

Division of Kinesiology  
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### Current Positions

**Associate Professor**, Dept. of Movement Science, U. of Michigan. 9/06-pres.  
**Graduate Chair**, Division of Kinesiology, U. of Michigan. 9/06-pres.  
**Associate Professor**, Dept. of Biomedical Engineering, U. of Michigan. 9/06-pres.  
**Faculty Member**, Neuroscience Graduate Program, U. of Michigan. 3/06-pres.  
**Adjunct Associate Professor**, Dept. of Physical Medicine & Rehabilitation, U. of Michigan. 9/07-pres.

### Past Positions

**Visiting Scholar**, Div. of Neurophysiology, Panum Institute, U. of Copenhagen. 4/97-5/97  
**Post-Doctoral Fellow**, Dept. of Neurology, UCLA. 10/98-4/00  
**Post-Doctoral Fellow**, Dept. of Electrical Engineering, U. of Washington. 5/00-8/01  
**Assistant Professor**, Dept. of Movement Science, U. of Michigan. 9/01-8/06  
**Assistant Professor**, Dept. of Biomedical Engineering, U. of Michigan. 9/01-8/06  
**Adjunct Assistant Professor**, Dept. of Physical Medicine & Rehabilitation, U. of Michigan. 5/05-8/07  
**Visiting Scholar**, Institute for Neural Computation, UC San Diego, 1/08-6/08

### Education

**Ph.D.**, *Human Biodynamics*, University of California, Berkeley, 1998  
**M.S.**, *Exercise Physiology*, University of Miami, 1994  
**B.S.**, *Mathematics Education*, University of Central Florida, 1992

### Publications (Peer Reviewed)

37. Simon AM, Kelly BM and **Ferris DP** (2008) Sense of effort determines lower limb force production during dynamic movement in individuals with post-stroke hemiparesis. *Neurorehabilitation and Neural Repair*, in press.
36. Kinnaird CR and **Ferris DP** (2008) Medial gastrocnemius myoelectric control of a robotic ankle exoskeleton for human walking. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, in press.
35. Kao P-C and **Ferris DP** (2008) Motor adaptation during dorsiflexion-assisted walking with a powered orthosis. *Gait and Posture*, in press.
34. Gordon KE, **Ferris DP** and Kuo AD (2008) Metabolic and mechanical energy costs of reducing vertical center of mass movement during gait. *Archives of Physical Medicine and Rehabilitation*, in press.
33. Collins SH, Adamczyk PG, **Ferris DP** and Kuo AD (2008) A simple method for calibrating force plates and treadmills using an instrumented pole. *Gait and Posture*, in press.
32. Lewis CL and **Ferris DP** (2008) Walking with increased ankle pushoff decreases hip moments. *Journal of Biomechanics*, 41:2082-9.
31. Sawicki GS and **Ferris DP** (2008) Mechanics and energetics of level walking with powered ankle exoskeletons. *Journal of Experimental Biology*, 211:1402-1413.
30. Simon AM and **Ferris DP** (2008) Lower limb force production and bilateral force asymmetries are based on sense of effort. *Experimental Brain Research*, 187:129-138.
29. Pelc E, Daley MA, and **Ferris DP** (2008) Resonant hopping of a robot controlled by an artificial neural oscillator. *Bioinspiration and Biomimetics*, 3(2):26001.

28. Cain S, Gordon KE and **Ferris DP** (2007) Human motor adaptation during walking with a powered ankle-foot orthosis depends on control method. *Journal of Neuroengineering and Rehabilitation*, 4:48.
27. **Ferris DP**, Sawicki GS and Daley MA (2007) A physiologist's perspective on robotic exoskeletons for human locomotion. *International Journal of Humanoid Robotics*, 4:507–528.
26. Domingo A, Sawicki GS and **Ferris DP** (2007) Kinematics and muscle activity of individuals with incomplete spinal cord injury during treadmill stepping with and without manual assistance. *Journal of Neuroengineering and Rehabilitation*, 4:32.
25. Zehr EP, Balter JE, **Ferris DP**, Hundza SR, Loadman P and Stoloff RH (2007) Neural control of rhythmic arm and leg movement is conserved across human locomotor tasks. *Journal of Physiology*, 582: 209-227.
24. Gordon KE and **Ferris DP** (2007) Learning to walk with a robotic ankle exoskeleton. *Journal of Biomechanics*, 40:2636-2644.
23. Stoloff RH, Zehr EP and **Ferris DP** (2007) Recumbent stepping has similar but simpler neural control compared to walking. *Experimental Brain Research*, 178:427-438.
22. Simon AM, Gillespie RB and **Ferris DP** (2007) Symmetry-based resistance as a novel means of lower limb rehabilitation. *Journal of Biomechanics*, 40:1286-1292.
21. Cherry MS, Choi DJ, Deng KJ, Kota S and **Ferris DP** (2006) Design and fabrication of an elastic knee orthosis - preliminary results. *Proceedings of the International Design Engineering Technical Conference & Computers and Information in Engineering Conference*, September 10-13, Philadelphia, USA, DETC2006-99622.
20. **Ferris DP**, Huang HJ and Kao P-C (2006) Moving the arms to activate the legs. *Exercise and Sport Sciences Reviews*, 34:113-120.
19. Gordon KE, Sawicki GS and **Ferris DP** (2006) Mechanical performance of artificial pneumatic muscles to power an ankle-foot orthosis. *Journal of Biomechanics*, 39:1832-1841.
18. **Ferris DP**, Gordon KE, Sawicki GS and Peethambaran A (2006) An improved powered ankle-foot orthosis using proportional myoelectric control. *Gait and Posture*, 23:425-428.
17. Sawicki GS, Domingo A and **Ferris DP** (2006) The effects of powered ankle foot orthoses on muscle activation and joint kinematics during walking by individuals with incomplete spinal cord injury. *Journal of Neuroengineering and Rehabilitation*, 3(1):3.
16. **Ferris DP**, Bohra ZA, Lukos JR and Kinnaird CR (2006) Neuromechanical adaptation to hopping with an elastic ankle-foot orthosis. *Journal of Applied Physiology*, 100:163-170.
15. **Ferris DP**, Sawicki GS and Domingo AR (2005) Powered lower limb orthoses for gait rehabilitation. *Topics in Spinal Cord Injury Rehabilitation*, 11:34-49.
14. Sawicki GS, Gordon KE and **Ferris DP** (2005) Powered lower limb orthoses: applications in motor adaptation and rehabilitation. *IEEE Proceedings of the International Conference on Rehabilitation Robotics*, 206-211.
13. Danek KA, Gillespie RB, Aldridge JW, **Ferris DP** and Grizzle JW (2005) A dual input device for self-assisted control of a virtual pendulum. *IEEE Proceedings of the International Conference on Rehabilitation Robotics*, 313-318.
12. **Ferris DP**, Czerniecki JM and Hannaford B (2005) An ankle-foot orthosis powered by artificial pneumatic muscles. *Journal of Applied Biomechanics*, 21:189-197.
11. Kao P-C and **Ferris DP** (2005) The effect of movement frequency on interlimb coupling during recumbent stepping. *Motor Control*, 9:144-163.
10. Gordon KE and **Ferris DP** (2004) Proportional myoelectric control of a virtual object to investigate human efferent control. *Experimental Brain Research*, 159:478-486.
9. Huang HJ and **Ferris DP** (2004) Neural coupling between upper and lower limbs during recumbent stepping. *Journal of Applied Physiology*, 97:1299-1308.
8. **Ferris DP**, Gordon KE, Beres JA and Harkema SH (2004) Muscle activation during unilateral stepping occurs in the nonstepping limb of humans with clinically complete spinal cord injury. *Spinal Cord*, 42:14-23.
7. **Ferris DP**, Aagaard P, Simonsen EB, Farley CT, and Dyhre-Poulsen P (2001) Soleus H-reflex gain in humans walking and running under simulated reduced gravity. *Journal of Physiology*, 530:167-180.

