

## **JAMES J. ABBAS, PH.D.**

### **CONTACT INFORMATION**

Address: Center for Adaptive Neural Systems  
PO Box 874404  
Arizona State University  
Tempe, AZ 85287-4404

Telephone: work: 480-965-9521 fax: 480-727-7624  
Email: jimmy.abbas@asu.edu

Date of Birth: 5 January 1961 Citizenship: USA

### **EDUCATION**

#### **Ph.D., Biomedical Engineering, 1992.**

Case Western Reserve University  
Cleveland, OH

Thesis title: *Neural Network Control of Functional Neuromuscular Stimulation Systems.*

Advisor: Howard J. Chizeck, ScD

#### **M.S., Biomedical Engineering, 1989.**

Case Western Reserve University,  
Cleveland, OH

Thesis title: *Feedback Control of Coronal Plane Hip and Trunk Angles in Paraplegic Subjects Using Functional Neuromuscular Stimulation.*

Advisor: Howard J. Chizeck, ScD

#### **Sc.B., Bio-electrical Engineering, 1982.**

Brown University  
Providence, RI

### **PROFESSIONAL INTERESTS**

Neurorehabilitation engineering.  
Technology to promote neural plasticity.  
Adaptive biomimetic system design.  
Neurorehabilitation in spinal cord injury,  
Parkinson's Disease, cerebral palsy, or limb loss  
Neural stimulation system design.  
Neurophysiological systems modeling and simulation.

## **EXPERIENCE**

- Aug '02 - present     **Co-Director.**  
Center for Adaptive Neural Systems  
(formerly Center for Rehabilitation Neuroscience and Rehabilitation Engineering)  
Arizona State University, Tempe, AZ.
- Aug '02 - present     **Associate Professor.**  
Harrington Department of Bioengineering  
Arizona State University, Tempe, AZ.
- Aug '02 - present     **Director of Clinical Rehabilitation Engineering.**  
Department of Clinical Neurobiology and Bioengineering  
Banner Good Samaritan Medical Center, Phoenix, AZ.
- Aug '02 - present     **Adjunct Associate Professor.**  
Center for Biomedical Engineering  
University of Kentucky, Lexington, KY.
- Sept. '00 - present     **Vice President and Co-Founder.**  
customKYnetics, Inc., Lexington, KY.
- July '00 – Aug. '02     **Associate Professor.**  
Center for Biomedical Engineering  
University of Kentucky, Lexington, KY.
- July '00 - Aug. '02     **Joint Appointment as Associate Professor.**  
Department of Physical Medicine & Rehabilitation  
University of Kentucky, Lexington, KY.
- Nov '00 - Aug. '02     **Affiliated Faculty.**  
Spinal Cord and Brain Injury Research Center  
University of Kentucky, Lexington, KY.
- Aug. '95 - June '00     **Assistant Professor.**  
Center for Biomedical Engineering  
University of Kentucky, Lexington, KY.
- Aug. '95 - June '00     **Joint Appointment as Assistant Professor.**  
Department of Physical Medicine & Rehabilitation  
University of Kentucky, Lexington, KY.
- Aug. '93 - Aug. '95     **Assistant Professor of Biomedical Engineering.**  
Department of Mechanical Engineering  
The Catholic University of America, Washington, DC.
- Sept. '92 - Aug. '93     **Adjunct Assistant Professor.**  
Systems Engineering Department  
Case Western Reserve University, Cleveland, OH.

- Sept. '92 - July '93 **Biomedical Engineer.**  
 Research Department  
 Shriners Hospital, Philadelphia, PA.
- May '86 - Aug. '92 **Biomedical Research Engineer.**  
 Motion Study Laboratory  
 Cleveland Veterans Administration Medical Center, Cleveland, OH.
- Oct.'85 - May '86 **Research Assistant.**  
 Rehabilitation Engineering Center  
 Metropolitan General Hospital, Cleveland, OH.
- July '82 - Oct. '84 United States Peace Corps.  
**Teacher,**  
 Marymount Secondary School, Mzuzu, Malawi.  
**Public Health Worker,**  
 Chitipa District Hospital, Chitipa, Malawi.

