal Cord Injury” Department of Biomedical Engineering, CWRU, 2010.
- A. Dutta (Ph.D.), “Development of an Electromyogram-Based Controller for Functional Electrical Stimulation-Assisted Walking after Partial Paralysis” Department of Biomedical Engineering, CWRU, 2009.
- M. Schiefer, “Optimized Design of Neural Interfaces for Femoral Nerve Clinical Neuroprostheses: Anatomically-Based Modeling and Intraoperative Evaluation” Department of Biomedical Engineering, CWRU, 2009 (Co-advisor with D. Tyler).
- K. Amankwah, “The Impact of Lower Extremity Passive Joint Properties on Standing Function” Department of Biomedical Engineering, CWRU, 2004
VA Rehabilitation R&D Pre-Doctoral Fellowship, 2003

Primary Research Advisor: Completed Master’s Thesis Projects

- V. Everding (M.S.), “Stability Analysis of Human Walking,” Department of Biomedical Engineering, CWRU 2009.
- L. Fisher (M.S.) “Evaluating Methods to Determine Selectivity of Implanted Neural Interfaces,” Department of Biomedical Engineering, CWRU 2008
- T. Bulea (M.S.), “Design of a Permanent Magnet MR Fluid Controllable Knee Locking Orthosis,” Department of Biomedical Engineering, CWRU, 2007.
- S. Gartman (M.S.), “Selection of an Optimal Muscle Set for a 16-Channel Standing Functional Neuromuscular Stimulation System,” Department of Biomedical Engineering, CWRU, 2007.
- J. Zakrajsek (M.S.), “Development and Feasibility of Error Distribution Map for Center of Mass Controller for Automatic Control of Standing Balance with FNS,” Department of Biomedical Engineering, CWRU, 2004.
- D. Goldstein (M.S.), “Sensory Feedback for Balance in Standing Subjects,” Department of Biomedical Engineering, CWRU, 2004.
- C. To, “A Three-Dimensional Computer Model of the Hybrid Orthosis System”, Department of Biomedical Engineering, CWRU, 2004.
- B. Heilman, “Selection of an Optimal Muscle Set for a Standing Neuroprosthesis”, Department of Biomedical Engineering, CWRU, 2003
- S. Kukke, “The Effects of Trunk Stimulation on Seated Workspace.” Master’s Thesis, Department of Biomedical Engineering, CWRU, 2002.
- J. Uhler, “Selective Electrical Stimulation of the Quadriceps to Improve Standing Function in Paraplegia.” Master’s Thesis, Department of Biomedical Engineering, CWRU, 1998. *Honorable Mention, 1997 Whitaker Student Paper Competition*
- M. Wibowo, “Selection and Activation of Hip Extensor Muscles for Standing with FNS.” Master’s Thesis, Department of Biomedical Engineering, CWRU, 1998. *Winner, 1998 Whitaker Student Paper Competition*
- K. Werner, “Modeling the Postural Disturbances Caused by Upper Extremity Movements.” Master’s Thesis, Department of Biomedical Engineering, CWRU, 1998. *Winner, 1998 Whitaker Student Paper Competition*

- M. Walker, “The Effects of Intramuscular Electrical Stimulation Treatment on Shoulder Subluxation, Pain, Motor Function, and Self-Care Skills in Chronic Hemiplegia.” Master’s Thesis, Department of Biomedical Engineering, CWRU, 1998.
- D. Wormser, G. Eisenhower & T. Stabinski. “Inter-rater Reliability of the Functional Standing Test.” Master’s Thesis, Department of Physical Therapy, Beaver College, Glenside, PA 1993.
- T. Houdayer. “Prolonged Standing for Children with Paraplegia by Means of Hybrid Orthosis: A Case Study.” Master’s Thesis, Biomedical Engineering & Science Institute, Drexel University, Philadelphia, PA, 1993.
- B. Dodge & S. Sheehan. “The Functional Reach Test: Its Reliability and Utility with a Young Population.” Master’s Thesis, Department of Physical Therapy, Beaver College, Glenside, PA 1992.
- N. Barnett & H. Lamite. “A Comparison of Energy Expenditure Between FNS Supported Standing and KAFO Supported Standing with Paraplegic Patients.” Master’s Thesis, Department of Physical Therapy, Beaver College, Glenside, PA 1991.
- B. Billau. “Development and Standardization of an Evaluation for Function in Standing.” Master’s Thesis, Biomedical Engineering & Science Institute, Drexel University, Philadelphia, PA, 1990
- S. Albright & M. Pettit. “The Effect of Electrical Stimulation on Upper Extremity ROM and Function in Children with Spastic CP.” Master’s Thesis, Department of Physical Therapy, Beaver College, Glenside, PA 1989.