6. **Ferris DP**, Liang K and Farley CT (1999) Runners adjust leg stiffness for their first step on a new running surface. *Journal of Biomechanics*, 32:787-794.
5. **Ferris DP**, Louie M and Farley CT (1998) Running in the real world: adjusting leg stiffness for different surfaces. *Proceedings of the Royal Society of London: Biological Sciences*, 265:989-994 (cover).
4. Farley CT and **Ferris DP** (1998) Biomechanics of walking and running: from center of mass movement to muscle action. *Exercise and Sport Sciences Reviews*, 26:253-285.
3. **Ferris DP** and Farley CT (1997) Interaction of leg stiffness and surface stiffness during human hopping. *Journal of Applied Physiology*, 82:15-22 (cover).
2. Kram R, Domingo A and **Ferris DP** (1997) Effect of reduced gravity on the preferred walk-run transition speed. *Journal of Experimental Biology*, 200:821-826.
1. **Ferris DP**, Signorile JF and Caruso JF (1995) The relationship between physical and physiological variables and volleyball spiking velocity. *Journal of Strength and Conditioning Research*, 9:32-36.

### **Manuscripts in Review**

5. Sawicki GS, Lewis CL and **Ferris DP** (In review) It pays to have a spring in your step. *Exercise and Sport Sciences Reviews*.
4. Sawicki GS and **Ferris DP** (In review) Mechanics and energetics of incline walking with robotic ankle exoskeletons. *Journal of Experimental Biology*.
3. Sawicki GS and **Ferris DP** (In review) Metabolic cost of ankle joint work during level walking with increasing step length. *Journal of Experimental Biology*.
2. Danek KA, **Ferris DP**, Grizzle JW and Gillespie RB (In review) Anticipatory adjustments in the upper and lower limbs in response to self-triggered and externally triggered perturbations. *Journal of Neuroengineering and Rehabilitation*.
1. Huang HJ and **Ferris DP** (In review) Excitatory neural coupling between upper and lower limbs is bidirectional and ipsilateral. *Medicine and Science in Sports and Exercise*.

### **Manuscripts in Preparation (data collection is completed)**

2. Sawicki GS and **Ferris DP** (In preparation) Mechanics and control of a knee-ankle-foot orthosis (KAFO) powered with artificial pneumatic muscles. *Journal of Neuroengineering and Rehabilitation*.
1. Gordon KE and **Ferris DP** (In preparation) A neurobotic simulation of antagonistic coactivation during human walking. *Journal of Neurophysiology*.

### **Publications (Non-Peer Reviewed)**

1. **Ferris DP** (2008) Case Study: an ankle-foot orthosis powered by artificial pneumatic muscles. In *Wearable Robots: Biomechatronic Exoskeletons*, ed. Pons JL. (Wiley, John & Sons) pp. 289-295.

### **Recent Abstracts (projects not yet published as full papers)**

16. Huang HJ and **Ferris DP** (2008) Neural coupling between the upper and lower limbs in individuals with incomplete spinal cord injury. Proceedings of the North American Congress on Biomechanics, August 5-9, 2008, Ann Arbor, MI.
15. Kao PC, Lewis CL and **Ferris DP** (2008) Motor response during unexpectedly reduced plantar flexor torque provided by a powered orthosis during walking. Proceedings of the North American Congress on Biomechanics, August 5-9, 2008, Ann Arbor, MI.
14. Lewis CL, Kao PC and **Ferris DP** (2008) Invariant ankle moment patterns with plantar flexor assistance from a powered ankle orthosis. Proceedings of the North American Congress on Biomechanics, August 5-9, 2008, Ann Arbor, MI.