## GRANTS AND FELLOWSHIPS RECEIVED

### *Neural-enabled Prostheses for Sensorimotor Integration*

NIH-National Institute of Biomedical Imaging and Bioengineering  
 R01-EB008578 09/30/07- 06/30/12; \$3,281,759  
**PI:** Ranu Jung, Ph.D(Center for Adaptive Neural Systems/Bioeng.)  
**co-Investigators:** **James J. Abbas, PhD** (Center for Adaptive Neural Systems/Bioeng.)  
 Kenneth Horch (Center for Adaptive Neural Systems)  
 Bertan Bakkaloglu, Ph.D (Electrical Engineering)  
 Marco Santello, Ph.D. (Kinesiology/Bioengineering)  
 Stephen Phillips, Ph.D. (Electrical Engineering)  
 Sayfe Kiaei, PhD (Electrical Engineering)

**Sub-Contracts:** Mayo Clinic Arizona, Scottsdale, AZ, USA; **PI:** Anthony Smith, MD  
 Cochlear Ltd., Australia; **PI:** James Patrick  
 Motion Control, Inc., Utah, USA; **PI:** Harold Sears, PhD

### *Adaptive Electrical Stimulation for Locomotor Retraining*

NIH-NICHD-National Center for Medical Rehabilitation Research  
 R01-HD049773 07/01/05-04/30/09; \$868,573  
**PI:** **James J. Abbas, Ph.D.**  
**co-Investigator:** Ranu Jung, Ph.D.

### *Adaptive Stimulator for Exercise and Rehabilitation*

Subcontract on Phase II SBIR to customKYnetics, Inc. from NIH-NICHD-NCMRR  
 R44-HD41820 07/01/04-06/30/08; subcontract budget: \$234,885  
**PI on SBIR grant:** Eric Hartman, MS (customKYnetics, Inc.)  
**PI on subcontract:** **James J. Abbas, PhD**

*Catalyst- Center of Excellence for Adaptive Neuro-Biomechatronic Systems (CEANS)*

National Science Foundation

SBE-0518697 07/01/05-06/30/07; \$133,118

PI: Ranu Jung, Ph.D.

**co-Investigators: James J. Abbas, Ph.D.**

Carlos Castillo-Chavez (Mathematics)

Sharon Crook (Mathematics)

Antonio Garcia (Bioengineering)

Lokesh Joshi (Biodesign/Bioengineering)

Yang Kuang (Mathematics)

Stephen Phillips (Electrical Engineering)

Anshuman Razdan (PRISM)

Marco Santello (Kinesiology/Bioengineering)

Joseph Wang (Biodesign/Chem. & Materials Engineering/ Chemistry)

*CRCNS-Modeling Neuromusculoskeletal Alterations After Spinal Cord Injury*

NIH-NSF Joint Program; National Institute of Neurological Disorders & Stroke

R01-NS10021029 7/1/05-7/31/09, \$1,314,799

PI: R. Jung, Ph.D.

**co-Investigator: James J. Abbas, Ph.D.**

Co-I: A. Razdan, Ph.D. (PRISM/Computer Science)

Sub-contract: T. Hamm, Ph.D. (Barrow Neurological Institute)

Sub-contract: G. Yamaguchi, Ph.D. (E<sup>x</sup>ponent, Inc.)

Sub-contract: V. Booth, Ph.D. (U. Michigan, Mathematics).

*Neuromorphic Control System for Powered Limb Splints*

Subcontract on Phase II STTR to AdveNSys, LLC from US Army

W911NF-05-C-0122 09/28/05-03/27/08 subcontract budget: \$225,805

PI on STTR: R. Jung, Ph.D.