Student Examining Committees

- K. White, Master’s Degree, Department of Biomedical Engineering, CWRU, 2012 (anticipated).
- N. Kern, Doctoral Degree, Department of Mechanical and Aerospace Engineering, CWRU, 2012.
- M. Nandor, Doctoral Degree, Department of Mechanical and Aerospace Engineering, CWRU, 2012.
- B. Wodlinger, Doctoral Degree, Department of Biomedical Engineering, CWRU, 2010
- A. Polinkovsky, Master’s Degree, Department of Mechanical and Aerospace Engineering, CWRU, 2010
- B. Farnsworth, Master’s Degree, Department of Electrical Engineering and Computer Science, CWRU, 2008
- L. Guevremont, Doctoral Degree, Department of Medical Science and Biomedical Engineering, University of Alberta, 2007
- T.J. Majewski, Master’s Degree, Department of Mechanical and Aerospace Engineering, CWRU, 2007
- J. Lambrecht, Master’s Degree, Department of Biomedical Engineering, CWRU, 2006.
- Y. Yang, Doctoral Degree, Department of Rehabilitation Science, University of Pittsburgh, 2005.
- M. Pierre, Doctoral Degree, Department of Biomedical Engineering, CWRU, 2005
- O. Papuga, Master’s Degree, Department of Biomedical Engineering, CWRU, 2004.
- P. Yoo, Doctoral Degree, Department of Biomedical Engineering, CWRU, 2004.

- P. Spooner, Doctoral Degree, Department of Electrical and Electronic Engineering, University of Melbourne, Melbourne Australia, 2001.
- E. Hartman, Master's Degree, Department of Biomedical Engineering, University of Kentucky, Lexington KY, 2000.
- M. Tarler. Doctoral Degree, Department of Biomedical Engineering, CWRU, 1999
- S. Chang. Doctoral Degree, Department of Systems & Industrial Engineering, CWRU, 1997.
- J. Abbas. Master's Degree, Department of Biomedical Engineering, CWRU, 1990.

Post-Doctoral Fellows & Mentoring Activities

- Nathan Makowski, Ph.D. – 9/13 – present
- Dennis Barbeau, Ph.D. – 10/13 – present
Winner, VA Career Development Award Level 1
- Matthew Schiefer, Ph.D. – 5/09 – present
Winner, Musculoskeletal Training Grant Post-Doctoral Fellowship
Winner, VA Career Development Award Level 1
- Stephen Selkirk, M.D./Ph.D. – 8/10 – 7/13
Winner, VA Career Development Award Level 2
- Katharine Polasek, Ph.D. – 4/08 – 7/10
Winner, VA Career Development Award Level 1
- Joseph Potkay, Ph.D. – 1/06 - present.
Winner, VA Career Development Award Level 1
- Jeffrey Capadona, Ph.D. - 7/05 – 2010
Winner, VA Career Development Award Levels I & II
- Elizabeth Hardin, Ph.D - 7/04-present
Winner, VA Career Development Award Levels I & II
- A. Winkenfeld, CWRU School of Medicine, 9/00 – 2005
Winner, Crile Summer Research Fellowship;
NIH Post-Doctoral Fellowship (F32) Awardee (2002-2003)
- M. Audu, Ph.D. (2000-2001)
- N. Lan, Ph.D. (1999)
- K. Bogie, D.Phil. (1996-1999)
- W. Zhao, Ph.D. (1996-1999)
- J. Abbas, Ph.D. (1992-93)
- M. Moynahan, M.S. - pre-doctoral fellowship (1990-93)
- R. Barnett, Ph.D. (1989-90)
- G. Phillips, Ph.D. (1989)

Senior Projects Advised

- J. Alabek (B.S.), Department of Biomedical Engineering, CWRU 1/06-5/06
- Y. Martynyuk (B.S.), Department of Biomedical Engineering, CWRU 1/06-5/06
- C. Pulliam (B.S.), Department of Biomedical Engineering, CWRU 1/05-6/06.
- D. Yungher (B.S.), Department of Biomedical Engineering, CWRU 6/04-5/05.
- E. Wilson (B.S.), Department of Biomedical Engineering, CWRU 5/03-5/04

- M. Finlay (B.S.), Department of Mechanical and Aerospace Engineering, CWRU 1/02-5/02 “A Flexible Locking Thoracic-Lumbar-Sacral Orthosis (TLSO).”
- M. Liu (B.S.), Department of Biomedical Engineering, CWRU 9/97-12/97 “Selectivity of Intramuscular Stimulating Electrodes in the Lower Extremities.”
- J. Moss (B.S.), Department of Biomedical Engineering, CWRU 6/96-12/96 “A Reusable, Self-adhesive Electrode for Intraoperative Muscle Stimulation in the Lower Extremity” *Winner, 1997 Paralyzed Veterans of America Student Design Competition.*
- K. Haycock (B.S.), Department of Biomedical Engineering, CWRU 9/96-12/96