13. Simon AM, Kelly BM and **Ferris DP** (2008) Bilateral lower limb force production in individuals with poststroke hemiparesis. *Proceedings of the North American Congress on Biomechanics*, August 5-9, 2008, Ann Arbor, MI.
12. Domingo A and **Ferris DP** (2008) Physical assistance can be detrimental to learning walking balance. *Proceedings of the North American Congress on Biomechanics*, August 5-9, 2008, Ann Arbor, MI.
11. **Ferris DP** and Kinnaird CR (2008) Robotic lower limb orthoses for gait rehabilitation after incomplete spinal cord injury. *Proceedings of the 2008 Annual Meeting of the American Spinal Injury Association*, June 19-22, 2008, San Diego, CA.
10. Domingo A and **Ferris DP** (2007) The effects of physical assistance on motor learning of narrow beam walking. *Proceedings of the Society for Neuroscience Annual Meeting*, November 3-7, 2007, San Diego, CA.
9. Sawicki GS and **Ferris DP** (2007) Mechanics and energetics of incline walking with powered ankle exoskeletons. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
8. Huang HJ and **Ferris DP** (2007) Bidirectional neural coupling between upper and lower limbs. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
7. Domingo A and **Ferris DP** (2007) Effects of physical assistance on narrow beam walking. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
6. Danek KA, **Ferris DP**, Grizzle JW and Gillespie RB (2007) Anticipatory actions in the lower limbs in response to self-triggered and computer-cued load perturbations. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
5. Kao P-C and **Ferris DP** (2007) Motor adaptation during dorsiflexion-assisted walking with a powered orthosis. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
4. Cain SM and **Ferris DP** (2007) Walking in simulated hyper-gravity. *Proceedings of the 31st Annual Meeting of the American Society of Biomechanics*, August 22-25, 2007, Palo Alto, CA.
3. Kinnaird C and **Ferris DP** (2006) Locomotor adaptation to a robotic ankle exoskeleton under proportional myoelectric control of the medial gastrocnemius. *Proceedings of the 5th World Congress of Biomechanics*, July 29-August 4, Munich, Germany.
2. Sawicki GS and **Ferris DP** (2006) Mechanics and control of a knee-ankle-foot orthosis (KAFO) powered with artificial pneumatic muscles. *Proceedings of the 5th World Congress of Biomechanics*, July 29-August 4, Munich, Germany.
1. Chang CL and **Ferris DP** (2005) A neuromuscular model to understand muscle co-activation during walking. *Second Asian Pacific Conference on Biomechanics*, November 23-25, Taipei, Taiwan.

### **Book Review**

1. **Ferris, DP** (2003) Neurotechnology for Biomimetic Robots, ed. J. Ayers, J.L. Davis, and A. Rudolph. *The Quarterly Review of Biology*, 78(3):380.

### **Extramural Grants Funded (Completed)**

9. *Motor Adaptation during Human Locomotion*  
Principal Investigator: Daniel Ferris (40% effort)  
Agency: NIH (R01 NS45486)  
Period: 09/01/02 – 07/31/07  
Amount: \$1,233,622 Total Costs  
Aim: To determine how healthy subjects adapt to walking with powered ankle-foot orthoses.

- 8.** *Control of Balance during Human Walking*  
Principal Investigator: Arthur D. Kuo, UM (Daniel Ferris, Co-Investigator, 10% effort)  
Agency: NIH (R21 DC006466)  
Period: 1/15/04 – 12/31/06  
Amount: \$569,087 Total Costs  
Aim: To determine how humans balance their bodies during walking.
- 7.** *Efficacy of Coupled Rhythmic Arm and Leg Movement as an Alternative to Body Weight Supported Walking Training for Recovery of Walking after Incomplete Spinal Cord Injury*  
Principal Investigator: E. Paul Zehr (Daniel Ferris, Co-Investigator, 5% effort)  
Agency: Rick Hansen Man In Motion Foundation  
Period: 07/01/05 – 6/30/06  
Amount: \$27,813 Total Costs  
Aim: To compare reflex modulation in spinal cord injury subjects during rhythmic movements.
- 6.** *Network Collaboration for CRPF Grantees*  
Principal Investigator: Daniel Ferris (5% effort)  
Agency: Christopher Reeve Paralysis Foundation  
Period: 07/15/04 – 12/15/04  
Amount: \$5,000 Total Costs  
Aim: To compare reflex modulation patterns for walking and recumbent stepping.
- 5.** *Recumbent Stepping for Gait Rehabilitation after Spinal Cord Injury*  
Principal Investigator: Daniel Ferris (20% effort)  
Agency: Paralyzed Veterans of America Spinal Cord Research Foundation (2293-01)  
Period: 10/01/03 – 03/31/06  
Amount: \$150,000 Total Costs  
Aim: To assess the feasibility of using self-assisted recumbent stepping as gait rehabilitation therapy after spinal cord injury.
- 4.** *A Powered Lower Limb Exoskeleton to Assist Locomotor Training*  
Principal Investigator: Daniel Ferris (20% effort)  
Agency: Christopher Reeve Paralysis Foundation  
Period: 12/15/01 – 12/15/04  
Amount: \$150,000 Total Costs  
Aim: To build a pneumatically-powered orthosis for locomotor training after spinal cord injury.
- 3.** *Motor Adaptation during Human Locomotion*  
Principal Investigator: Daniel Ferris (100% effort)  
Agency: NIH (F32 AR08602)  
Period: 05/01/00 – 06/30/01  
Amount: \$65,212 Total Costs  
Aim: To assess the feasibility of using myoelectrically controlled orthoses to study gait adaptation.
- 2.** *H-Reflex Modulation During Human Locomotion*  
Principal Investigator: Poul Dyhre-Poulsen (Daniel Ferris, Co-Investigator)  
Agency: Danish Sports Research Council  
Period: 1997  
Amount: \$5,667 Total Costs  
Aim: To examine H-reflex gain during simulated reduced gravity locomotion.