Co-I on STTR: V. Jung, MBA (AdveNSys, LLC)

**PI on subcontract: James J. Abbas, Ph.D.**

*Force Modulation Training in Children with Cerebral Palsy*

NIH- National Institute of Neurological Disorders & Stroke

F31-NS053010 09/01/05-08/31/08; \$90,000

PI: Andrea Downing (Ruth Kirschstein Individual NRSA  
pre-doctoral fellowship)

**Mentor: James J. Abbas, PhD**

*Neuromorphic Control System for Powered Limb Splints*

Subcontract on Phase I STTR to AdveNSys, LLC from US Army

W911NF-04-L-0071; 08/01/04-01/31/05; subcontract budget: \$31,515

PI on STTR: Ranu Jung, Ph.D.

Co-Investigator: Vikram Jung, MBA (AdveNSys, LLC)

**PI on subcontract: James J. Abbas, Ph.D.**

*A Rodent Model for Locomotor Training with FNS*

NIH-NICHD-National Center for Medical Rehabilitation  
 R01-HD40335 01/01/02–12/31/04; \$781,920  
 PI: Ranu Jung, PhD (Center for Biomedical Engineering)  
**co-Investigators: James J. Abbas, PhD**  
 Steve Scheff, PhD (Anatomy & Neurobiology)

*Customized Electrical Stimulation for SCI Rehabilitation*

Subcontract on Phase II SBIR grant to customKYnetics, Inc. from NIH-NICHD-NCMRR  
 R44-HD39013 09/01/02–08/31/04, subcontract budget: \$65,000  
 PI on SBIR grant: Eric Hartman, MS (customKYnetics, Inc.)  
**PI on subcontract: James J. Abbas, PhD**  
 co-Investigators: Susan McDowell, MD (Physical Medicine & Rehabilitation)

*Electrical Stimulation for Trunk Stabilization in SCI*

Subcontract on Phase I SBIR grant to customKYnetics, Inc. from NIH-NICHD-NCMRR  
 R43-HD041286 04/01/02–09/30/02; \$27,000  
 PI on SBIR grant: Eric Hartman, MS (customKYnetics, Inc.)  
**PI on subcontract: James J. Abbas, PhD**  
 co-Investigators: Susan McDowell, MD (Physical Medicine & Rehabilitation)

*Adaptive Stimulator for Exercise and Rehabilitation*

Subcontract on Phase I SBIR grant to customKYnetics, Inc. from NIH-NICHD-NCMRR  
 02/01/02–07/31/02, \$17,000  
**PI on subcontract: James J. Abbas, PhD**  
 co-Investigators: Susan McDowell, MD (Physical Medicine & Rehabilitation)  
 PI on SBIR grant: Eric Hartman, MS (customKYnetics, Inc.)

*Preparatory Adjustments for Improved Standing with FNS*

NIH-NICHD-National Center for Medical Rehabilitation  
 R01-HD38570 05/01/00–04/31/04, \$588,488  
**PI: James J. Abbas, PhD**  
 co-Investigators: Jean McCrory, PhD (Kinesiology & Health Promotion)  
 David Gater, MD, PhD (Physical Medicine & Rehabilitation)  
 Susan McDowell, MD (Physical Medicine & Rehabilitation)  
 Ronald J. Triolo, PhD (Case Western Reserve University)  
 Robert F. Kirsch, PhD (Case Western Reserve University)

*Automatic Control of Standing Balance with FNS*

Sucontract on grant from NIH-National Institute for Neurological Disorders and Stroke  
 R01-NS-40547-01 07/01/00–06/30/03; subcontract budget: \$124,670  
 PI on primary: Ronald J. Triolo (Case Western Reserve University)  
**PI on subcontract: James J. Abbas, PhD**