Undergraduate Research Projects

- J. Gregor, Department of Biomedical Engineering, CWRU, 9/13 – present.
- A. Crawford, Department of Biomedical Engineering, CWRU, 9/13 – present.
- N. Michaels, Dept of Mechanical & Aerospace Engineering, CWRU, 9/13 - present
- A. Basu, Department of Biomedical Engineering, CWRU, 5/13-9/13.
- F. McPherson, Department of Biomedical Engineering, CWRU, 9/11–5/13
- A. Cephess, Department of Biomedical Engineering, CWRU, 5/12-9/12
- A. Raghu, Department of Biomedical Engineering, CWRU, 8/11-12/11.
- K. Tepe, Department of Biomedical Engineering, CWRU 6/11 – 9/11
- A. Bonner, Department of Biomedical Engineering, CWRU 9/10 – 12/10
- P. Doshi, Department of Biomedical Engineering, CWRU 1/10 – 12/10
- J. Beverly, Department of Biomedical Engineering, CWRU 5/07-10/07
- D. Cifranick, Department of Biomedical Engineering, CWRU 6/06-12/06
- M. Quick, Department of Mechanical & Aerospace Engineering, CWRU 9/04-12/04
- M. Hathorn, Department of Biomedical Engineering, CWRU 6/04-9/04
- A. Mathewson, Department of Biomedical Engineering, CWRU 9/03-12/03
- K. Kemp, Department of Biomedical Engineering, CWRU 3/03-5/03
- S. Gartman, Department of Biomedical Engineering, CWRU 5/02-9/02.
- K. Morris, Department of Biomedical Engineering, CWRU 1/02 – 5/02
- P. Shaw, Department of Biomedical Engineering, CWRU 1/01 – 12/02
- B. Bowers, Department of Biomedical Engineering, CWRU 1/00 – 5/01
- S. Gartman, Department of Biomedical Engineering, CWRU 9/99 – 12/99.
- A. Ratzler, Department of Biomedical Engineering, CWRU 5/99 – 8/99.

Medical Students Advised or Research Projects Supervised

- L. Mensis, CWRU School of Medicine, 9/13-present.
- M. Freeberg, CWRU School of Medicine, 2009
- J. Park, CWRU School of Medicine, 2007
- B. Masini, CWRU School of Medicine, 2004 – 2005
- J. Neville, CWRU School of Medicine, 2002-2005.
- I. Sayed, CWRU School of Medicine, 2000 – 2003
Winner, Crile Summer Research Fellowship

Mentoring Activities

- Dennis Barbeau, Ph.D. Co-mentor for research on neuroprostheses for control of micturition and defecation. *Recipient, VA Career Development Award Level 1 (CDA-1)* 10/1/13 – 9/30/15.
- Stephen Selkirk, M.D., Ph.D. Co-mentor for research on genetic therapies for multiple sclerosis. 2010 – present. *Recipient, VA Career Development Award Level II (CDA II).*
- Matthew Schiefer, Ph.D. Co-mentor for research in the design and evaluation of selective peripheral nerve interfaces. 5/09 – present. *Recipient, VA Career Development Award Level 1 (CDA-1)*
- Katharine Polasek, Ph.D. – Co-mentor for research in advanced prosthetics involving methods of providing natural sensation to amputees via interfaces with the nervous system. 4/08 – 7/10. *Recipient, VA Career Development Award, Level 1 (CDA-1)*
- Joseph Potkay, Ph.D. – Senior member of mentoring committee for research career development in medical applications of microelectrical/mechanical systems. 1/06 – 4/11. *Recipient, VA Career Development Award, Level 1 (CDA-1)*
- Jeffrey Capadona, Ph.D., *VA Associate Investigator Awardee*. Co-supervisor and mentor on research on rehabilitation applications of mechanically dynamic composite polymer materials. 7/05 – 7/10. *Recipient, VA Career Development Award, Levels 1 & 2 (CDA-1, CDA-2)*
- Elizabeth Hardin, Ph.D., *VA Associate Investigator Awardee*. Supervisor & mentor on research directed toward facilitating ambulation after incomplete SCI or stroke. 7/04 – 6/12. *Recipient, VA Career Development Award, Levels 1 & 2 (CDA-1, CDA-2)*
- Guang Yang, M.D., Resident, Department of Physical Medicine & Rehabilitation, CWRU/MetroHealth Medical Center. Research project advisor: “The effects of trunk position on pulmonary function after SCI.” 6/04 - 12/05
- Chester Ho, M.D., Spinal Cord Injury Service, LSVAMC, Department of Physical Medicine & Rehabilitation, CWRU. 1/03 - 6/04.
Recipient, VA Career Development Award