1. *The Biomechanics of Reduced Gravity Locomotion*  
Principal Investigator: Daniel Ferris (50% effort)  
Agency: NASA (NGT-51416)  
Period: 09/01/95 – 08/30/98  
Amount: \$66,000 Total Costs  
Aim: To examine the effects of reduced gravity on muscle activation and walk-run transition speed.

#### **Extramural Grants Funded (Active)**

4. *Mobile Brain Imaging: Electroencephalographic Dynamics Accompanying Motivated Movements*  
Principal Investigator: Scott Makeig (D. Ferris, Co-I, 10% effort)  
Agency: ONR  
Period: 09/15/08 – 09/14/12  
Amount: \$5,800,000 Total Costs (UM subcontract \$261,169 Total Costs)  
Aim: To develop EEG based functional brain imaging for use during human movement.
3. *Robotic Orthoses for Gait Rehabilitation*  
Principal Investigator: Daniel Ferris (21% effort)  
Agency: NIH (R21 NS062119)  
Period: 02/01/08 – 01/31/10  
Amount: \$351,688 Total Costs  
Aim: To determine if individuals with incomplete spinal cord injury improve their energetics, biomechanics, and neural control from practice walking with powered ankle-foot orthoses.
2. *CAREER: Biomechanics and Energetics of Human Locomotion with Powered Exoskeletons*  
Principal Investigator: Daniel Ferris (15% effort)  
Agency: National Science Foundation (BES-0347479)  
Period: 04/01/04 – 03/30/09  
Amount: \$426,218 Total Costs  
Aim: To determine if powered lower limb exoskeletons can reduce the metabolic cost of walking.
1. *The University of Michigan Medical Rehabilitation Research Training Program*  
Principal Investigator: Denise Tate (Daniel Ferris, Mentor, 0% effort)  
Agency: National Institutes of Health (T32 HD007422)  
Period: 05/01/06 – 04/30/11  
Amount: \$1,535,015 Total Costs  
Aim: To support post-doctoral training in rehabilitation research.

#### **Extramural Grants (Pending)**

1. *High-Density Electroencephalography System*  
Principal Investigator: Daniel Ferris (0% effort)  
Agency: ONR and ARO  
Period: 04/15/09 – 04/14/10  
Amount: \$195,745 Total Costs  
Aim: To purchase a high-density electroencephalography system.

## **Extramural Training Grants for my Doctoral and Post-Doctoral Trainees (Funded)**

5. *Postdoctoral Research Fellowship in Biological Informatics* (post-doctoral fellowship)  
Principal Investigator: Monica Daley, PhD (D. Ferris, mentor)  
Agency: National Science Foundation (BIO-0630664)  
Period: 10/01/06 – 09/31/08  
Amount: \$120,000 Total Costs  
Aim: To build a neuromechanical computer simulation of a running biped
4. *Self-Assisted Neurological Rehabilitation* (pre-doctoral fellowship)  
Principal Investigator: Helen Huang (D. Ferris, mentor)  
Agency: National Institutes of Health (F31 NS056504)  
Period: 06/09/06 – 06/08/09  
Amount: \$100,152 Total Costs  
Aim: To determine if recumbent stepping has therapeutic effects on spinal cord injury subjects.
3. *Upper Limb Control of Robotic Lower Limb Assistance during Walking* (post-doctoral fellowship)  
Principal Investigator: Cara Lewis, PT, PhD (D. Ferris, mentor)  
Agency: National Institutes of Health (F32 HD055010)  
Period: 07/09/07– 07/08/09  
Amount: \$96,472 Total Costs  
Aim: To build and test an upper limb controller for robotic lower limb assistance.
2. *Effects of Physical Assistance on Walking Balance* (pre-doctoral fellowship)  
Principal Investigator: Antoinette Domingo, PT (D. Ferris, mentor)  
Agency: National Institutes of Health (F31 HD056588)  
Period: 06/01/07– 05/30/09  
Amount: \$56,884 Total Costs  
Aim: To determine how physical assistance affects motor learning of walking balance.
1. *Symmetry-Based Resistance for Stroke Rehabilitation* (pre-doctoral fellowship)  
Principal Investigator: Ann Simon (D. Ferris, mentor)  
Agency: American Heart Association  
Period: 09/01/07– 08/31/09  
Amount: \$51,139 Total Costs  
Aim: To determine if symmetry-based resistance control of lower limb exercise can improve functional ability in post-stroke subjects.

## **Intramural Grants Funded (Completed)**

4. *Powered Lower Limb Orthoses for Stroke Rehabilitation*  
Principal Investigator: Daniel Ferris (0% effort)  
Agency: University of Michigan OVPR and Rackham Graduate School  
Period: 05/01/07 – 8/31/07  
Amount: \$4,000 Total Costs  
Aim: To collect pilot data on stroke subjects wearing powered orthoses for gait rehabilitation.
3. *Apparatus and Preliminary Data for an Interdisciplinary Project in Self-Teleoperated Stabilization*  
Principal Investigator: Jessy Grizzle (Daniel Ferris, Co-Investigator, 5% effort)  
Agency: University of Michigan Office of the Vice President for Research  
Period: 5/1/03 – 4/30/04  
Amount: \$10,000 Total Costs  
Aim: To build a tele-operated device for studying control of human standing.

2. *Artificial Neural Oscillator Control of Functional Electrical Stimulation during Gait Rehabilitation after Spinal Cord Injury*  
Principal Investigator: Daniel Ferris (5% effort)  
Agency: University of Michigan Rackham Graduate School  
Period: 2002  
Amount: \$14,944 Total Costs  
Aim: To test the efficacy of artificial neural oscillators as adaptive controllers.
  