*Recovery of Cardiovascular Control after Spinal Cord Injury*

Kentucky Spinal Cord & Head Injury Research Trust,  
01/01/01–12/31/04, \$279,931

**PI:** **James J. Abbas, PhD**  
co-Investigators: Joyce Evans, MS (Center for Biomedical Engineering)  
Charles F. Knapp, PhD (Center for Biomedical Engineering)  
Robert Taylor, MD, PhD (Cardinal Hill Rehabilitation Hospital)  
Susan McDowell, MD (Physical Medicine & Rehabilitation)  
David Gater, MD (Physical Medicine & Rehabilitation)  
David Randall, PhD (Department of Physiology)  
David Brown, PhD (Center for Biomedical Engineering)

*Implanted Neuroprostheses for Standing after SCI*

Subcontract on FDA Grant, 10/1/99-09/31/02; subcontract budget: \$92,131

PI on primary: Ronald J. Triolo (Case Western Reserve University)

**PI on subcontract: James J. Abbas, PhD**

co-Investigators: David Gater, MD, PhD (Physical Medicine & Rehabilitation)  
Susan McDowell, MD (Physical Medicine & Rehabilitation)

*Individualizing the Design and Use of a FES-based Standing Neuroprosthesis*

Subcontract on Department of Veterans Affairs Merit Review Grant  
B2105RC, 10/1/99-09/31/02; subcontract budget: \$22,000

PI on primary: Robert F. Kirsch, PhD (Case Western Reserve University)

**PI on subcontract: James J. Abbas, PhD**

*Effects of Phasic Neuromuscular Electrical Stimulation on Functional Recovery in Incomplete Spinal Cord Injury*

Kentucky Spinal Cord and Head Injury Trust, 01/01/99-12/31/00; \$124,056

**PI: James J. Abbas, PhD**

co-Investigator: Susan McDowell, MD (Physical Medicine & Rehabilitation)

*Customized Electrical Stimulation for SCI Rehabilitation*

Subcontract on Phase I SBIR grant from National Center for Medical Rehabilitation  
R43-HD39013, 09/01/00–08/31/01; subcontract budget: \$30,000

**PI on subcontract: James J. Abbas, PhD**

co-Investigators: David Gater, MD, PhD (Physical Medicine & Rehabilitation)

primary contract to customKYnetics, Inc:

*Customized Electrical Stimulation for SCI Rehabilitation*

PI: Eric Hartman

*Control of Limb Position Using Functional Neuromuscular Stimulation*

Whitaker Foundation, 01/01/97-06/30/00; \$208,946

**PI: James J. Abbas, PhD**

co-Investigators: Susan McDowell, MD (Physical Medicine & Rehabilitation)  
Bruce Walcott, PhD (Department of Electrical Engineering)

*Electrical stimulation for enhanced functional recovery in spinal cord injury*  
 Paralyzed Veterans of America, Kentucky and Indiana Chapter, 06/99, \$10,000  
**PI: James J. Abbas, PhD**

*Trunk Muscle Stimulation for Seated Posture Control in Spinal Cord Injury*  
 Univ. of Kentucky Medical Center Research Fund, 07/01/98-06/30/99; \$14,945  
**PI: James J. Abbas, PhD**  
 co-Investigators: David Gater, MD, PhD (Physical Medicine & Rehabilitation)  
 Charles F. Knapp, PhD (Center for Biomedical Engineering)

*Biomedical Engineering Approaches to Spinal Cord Injury Research (PI)*  
 The Whitaker Foundation, Conference Grant, 05/00-07/00; \$10,000  
**PI: James J. Abbas, PhD**  
 co-Investigators: Ranu Jung, PhD (Center for Biomedical Engineering)  
 James Geddes, PhD (Anatomy & Neurobiology)