Training Grant Participation

- Training Program in Musculoskeletal Research, NIH/NIAMS 5T32AR007505-27. (E. Greenfield, Principal Investigator). May 2012 - April 2017.
- Integrated Engineering and Rehabilitation Training (Ruth L. Kirschstein NRSA Institutional Research Training Grants 2T32EB004314-11) (R. Kirsch, Principal Investigator) September 2009 – June 2014.
- Multidisciplinary Scholar Training Program (MSTP), NIH -NIGMS 5T32GM007250 (C. Harding, Principal Investigator). July 2004 – present.
- GAANN National Need Graduate Fellowships in Neural Engineering, DOE P200A-10411-02 (D. Durand, Principal Investigator). August 2009 – Present.
- Post Resident Advanced Fellowship Program in Spinal Cord Injury Medicine (S. Selkirk, Principal Investigator). US Department of Veterans Affairs Office of Academic Affiliations (OAA). July 2011 – Present
- Training Program in Musculoskeletal Research, NIH/NIAMS 5T32AR007505-22E. (E. Greenfield, Principal Investigator). May 2007 - April 2012.

- Post Resident Advanced Fellowship Program in Spinal Cord Injury Medicine (CHK Ho & GH Creasey, Principal Investigators). US Department of Veterans Affairs Office of Academic Affiliations (OAA). July 2006 – 2010
- Integrated Engineering and Rehabilitation Training Grant, NIH – NIBIB 9 T32 EB004314 (P. Crago, Principal Investigator). July 2004 - June 2009

Invited Lectures, Seminars and Short Courses

- “Functional Electrical Stimulation: An Update,” Annual Assembly of the American Academy of Physical Medicine & Rehabilitation, Washington DC, October 2013.
- “Mobility Issues in SCI and MS,” PVA Summit, Orlando FL, August 2013.
- “Reanimating the Lower Extremities,” No Barriers Summit, Telluride CO, August 2013.
- “Electrical Interventions for Improving Seated Function after Spinal Cord Injury”, SCI/D In-service, LSCDVAMC, January 14, 2013.
- “Neuroprostheses for Upright Mobility and Seated Stability after SCI,” Grand Rounds, Department of Physical Medicine & Rehabilitation, MetroHealth Rehabilitation Institute of Ohio (MRIO), December 13, 2012.
- “Neuroprostheses for Upright Mobility and Seated Stability after Spinal Cord Injury,” Grand Rounds, Department of Clinical Neuroscience, University of Calgary School of Medicine, Calgary CA, September 2012.
- “Animating the Extremities: Neuroprostheses for Standing, Stepping and Seated Function after Spinal Cord Injury,” International FES Society, Annual Scientific Meeting, Banff Canada, September 2012.
- “Improving Seated Function by Controlling the Paralyzed Trunk with Electrical Stimulation,” Instructional Course, American Spinal Injury Association, Denver CO, April 19-21, 2012.
- “Studies toward a Neuroprosthesis for Seated Posture and Balance,” FES Center Seminar, MetroHealth Medical Center, December 7, 2011.
- “Longitudinal Performance of an 8-Channel Neuroprosthesis for Standing,” FES Center Seminar, MetroHealth Medical Center, November 30, 2011.
- “Form and Function of the Peripheral Nerves and Spinal Cord, and Related Research,” Grand Rounds, CWRU Department of Orthopaedics, October 19, 2011.
- “Neuroprosthetic and Advanced Orthotic Applications for Lower Limb Weakness,” Regional Lower Limb Prosthetic & Orthotic Rehabilitation Course, MetroHealth Rehabilitation Institute of Ohio/Case Western Reserve University, April 9, 2011.
- “Re-envisioning the RGO: Developing Hybrid Orthotic-Electrical Approaches for Ambulation after Paralysis,” American Orthotic & Prosthetic Association Annual Meeting, Orlando FL, October 2010.
- “Development of a Neuroprosthesis for Seated Posture and Balance,” Research Seminar Series, Louis Stokes Cleveland Department of Veterans Affairs Medical Center, May 6, 2010.
- “Controlling the Paralyzed Spine for Improved Seated Posture and Balance,” Grand Rounds, CWRU Department of Orthopaedics, April 21, 2010.
- “Improving Standing Function after Paralysis: Design and Application of Advanced Neuroprostheses,” Orthopaedic Research Seminar, CWRU Department of Orthopaedics, May 26, 2009.