1. *Powered Lower Limb Orthoses for Gait Rehabilitation*  
Principal Investigator: Daniel Ferris (5% effort)  
Agency: University of Michigan Office of the Vice President for Research  
Period: 10/1/01 – 9/30/02  
Amount: \$12,000 Total Costs  
Aim: To build a pneumatically powered knee-ankle-foot orthosis.

### **Scholarships, Fellowships, and Honors**

Florida Academic Scholar Scholarship, 1989-1992  
National Merit Scholar Scholarship, 1989-1992  
Department of Exercise and Sport Sciences Fellowship, 1992-1994  
University of California Regents Fellowship, 1994-1995  
Department of Defense Graduate Fellowship Honorable Mention, 1994  
NSF Graduate Fellowship Honorable Mention, 1995  
NASA Graduate Student Researcher's Program Fellowship, 1995-1998  
APS Graduate Student Award Finalist, Integrative Biology of Exercise, 1996  
NIH Institutional Post-Doctoral Research Fellowship, 1998-2000  
NIH Individual Post-Doctoral Research Fellowship, 2000-2001  
International Society of Biomechanics Promising Young Scientist Runner-Up, 2003  
NSF CAREER Award, 2003  
Invited participant for "Summit of Experts in Biomechanics" meeting organized by the U.S. National Committee of Biomechanics, 2007  
2<sup>nd</sup> Place, Best Oral Presentation, American Spinal Injury Association Annual Meeting, 2008

### **Invited Presentations**

Brain Research Institute, UCLA, Nov 1997  
Department of Exercise Science, UC Davis, Feb 1998  
Department of Exercise and Sport Science, Oregon State University, Apr 1998  
Department of Exercise Science and Physical Education, Arizona State University, Feb 1999  
School of Health Sciences, Deakin University - Melbourne, Australia, Feb 1999  
Department of Exercise and Movement Science, University of Oregon, Mar 1999  
Department of Exercise and Sport Sciences, University of Florida, Jan 2000  
Motor and Locomotion Control group, University of Southern California, Feb 2000  
Division of Kinesiology, University of Michigan, Mar 2000  
VA Center for Excellence in Limb Loss Prevention and Prosthetic Engineering, Seattle VA, Aug 2000  
Daniel Laboratory, Department of Zoology, University of Washington, Oct 2000  
Center for Ergonomics, Department of Industrial and Operations Engineering, University of Michigan, Oct 2001  
Department of Biomedical Engineering, University of Michigan, Dec 2001  
Department of Physical Medicine and Rehabilitation, University of Michigan, Apr 2002  
Orthopaedic Research Laboratories, Department of Surgery, University of Michigan, May 2002  
School of Biomedical Engineering & Sciences, Virginia Tech-Wake Forest University, April 2003  
Department of Kinesiology, University of Toledo, May 2003 (Keynote for Graduate Research Day)  
Department of Biomedical Engineering, University of Michigan, Oct 2003

School of Applied Physiology, Georgia Institute of Technology, Aug 2004  
 Department of Mechanical Engineering, Drexel University, Oct 2004  
 National Rehabilitation Hospital, Washington DC, Jan 2005  
 Department of Biokinesiology and Physical Therapy, University of Southern California, Feb 2005  
 Department of Kinesiology, Arizona State University, Feb 2005  
 Department of Integrative Physiology, University of Colorado at Boulder, Mar 2005  
 Department of Biomedical Engineering, University of Michigan, Oct 2006  
 Undergraduate Research Opportunity Program, University of Michigan, Nov 2006  
 Department of Physical Medicine and Rehabilitation, University of Michigan, Nov 2006  
 Institute for Neural Computation, UC San Diego, Dec 2006  
 Summit of Experts in Biomechanics, U.S. National Committee on Biomechanics, Keystone, CO, June 2007  
 12<sup>th</sup> World Congress for the International Society of Prosthetics and Orthotics, Vancouver, BC, Aug 2007  
 5<sup>th</sup> Scientific Meeting of the Neurorehabilitation and Reconstructive Neurosurgery Committee of the World Federation of Neurosurgical Societies, Taipei, Taiwan, Sept 2007  
 Department of Physical Therapy, National Taiwan University, Taipei, Taiwan, Sept 2007  
 Department of Biomedical Engineering, Wake Forest University, Dec 2007  
 Engineering, Neuroscience & Health Seminar Series, University of Southern California, Apr 2008  
 International Workshop on Biomimetic Complex System Design, Korea Advanced Institute of Science and Technology (KAIST), June 2008  
 Mexican National Congress on Biomechanics, Tecnológico de Monterrey, Leon, Mexico, June 2008 (Keynote)  
 Swartz Center for Computational Neuroscience, UC San Diego, June 2008  
 Dynamics of Biomechanical Processes Symposium, Society of Engineering Science 45<sup>th</sup> Annual Technical Meeting, University of Illinois at Urbana-Champaign, Oct 2008  
 Workshop on Robotic Exoskeletons, IEEE RAS / EMBS International Conference on Biomedical Robotics and Biomechatronics, Scottsdale, AZ, Oct 2008