*Analog VLSI-Spinal Cord Interface for Motor Control*  
 NIH-National Center for Research Resources  
 R21-RR12588 09/01/97-08/31/00; \$184,901.  
**PI: Ranu Jung, PhD (Center for Biomedical Engineering)**  
**co-Investigators: James J. Abbas, PhD**  
 Elizabeth Brauer, PhD (Northern Arizona University)

*Standing by Functional Neuromuscular Stimulation*  
 Subcontract on NIH Neural Prosthesis Contract,  
 N01-NS-6-2351 11/01/96-09/31/99, subcontract budget: \$140,636  
**PI on primary: Ronald J. Triolo, PhD (Case Western Reserve University)**  
**co-Investigators: Robert F. Kirsch, PhD (Case Western Reserve University)**  
 John A. Davis, MD (Case Western Reserve University)  
 James J. Abbas, PhD  
 Scott Delp, PhD (Northwestern University)  
**PI on subcontract: James J. Abbas, PhD**  
**co-Investigator: Susan McDowell, MD (Physical Medicine & Rehabilitation)**

*Metabolic Analysis in Exercise Physiology and Rehabilitation*  
 Major Research Equipment Grant, U. of Kentucky, 1997, \$27,429  
**PI: J.W. Yates, PhD (Kinesiology & Health Promotion)**  
**co-Investigators: James J. Abbas, PhD**  
 David Gater, MD, PhD (Physical Medicine & Rehabilitation)

*Design and Assessment of Assistive Technology*

Subcontract to on US Army Grant, 11/01/94-10/31/98, \$280,000

PI on subcontract: Jack Winters, PhD

**co-PI: James J. Abbas, PhD**

primary grant to the National Rehabilitation Hospital: *Assistive Technology Research Center*

US Army Medical Research and Materials Command, 10/94 – 10/98, \$4,000,000

PI: William Peterson (National Rehabilitation Hospital)

(this proposal was funded, but I could not participate due to my departure from Washington, DC)

*Adaptive Feedforward Neural Network Control System Design*

Subcontract to The Catholic University of America on NSF Grant,

09/01/92–08/31/95; \$80,396

**PI on subcontract: James J. Abbas, PhD**

primary contract to Case Western Reserve University:

*Neural Network Control of Oscillatory Movements of Multi-segmented Musculoskeletal Systems.*

NSF-BCS-9216697, 09/01/92–08/31/95; \$285,387

PI: Howard J. Chizeck, ScD

**co-PI: James J. Abbas, PhD**

*The Application of Artificial Neural Networks to Control FNS-Generated Walking in Children with Spinal Cord Injuries.*

Research Fellowship from Shriners Hospitals, 09/01/92–06/30/93, \$45,000

**Post-doctoral research fellow: James J. Abbas, PhD**

Research mentor: Ronald J. Triolo, PhD

**PEER-REVIEWED PUBLICATIONS** (\* indicates students mentored)

J.C. Gillette, C. A. Stevermer, N.E. Quick, and J.J. Abbas, “Alternative foot placements for individuals with spinal cord injuries standing with the assistance of functional neuromuscular stimulation”, to appear in *Gait and Posture*, 2007 ([doi:10.1016/j.gaitpost.2007.04.005](https://doi.org/10.1016/j.gaitpost.2007.04.005)).

T.J. Kanchiku, J.V. Lynskey, D. Protas, J.J. Abbas and R. Jung. “Neuromuscular electrical stimulation induced forelimb movement in a rodent model”, to appear in *J. Neurosc. Methods*, 2007.

J.C. Gillette and J.J. Abbas, “Foot Placement Alters the Mechanisms of Postural Control While Standing and Reaching”, *IEEE Trans. Neural Systems & Rehab*, Vol. 11, No. 4, pp. 377-385, 2003.

J.C. Gillette, N.E. Quick, and J.J. Abbas, “Center of pressure measures to assess FNS standing performance” *Biomedical Sci Instrum*, pp. 239-244, 2002.