- “Biomechanics of Bipedal Locomotion,” Grand Rounds, CWRU Department of Orthopaedics, August 26, 2009.
- “Spinal Mechanisms for Control of Movement,” Grand Rounds, CWRU Department of Orthopaedics, September 17, 2008.
- “Strategies in Applied Peripheral Nerve Stimulation,” Mini-workshop on Restoration of Movement via Peripheral Nerve Stimulation, Mathematical Biosciences Institute, Ohio State University. April 29, 2008.
- “Neuroprosthetic Treatment Options for Thoracic Spinal Cord Injury,” Department of Physical Medicine & Rehabilitation, MetroHealth Medical Center. April 10, 2008.
- "Neuroprostheses for facilitating ambulation, postural control and balance after paralysis," Department of Biomedical Engineering, Rutgers University East Brunswick NJ, November 26, 2007.
- “Advances in Neuroprostheses for Balance, Standing and Ambulation,” Grand Rounds, CWRU Department of Orthopaedics, October 17, 2007.
- “Restoration of Trunk Stability using FES” 46th International Spinal Cord Society Annual Scientific Meeting/10th Norwegian Spinal Cord Society Congress (ISCoS/NoSCoS), Reykjavik Iceland, June 27-July1, 2007.
- Restoration of Walking after Incomplete paralysis with FES”, 46th International Spinal Cord Society Annual Scientific Meeting/10th Norwegian Spinal Cord Society Congress (ISCoS/NoSCoS), Reykjavik Iceland, June 27-July1, 2007.
- “Implanted Neuroprostheses for Standing and Walking after Spinal Cord Injury: The Case Western Reserve University Approach,” Centre for Neuroscience Seminar, University of Alberta, Edmonton Canada, April 24, 2007.
- “Advanced Platform Technology Center: Overview and Examples of New Approaches to Rehabilitation,” Electrical Engineering and Computer Science (EECS) Colloquium, Case Western Reserve University, March 29, 2007.
- “Neuroprosthetic Interventions for Seated Balance and Bipedal Mobility after Spinal Cord Injury,” Distinguished Speakers in Bioengineering Lecture Series, Institute for Biomaterials and Biomedical Engineering, University of Toronto, Toronto Canada, February 27, 2007.
- “Lower Extremity FES Treatment Options in SCI,” CWRU SOM PM&R Resident seminar, MetroHealth Medical Center, Cleveland OH, October 12, 2006
- “Advanced Platform Technology Center,” VA Rehabilitation R&D Center Directors Meeting, Palo Alto CA, October 23-24, 2006.
- “FNS Approaches to Standing and Walking”, NIH Neural Interfaces Workshop, Bethesda MD, August 22, 2006
- “Spinal Mechanisms for Control of Movement,” Grand Rounds, CWRU Department of Orthopaedics, July 19, 2006.
- “Facilitating Ambulation after Incomplete SCI,” American Spinal Injury Association (ASIA), Boston MA, June 27 2006.
- “Biomechanics of Gait and Neruological Pathologies of the Foot and Ankle,” Grand Rounds, CWRU Department of Orthopaedics, June 7, 2006.
- “Advanced Platform Technology Center,” VA Rehabilitation R&D Center Directors Meeting, Palo Alto CA, October 24-25, 2005.

- “Perspectives on Research Priorities for Neuroprostheses for Standing and Walking after Spinal Cord Injury,” Department of Defense, Integrated Research Team: Neuroprostheses for the Soldier and Society. Del Mar, California, October 10-12, 2005
- “Lower Extremity FES Treatment Options in SCI”, CWRU SOM PM&R resident seminar, MetroHealth Medical Center, Cleveland OH, May 12, 2005
- “Functional Electrical Stimulation for Standing and Walking”, First Annual Lexington Conference on Translational Neuroscience, University of Kentucky, Lexington KY, April 29, 2005.
- “Implanted Neuroprostheses for Standing after Spinal Cord Injury,” University of Michigan Model Spinal Cord Injury Care System, Ann Arbor MI, December 7, 2004.
- “Spinal Mechanisms for Control of Movement,” Grand Rounds, CWRU Department of Orthopaedics, July 21, 2004.
- “Advances in Neuromuscular Stimulation for the Lower limbs,” 2004 Spinal Cord Injury Conference, Long Beach CA.
- “Neuroprostheses for Standing, Walking and Balance after Paralysis,” Grand Rounds, CWRU Department of Orthopaedics, March 17, 2004.
- “Lower Extremity FES Treatment Options in SCI”, CWRU SOM PM&R resident seminar, MetroHealth Medical Center, Cleveland OH, December 4, 2003.
- “Strategies to Improve Transfers and Gait,” American Society of Neurorehabilitation Workshop: Scientific Basis of Neurorehabilitation for Spinal Cord Injury and Stroke, Cleveland OH, August 9, 2003
- “Standing, Transfers and Walking with FES after Spinal Cord Injury,” American Society of Neurorehabilitation Workshop: Scientific Basis of Neurorehabilitation for Spinal Cord Injury and Stroke, Cleveland OH, August 9, 2003
- “Gait and Human Motion Analysis,” American Society of Neurorehabilitation Workshop: Scientific Basis of Neurorehabilitation for Spinal Cord Injury and Stroke, Cleveland OH, August 9, 2003
- “Neuroprostheses for Standing, Walking and Seated Trunk Control after Spinal Cord Injury,” Combined CWRU-CCF Musculoskeletal Research Seminar, June 2003.
- “Controlling the Trunk for Standing and Seated Posture.” Invited lecture, Department of Rehabilitation Services, University Hospitals, Cleveland OH. February 20, 2003.
- “Kinesiology: What You Need to Know About the Control of Movement.” Grand Rounds, CWRU Department of Orthopaedics, November 23, 2002.
- “Functional Electrical Stimulation for Standing and Walking after Spinal Cord Injury.” Invited lecture, ABC Traveling Fellowship program, Cleveland Clinic-Case Western Reserve University. May 10, 2002.
- “Neuroprostheses for Standing and Stepping” in short course entitled “New Techniques for Restoring Function” *Joint ASIA/IMSOP meeting*, Vancouver BC, Canada, May 2002
- “The Effects of Trunk Stimulation on Seated Reach after SCI,” S. Kukke, **R. Triolo**, J.A. Davis. *Joint ASIA/IMSOP meeting*, Vancouver BC, Canada, May 2002
- “Surgical Implantation of FES Hardware for Functional Standing in Persons with SCI.” Invited lecture, Kentucky Spinal Cord & Head Injury Research & Training Center: Clinical Advances in Neurorehabilitation Science Conference, Lexington KY, September 27, 2001.