**Presentations at Scientific Meetings (only presentations as presenting author listed)**

1993 American College of Sports Medicine, Seattle, WA (podium)  
 1995 American Society of Biomechanics, Palo Alto, CA (podium)  
 1996 American Physiological Society & American College of Sports Medicine Intersociety Meeting, "Integrative Biology of Exercise", Vancouver, B.C. (poster)  
 1997 Neural Control of Movement, Cancun, Mexico (poster)  
 1997 Bay Area Biomechanics Meeting, Hopkins Marine Station, Monterey, CA (podium)  
 1998 North American Congress on Biomechanics, Waterloo, Canada (poster)  
 1998 Society For Neuroscience, Los Angeles, CA (poster)  
 1998 Society For Neuroscience Satellite Meeting on Motor Control, Tucson, AZ (poster)  
 1999 Society For Neuroscience, Miami, FL (poster)  
 2000 Society For Neuroscience, New Orleans, LA (poster)  
 2001 National Center for Medical Rehabilitation Research Symposium, "Medical Rehab on the Move: Spotlight on BioEngineering", National Institutes of Health, Bethesda, MD (poster)  
 2001 American Society of Biomechanics, San Diego, CA (poster)  
 2002 World Congress of Biomechanics, Calgary, Alberta, Canada (podium)  
 2003 International Society of Biomechanics Bi-Annual Congress, Dunedin, New Zealand (podium)  
 2004 Christopher Reeve Paralysis Foundation Spinal Cord Symposium, Oak Brook, IL (poster)  
 2004 Neural Control of Movement, Sitges, Spain (panel)  
 2005 Neural Control of Movement, Key Biscayne, FL (panel chair)  
 2006 World Congress of Biomechanics, Munich, Germany (podium)  
 2008 American Spinal Injury Association, San Diego, CA (podium, awards session)

## Teaching Experience

**Algebra I, Algebra II, and Integrative Mathematics**, University High School, Orlando, FL. Fall 1991 - Spring 1992 (~30 students per class). High school mathematics courses.

**HUMAN BIODYNAMICS 103 Musculoskeletal Biomechanics**, UC Berkeley. Spring 1995 (~40 students). Undergraduate laboratory course on human movement biomechanics.

**INTEGRATIVE BIOLOGY 132L Mammalian Physiology**, UC Berkeley. Spring 1996 (~40 students). Undergraduate laboratory course on principles of cellular and systemic physiology.

**HUMAN BIODYNAMICS 101 Muscle Biology and Plasticity**, UC Berkeley. Fall 1997 (~40 students). Undergraduate lecture and laboratory course on muscle physiology.

**KINESIOLOGY 533 / BIOMEDICAL ENGINEERING 533 Neuromechanics**, U. of Michigan. Fall 2001 (7 students), Fall 2003 (25 students), Fall 2005 (16 students), Winter 2007 (12 students). Graduate lecture/laboratory course on neuromechanical control of movement.

**KINESIOLOGY 600 Graduate Seminar in Movement Science**, U. of Michigan. Winter 2003 (11 students). Graduate course where students present their own research.

**KINESIOLOGY 616 Professional Skills for Research Scientists**, U. of Michigan. Winter 2009. Core graduate course on professional skills necessary inside and outside of academia.

**MOVEMENT SCIENCE 330 Biomechanics of Human Movement**, U. of Michigan. Winter 2002 (25 students), Fall 2002 (36 students), Winter 2003 (40 students), Winter 2004 (59 students), Winter 2005 (73 students), Winter 2006 (91 students), Fall 2006 (41 students). Undergraduate lecture and laboratory course on musculoskeletal biomechanics.

**MOVEMENT SCIENCE 435 Biomechanics of Human Locomotion**, U. of Michigan. Fall 2004 (19 students), Fall 2008 (17 students). Problem-based learning course on human locomotion.

**Invited Lectures**, U. of Michigan. 2001-2005. Undergraduate and graduate courses in Biomedical Eng., Industrial & Operations Eng., Mechanical Eng., and Kinesiology.

## Service

### *University of Michigan Committee and Supervisory Duties*

Member of Kinesiology Graduate Committee, 2002-present  
Chair of Kinesiology Graduate Committee, 2006-present  
Member of Kinesiology Computer Disk Space Committee, 2002-present  
Temporary Supervisor of Kinesiology IT Staff, Summer 2003  
Chair of Athletic Training (Kinesiology) Faculty Search Committee, 2003-2004  
Co-Chair of Biomechanics (Kinesiology) Faculty Search Committee, 2005-2006  
Faculty Advisor, Men's Club Volleyball Team, 2005-present  
Member of Biomechanics Committee for Biomedical Engineering Undergraduate Curriculum, 2003  
Member of Sport Injury Prevention Center Director Search Committee, 2007  
Advisory Board Member, University of Michigan Model Spinal Cord Injury Care System, 2003-pres.

### *Community Outreach Presentations*

Conference on Exercise for Individuals with Spinal Cord Injury for patients and clinicians, Model Spinal Cord Injury Center, University of Michigan, September 2002  
MedRehab Physical Therapy, University of Michigan Health System, May 2003  
Health Sciences Scholars Program, University of Michigan, Mar 2005  
Health Sciences Scholars Program, University of Michigan, Jan 2006  
Physical Therapy, Chelsea Community Hospital, Chelsea, MI, Aug 2006  
Investing in Ability Week, University of Michigan, Oct 2006  
Health Sciences Scholars Program, University of Michigan, Mar 2007

### *Professional Societies*

Member, American Society of Biomechanics (ASB), 1995-present  
Membership Committee, 2002-2005

Abstract Reviewer for Annual Meeting, 2003  
Nominating Committee, 2006  
Annual Meeting Program Committee, 2006  
Awards Committee, 2007  
Member, American Physiological Society (APS), 1996-present  
Member, Neural Control of Movement Society (NCM), 1997-present  
Member, Society for Neuroscience (SFN), 1997-present  
Member, International Society of Biomechanics (ISB), 2007-present  
Awards Chair, 9<sup>th</sup> International Conference on Rehabilitation Robotics (ICORR), 2005  
Program Committee, IEEE Biorob 2008 Conference

*Grant Applications Reviewer*

American Society of Biomechanics  
Michael Smith Foundation for Health Research  
National Institutes of Health [Geriatrics and Rehabilitation Medicine (GRM) study section, 2 times;  
Musculoskeletal Rehabilitation Sciences (MRS) study section, 4 times; Collaborations with  
National Centers for Biomedical Computing (ZRG1 BST-E 50) study section, 5 times]  
National Science Foundation (BES panel)  
Department of Veterans Affairs  
University of Michigan Office of Vice Provost for Research  
U.S. Civilian Research and Development Foundation  
U.S. Army Medical Research and Materiel Command