- “Standing Transfer and Walking after Spinal Cord Injury,” invited lecture 2001 Charles Herndon Alumni Society, Cleveland OH, June 22 2001.
- “Standing Neuroprostheses: Where Do We Stand?” invited lecture CWRU Applied Neural Control Research Day, June 2001.
- “A Surgically Implanted Lower Extremity Neuroprosthesis for Exercise, Standing and Transfers after Spinal Cord Injury.” Neurosurgery Grand Rounds, Jackson Memorial Hospital and the Miami Project to Cure Paralysis, Miami Florida, April 5, 2001
- “Preliminary Performance of a Surgically Implanted Neuroprosthesis for Exercise, Standing and Transfers after Spinal Cord Injury.” Rehabilitation Engineering Center of Excellence on Aging with a Disability, Houston VA Medical Center, December 1, 2000, Houston TX.
- “Lower Extremity Neuroprostheses.” American Academy of Physical Medicine and Rehabilitation, Instructional Course. November 4, 2000, San Francisco CA.
- “Unassisted Standing with Functional Neuromuscular Stimulation.” 31st Neural Prosthesis Workshop, National Institutes of Health, Bethesda MD, October 26, 2000.
- “Preliminary Clinical Performance of an Implanted Neuroprosthesis for Standing and Mobility after Spinal Cord Injury.” Department of Anatomy and Neuroscience, University of Kentucky, October 12, 2000, Lexington KY.
- “Neuroprostheses for Lower Extremity Function after Spinal Cord Injury.” Center for Ergonomics, Department of Industrial Engineering, University of Michigan, September 19, 2000, Ann Arbor, MI.
- “A Surgically Implanted Neuroprosthesis for Exercise, Standing and Transfers.” NeuroControl Corporation, July 17, 2000, Cleveland OH.
- “A Surgically Implanted Neuroprosthesis for Exercise and Standing, Transfers.” Department of Physical Medicine and Rehabilitation, University of Kentucky and Cardinal Hill Rehabilitation Hospital, July 10, 2000, Lexington KY.
- “A Surgically Implanted Neuroprosthesis for Exercise and Standing, Transfers.” Department of Orthopaedics, Medical College of Albany, June 1, 2000, Albany NY.
- “Implanted Lower Extremity Neuroprostheses.” Orthopaedic Rehabilitation Association instructional course, May 12, 2000. Cleveland, Ohio.
- “Lower Extremity Neuroprostheses: Fundamental Studies to Clinical Research.” Grand Rounds, CWRU Department of Orthopaedics, April 1, 2000.
- “Multicenter Clinical Trial of a Neuroprosthesis for Exercise, Standing and Transfers.” Rehabilitation Engineering Center Seminar, Department of Orthopaedics, MetroHealth Medical Center. March 15, 2000.
- “Measurement Issues in FES-Assisted Standing, Transfers and Ambulation.” 2nd National VA Rehabilitation Research R&D Meeting, Washington DC, February 21 & 22, 2000.
- “A Biomechanical Model of the Kinematics and Moment-Generating Capacity of the Spine and Trunk Musculature.” CWRU Department of Orthopaedics Research Day, January 28, 2000.
- “Performance of Implanted Epimysial Electrodes in the Lower Extremities of Individuals with Spinal Cord Injury.” CWRU Department of Orthopaedics Research Day, January 28, 2000.

- “Implantable FNS Systems for Standing Transfers.” CWRU Department of Orthopaedics Research Day, January 28, 2000.
- “Unassisted Standing by Functional Electrical Stimulation.” 30th Neural Prosthesis Workshop, National Institutes of Health, Bethesda MD, October 13, 1999.
- “Lower Extremity Applications of FNS in Paraplegia and Incomplete Tetraplegia,” in a course entitled “Restoring Limb and Bladder Function with Electrical Stimulation” at the 1999 Meeting of the American Paraplegia Society (APS), Las Vegas NV, September 1999.
- “Biomechanics of Human Quadriceps Muscles During Electrical Stimulation.” Rehabilitation Engineering Center Seminar, Department of Orthopaedics, MetroHealth Medical Center. June 2, 1999.
- “Unassisted Standing by Functional Electrical Stimulation,” CWRU Neuroprosthesis Seminar, CWRU, January 8, 1999.
- “Human Lumbosacral Spinal Cord Interprets Loading During Stepping.” Rehabilitation Engineering Center Seminar, Department of Orthopaedics, MetroHealth Medical Center. December 16, 1998.
- “Clinical Results from Implanted Lower Extremity Neuroprostheses,” Resident Research Conference, CWRU Department of Orthopaedics, November 11, 1998.
- “Unassisted Standing with Functional Neuromuscular Stimulation,” 29th Neural Prosthesis Workshop, National Institutes of Health, Bethesda MD, October 28-30, 1998.
- “Implanatable Systems: What’s Going Right, and What’s Gone Wrong.” Rehabilitation Engineering Center Seminar, Department of Orthopaedics, MetroHealth Medical Center. June 4, 1998.
- “Maximizing Hip Extension Moment with Two Channels of Electrical Stimulation for FES-Induced Standing,” Poster Presentation, Annual Rehabilitation Engineering Society of North America (RESNA) Conference, June 1998.
- “Performance Results of Epimysial Electrodes in the Lower Extremities of Individuals with Spinal Cord Injuries,” American Spinal Injury Association (ASIA) annual meeting, Cleveland Ohio, April 21, 1998.
- “Future Directions: FES for Standing and Transfers,” in pre-conference course entitled “Restoring Limb & Bladder Function with Electrical Stimulation.” Presented at the 1998 meeting of the American Spinal Injury Association (ASIA) Cleveland Ohio, April 19, 1998.
- “Lower Extremity FES,” Multidisciplinary Spine Conference, MetroHealth Medical Center, Cleveland Ohio, April 17 1998.
- “Implantable FNS Systems for Standing and Walking Mobility: Surgical Considerations,” Resident Research Conference, CWRU Department of Orthopaedics. November 1997.
- “Unassisted Standing with Functional Neuromuscular Stimulation,” 28th Neural Prosthesis Workshop, National Institutes of Health, Bethesda MD, October, 1997.
- “Functional Electrical Stimulation for Ambulation after Spinal Cord Injury,” Living Well into the Next Century: An Educational Forum for People with Spinal Cord Injuries, MetroHealth Medical Center, October 7, 1997.
- “Clinical Results from Implanted FNS Systems for Mobility after Spinal Cord Injury,” 2nd Annual Meeting of the International FES Society (IFESS), August 1997.