*Manuscript Reviewer*

Brain Research  
Canadian Journal of Applied Physiology  
Clinical Biomechanics  
Computers in Biology and Medicine  
European Journal of Applied Physiology  
European Journal of Neuroscience  
Exercise and Sport Sciences Reviews  
Experimental Brain Research  
Gait and Posture  
IEEE Transactions on Biomedical Engineering  
IEEE Transactions on Neural Systems and Rehabilitation Engineering  
IEEE Transactions on Robotics  
IET Control Theory & Applications  
International Journal of Robotics Research  
Journal of Applied Biomechanics  
Journal of Applied Physiology  
Journal of Biomechanics  
Journal of Experimental Biology  
Journal of Morphology  
Journal of Motor Behavior  
Journal of Neuroengineering and Rehabilitation  
Journal of Neurophysiology  
Medicine and Science in Sports and Exercise  
Neurorehabilitation and Neural Repair  
Proceedings of the Royal Society of London: Biological Sciences  
Scandinavian Journal of Medicine & Science in Sports  
Science

### *Editorial Boards*

Associate Editor, Journal of Neuroengineering and Rehabilitation, 2007-pres.  
Associate Editor, Exercise and Sport Sciences Reviews, 2008-2010

### **Mentoring Experience**

#### *Post-Doctoral Scholars:*

**Amy Sipp, Ph.D.** (2008-present) National Institutes of Health T32 NRSA Post-Doctoral Fellow  
**Cara Lewis, Ph.D., P.T.** (2006-present) National Institutes of Health NRSA Post-Doctoral Fellow,  
National Institutes of Health T32 NRSA Post-Doctoral Fellow  
**Monica Daley, Ph.D.** (2006-2008) National Science Foundation Bioinformatics Post-Doctoral  
Research Fellow; currently a faculty member at the Royal Veterinary College in London, England

#### *Doctoral Students:*

**Keith Gordon, Ph.D.** (Kinesiology, 2001-2005); currently a post-doctoral fellow at the Rehabilitation  
Institute of Chicago, IL  
**Greg Sawicki** (Kinesiology & Mechanical Engineering dual Ph.D. degree, 2002-2007) Rackham Pre-  
Doctoral Fellow; currently a post-doctoral fellow at Brown University Department of Ecology and  
Evolutionary Biology  
**Antoinette Domingo, P.T.** (Kinesiology, 2003-present) Rackham Merit Fellow, Rackham Pre-Doctoral  
Fellow, National Institutes of Health NRSA Pre-Doctoral Fellow, Foundation for Physical Therapy  
PODS II Scholar  
**Pei-Chun Kao, P.T.** (Kinesiology, 2004-present)  
**Helen Huang** (Biomedical Engineering, 2004-present) National Institutes of Health NRSA Pre-  
Doctoral Fellow  
**Ann (Barkowitz) Simon** (Biomedical Engineering, 2005-present) National Science  
Foundation Graduate Research Fellow, American Heart Associate Pre-Doctoral Fellow  
**Stephen Cain** (Biomedical Engineering, 2005-present) National Science Foundation  
Graduate Research Fellow  
**Michael Cherry** (Mechanical Engineering, 2005-present) National Science Foundation  
Graduate Research Fellow (co-advising with Prof. Kota from Dept. of Mechanical  
Engineering)  
**Joseph Gwin** (Kinesiology, 2008-present)  
**Sasha Voloshina** (Kinesiology, 2008-present) Rackham Merit Fellow

#### *Doctoral Student Research Rotations:*

**Ugo Buzzi** (Kinesiology, Fall 2003-Winter 2004); graduated with J.D. from Michigan State  
University, currently a district attorney in Chicago  
**Chris Mendias** (Physiology, Winter 2004); currently a post-doctoral fellow at UM  
**Chia-Lin Chang** (Kinesiology, Winter 2004); currently a post-doctoral fellow at University of Pittsburgh

#### *Master's Students:*

**Tiffany Viant** (Biomedical Engineering, 2001-2002); currently working as a biomedical engineer in  
the University of Michigan Health System  
**Mekayla Beaver** (Biomedical Engineering, 2002); currently working as a consulting engineer at IDEO  
in Boston, MA  
**Pei-Chun Kao, P.T.** (Kinesiology, 2002-2003); currently a doctoral student in Kinesiology at UM  
**Elena Marin** (Mechanical Engineering, 2002-2003); currently working as a design engineer for a  
defense company in Washington, DC  
**Helen Huang** (Biomedical Engineering, 2002-2004); currently a doctoral student in Biomedical  
Engineering at UM  
**Ann Barkowitz** (Biomedical Engineering, 2003-2005); currently a doctoral student in Biomedical  
Engineering at UM

**Stephen Cain** (Mechanical Engineering, 2004-2005); currently a doctoral student in Biomedical Engineering at UM

**Evan Pelc** (Biomedical Engineering, 2006-2007); currently in medical school at Michigan State University

*Undergraduate Students:* 6 Under-represented Minority Students, 10 Female Engineering Students, 11 Female Science Students; \*UROP = Undergraduate Research Opportunity Program