- “Installation and Performance of a 16-Channel Implantable FES System for Upright Mobility,” 1997 Annual Rehabilitation Engineering Society of North America (RESNA) Conference, June 1997.
- “Implanted FNS Systems for Lower Extremity Mobility: Developing a Strategy,” 12th Annual Applied Neural Control Laboratory Research Day, CWRU. May 1997.
- “Unassisted Standing with Functional Neuromuscular Stimulation,” 27th Neural Prosthesis Workshop, National Institutes of Health, Bethesda MD, October 17, 1996.
- “Implanted FNS Systems for Standing and Transfers,” US Department of Veterans Affairs Research R&D Committee, Cleveland OH, October 15, 1996.
- “Research Directions in Lower Extremity Applications of Functional Neuromuscular Stimulation,” Research Retreat, Department of Orthopaedics, CWRU. October, 1996.
- “Functional Electrical Stimulation Hand Grasp Neuroprostheses: Impact on Impairment, Disability and Handicap,” Department of Physical Therapy, Beaver College, Glenside, PA. April, 1996.
- “Lower Extremity Applications of Functional Electrical Stimulation: Exercise, Standing, Transfers and Walking,” Department of Physical Therapy, Beaver College, Glenside, PA. April, 1996.
- “FES Facilitated Standing Transfers in Low Tetraplegia: Fundamental Studies and Clinical Outcomes,” Grand Rounds, CWRU Department of Orthopaedics. March 1996.
- “The Effects of FNS on the Bones, Joints and Functional Independence of Adolescents with Spinal Cord Injuries,” Resident Research Conference, CWRU Department of Orthopaedics. November 1995.
- “Sit to Stand Motor Prostheses,” 10th Annual Applied Neural Control Research Day, CWRU. May 1995.
- “Challenges to Clinical Deployment of Upper Extremity Neuroprostheses,” Platform presentation, *Neural Prostheses: Motor Systems IV* Conference, Engineering Foundation, Deer Creek OH. July 1994.
- “Lower Extremity Applications of FNS in Children with Spinal Cord Injuries,” Neural Prosthesis Seminar, CWRU. March 1994.
- “Standing and Walking with Functional Neuromuscular Stimulation: Technical and Clinical Challenges,” Special Workshop on Human Motion Analysis, IEEE Engineering in Medicine & Biology Society Meeting, Sand Diego, CA. October 1993
- “Functional Electrical Stimulation: Engineering and Clinical Aspects,” Rehabilitation Engineering Summer Internship Program, Department of Bioengineering, University of Pennsylvania, Philadelphia, PA. August 1993.
- “Clinical Considerations for the Application of Functional Electrical Stimulation in Children with Spinal Cord Injuries or Cerebral Palsy,” Grand Rounds, Kessler Institute for Rehabilitation, West Orange, NJ. July 1993.
- “Technology Transfer from Academic to Clinical Environments,” Platform presentation, *Neural Prostheses: Motor Systems III* Conference, Engineering Foundation, Banff Canada. July 1991.
- “Upper and Lower Extremity Applications of Functional Neuromuscular Stimulation,” Combined Sections of the American Physical Therapy Association Annual Meeting, Philadelphia, PA. October, 1990.

- “Basic Electrophysiology,” Department of Physical Therapy, Beaver College, Glenside, PA. 1986, 1988-94.
- “Physical Principles of Electrical Stimulation,” Department of Physical Therapy, Beaver College, Glenside, PA. 1986, 1988-94.
- “Clinical Research: Principles and Design,” Department of Orthopaedics, Temple University, Philadelphia, PA. 1988-93.

Invention Disclosures

- Use of Accelerometer For Step Initiation With FES Gait System (2012-2229)
- Multilayer Microfabrication-Compatible Nerve Cuff Electrode With Regionally Patterned Stiffness (2012-2209)
- Self-Leveling Walker (2012-2198)
- Sum of Phase-Shifted Sinusoids Stimulation Paradigm (2012-2137)
- Electrotherapy for Low Back Pain (VA 12-025)
- Variable Impedance Polycentric Knee Mechanism with Controlled Damping (2011-2067)
- Power Assisted Orthosis with Hip-Knee Synergy (2011-2066)
- Methods of Gait Correction with Implanted FES Gait System (2010-1893)
- A Vertical Lift Walker for Sit-to-Stand Transition Assistance (2010-1846)
- Hydraulic Knee Constraint Mechanism (2009-1730)
- Self-Contained, Wireless, Micro-EEG and Micro-ECoG Systems (2009-1722)
- Smart, Instrumented Vascular Grafts (10-022)
- Wireless Implantable EMG Sensing Microsystem for Intelligent Control of Powered Prostheses (2009-1695)
- Natural Sensation for Lower Extremity Amputees with Multicontact Nerve Cuffs (2009-1690)
- Ankle Control via Selective Nerve Cuff electrodes (2009-1673)
- Variable Rigidity Trunk Corset (2009-1623)
- Integrated Surface Stimulation Device for Wound Therapy (2008-1600)
- Integrated Surface Stimulation Device for Pain Management (2008-1599)
- Split Collar Locking Mechanism for Use in Orthotics and Robotics (VHA #07-170)
- Controllable Joint Locking Mechanism for a Knee Orthosis (2009-1625)
- Permanent Magnet Magnetorheological Fluid Knee Brake Orthosis for a Hybrid Orthosis System (2006-1290)
- A Hybrid Orthosis with Variable Hip Coupling and Compliant Trunk Corset (2005-1107)
- User-Driven Automatic Control of Posture & Balance Based on Acceleration and Center of Pressure
- Automatic Control of Seated Posture & Sitting Balance with Electrical Stimulation
- A Slotted Epimysial Electrode
- Integrated Disposable Surface Stimulation System (2004-0966)
- Surgical Clamp for the Installation of an Epimysial Electrode
- Lower Extremity Control Unit (LECU)
- STRIDE (Software Technology Rehabilitating Injured & Disabled Extremities)
- Functional Performance Measure
- Rehabilitation and Evaluation Protocols for the Implantable FES Standing System
- Surgical Technique for Installing an 8-channel Neuroprosthesis for Standing