**Eileen Hidayetoglu** (Elec. Eng., UROP\* & Summer Biomedical Research Fellow, 2001-2003)

**Matt Walker** (Mech. Eng., UROP\*, 2001-2002)

**Ugo Okwumabua** (Mech. Eng., Summer Minority Engineering Research Fellow, 2002- 2003)

**Idy Usoro** (Elec. Eng., Summer Minority Engineering Research Fellow, 2002)

**Sara Johnson** (Mech. Eng., 2002)

**Heather Feldhusen** (Movement Science, 2002)

**John Green** (Movement Science, 2002-2003)

**Tanisha Tate** (Biology, UROP\*, 2002-2003)

**Melissa Thelen** (Indust. & Oper. Eng., 2002-2003)

**Sam Liang** (Elec. Eng., 2002-2003)

**Annie Zuzelski** (Biomed. Eng., Marian Sarah Parker Scholar, 2003)

**Sarah Allen** (Movement Science, 2003)

**Torre Finzel** (Movement Science, 2003)

**Julie van Helden** (Biomed. Eng., Marian Sarah Parker Scholar, 2003)

**Kate Havens** (Biomed. Eng., Marian Sarah Parker Scholar, 2003-2004)

**Theo Van Dam** (Elec. Eng., 2004)

**Alexis Ball** (Elec. Eng., 2004)

**Zaineb Bohra** (Movement Science, 2004-2005)

**Kristin Roberts** (Movement Science, 2004-2005)

**Becca Stoloff** (Mech. Eng., Marian Sarah Parker Scholar, 2004-2007)

**Sarah Lucey** (Movement Science, UROP\*, 2004-2005)

**Jamie Lukos** (Movement Science, 2004-2005)

**Evan Pelc** (Biomed. Eng., Summer Engineering & Physical Sciences Research Fellow, 2005-2006)

**Jose Mainardi** (Mech. Eng., UROP\*, 2005)

**Tom Serbowicz** (Mech. Eng., UROP\*, 2005-2006)

**Sabrina Silver** (Movement Science, 2006-2008)

**Sasha Voloshina** (Biomed. Eng., Marian Sarah Parker Scholar, 2006-2007)

**Allison Fersko** (Movement Science, 2006-2008)

**Kurt Sieloff** (Biomed. Eng., 2007-2008)

**Alex Duryea** (Biomed. Eng., 2007)

**Kelly Woznicki** (Movement Science, 2007-2008)

**Kristin Carroll** (Movement Science, 2008)

### **Graduate Student Committees**

#### *Doctoral Guidance Committee:*

**Keith Gordon**, Kinesiology, 2001-2003

**Jason Scibek**, Kinesiology, 2001-2003

**Ugo Buzzi**, Kinesiology, 2002-2004

**Dann Goble**, Kinesiology, 2002-2004

**Gregory Sawicki**, Kinesiology, 2002-2004

**Antoinette Domingo**, Kinesiology, 2003-2005

**Joaquin Anguera**, Kinesiology, 2004-2005

**Julia Looper**, Kinesiology, 2004-2005

**Chia-Lin Chang**, Kinesiology, 2004-2005

**Pei-Chun Kao**, Kinesiology, 2004-2006

*Qualifying Examination Committee (Exam Date)*

**Thomas Withrow**, Biomedical Engineering, 2003  
**Jesse Dean**, Biomedical Engineering, 2003  
**Keith Gordon**, Kinesiology, 2003  
**Jason Scibek**, Kinesiology, 2003  
**Dann Goble**, Kinesiology, 2004  
**Gregory Sawicki**, Kinesiology, 2004  
**Chris Mendias**, Physiology, 2004  
**Greg Gage**, Biomedical Engineering, 2004  
**Jiro Doke**, Mechanical Engineering, 2004  
**Antoinette Domingo**, Kinesiology, 2005  
**Chia-Lin Chang**, Kinesiology, 2005  
**Joaquin Anguera**, Kinesiology, 2005  
**Helen Huang**, Biomedical Engineering, 2005  
**Julia Looper**, Kinesiology, 2005  
**Pei-Chun Kao**, Kinesiology, 2006  
**Annie Simon**, Biomedical Engineering, 2006  
**Manuel Hernandez**, Biomedical Engineering, 2006  
**Shawn O'Connor**, Biomedical Engineering, 2007  
**Steve Cain**, Biomedical Engineering, 2007  
**Michael Cherry**, Mechanical Engineering, 2008

*Doctoral Dissertation Committee (Defense Date)*

**Jefferson Streepey**, Kinesiology, 2003  
**Jesse Dean**, Biomedical Engineering, 2005  
**Alaa Ahmed**, Biomedical Engineering, 2005  
**Thomas Withrow**, Biomedical Engineering, 2005  
**Keith Gordon**, Kinesiology, 2005 (Chair)  
**Jun Ho Choi**, Electrical Engineering, 2005  
**Jaebum Son**, Mechanical Engineering, 2006  
**Jiro Doke**, Mechanical Engineering 2006  
**Chia-Lin Chang**, Kinesiology, 2007  
**Gregory Sawicki**, Kinesiology & Mechanical Engineering, 2007 (Chair)  
**David Wagner**, Industrial and Operations Engineering, 2007  
**Ben Morris**, Electrical Engineering, 2007  
**Jesse Norris**, Biomedical Engineering (Wake Forest/Virginia Tech), 2007  
**Peter Adamczyk**, Mechanical Engineering, 2008  
**Julia Looper**, Kinesiology, 2008  
**Kari Danek**, Mechanical Engineering, 2008  
**Annie Simon**, Biomedical Engineering, 2008 expected (Chair)  
**Antoinette Domingo**, Kinesiology, 2008 expected (Chair)  
**Helen Huang**, Biomedical Engineering, 2008 expected (Chair)  
**Pei-Chun Kao**, Kinesiology, 2008 expected (Chair)  
**Michael Cherry**, Mechanical Engineering, 2009 expected (Co-Chair)

## **References**

### **Joseph M. Czerniecki, M.D.**

Co-Director, PACT Program (Preservation Amputation Care Team), Seattle VA Medical Center  
Associate Director, VA Rehabilitation Research and Development Center (Limb Loss Prevention and  
Prosthetic Engineering), Seattle VA Medical Center  
Professor, Department of Rehabilitation Medicine, University of Washington  
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