J.A. Riess, and J.J. Abbas, "Adaptive Control of Cyclic Movements as Muscles Fatigue Using Functional Neuromuscular Stimulation", *IEEE Trans. Rehab. Eng.* Vol. 9, No. 3, pp. 326-330, 2001.

J.J. Abbas and R. Riener, "Using Mathematical Models and Advanced Control Systems Techniques to Enhance Neuroprosthesis Function", *Neuromodulation*, Vol. 4, No. 4, pp. 187-195, 2001.

R. Jung, E.J. Brauer, and J.J. Abbas, "Real-time Interaction Between a Neuromorphic Electronic Circuit and the Spinal Cord", *IEEE Trans. Rehab. Eng.* Vol. 9, No. 3, pp. 319-326, 2001.

J.J. Abbas and J.C. Gillette, "Approaches to Control Standing Posture using Electrical Stimulation", *IEEE Control Systems Mag.* Vol. 21, No. 4, pp. 80-90, 2001.

E. Stites\* and J.J. Abbas "Sensitivity and Versatility of an Adaptive System for Controlling Cyclic Movements Using Functional Neuromuscular Stimulation", *IEEE Trans. Biomed. Eng.* Vol. 47, No. 9, pp. 1287-1292, 2000.

J.A. Riess\* and J.J. Abbas, "Adaptive Neural Network Control of Cyclic Movements Using Functional Neuromuscular Stimulation", *IEEE Trans. Rehab. Eng.*, Vol. 8, No. 1, pp. 42-52, 2000.

D.R. Gater, S.M. McDowell, and J.J. Abbas, "Electrical Stimulation: A Societal Perspective", *Assistive Technology*, Vol. 12, pp. 85-91, 2000.

S. Grandhe, J.J. Abbas and R. Jung, "Brain-spinal cord interactions stabilize the locomotor rhythm to an external perturbation", *Biomedical Sci Instrum*, Vol. 35, pp. 175-180, 1999.

J.J. Abbas and R.J. Triolo, "Experimental Evaluation of an Adaptive Feedforward Controller for Use in Functional Neuromuscular Stimulation Systems", *IEEE Trans. Rehab. Eng.*, Vol. 5, No. 1, pp. 12-22, 1997.

J.A. Riess\* and J.J. Abbas, "Evaluation of FNS Control Systems: Software Development and Sensor Characterization", *Biomedical Sci Instrum*, Vol. 33, pp. 197-202, 1997.

P.E. Crago, N. Lan, P.H. Veltink, J.J. Abbas and C. Kantor, "New Control Strategies for Neuroprosthetic Systems", *J. Rehab. Res. & Devel.* Vol. 33, No.2, pp.158-172, 1996.

J.J. Abbas and H.J. Chizeck, "Neural Network Control of Functional Neuromuscular Stimulation Systems: Computer Simulation Studies", *IEEE Trans. Biomed. Eng.*, Vol.42, No. 11, pp. 1117-1126, 1995.

J.J. Abbas and H.J. Chizeck, "Feedback Control of Coronal Plane Hip Angle Using Functional Neuromuscular Stimulation", *IEEE Trans. Biomed. Eng.*, Vol.38, No.7, pp. 687-698, July, 1991.

H.J. Chizeck, R. Kobetic, E.B. Marsolais, J.J. Abbas, I.H. Donner and E. Simon, "Control of Functional Neuromuscular Stimulation Systems for Standing and Locomotion in Paraplegics", *Proceedings of the IEEE*, Vol. 76, No. 9, pp. 1155-1165, Sept. 1988.

**PEER-REVIEWED AND INVITED BOOK CHAPTERS** (\* indicates students mentored)

J.J. Abbas, “Neural Networks for Physiological Control” in Biomedical Engineering Fundamentals: The Biomedical Engineering Handbook, 3<sup>rd</sup> Edition, Ed. J.D. Bronzino, CRC Press, Inc., Boca Raton, FL, 2006. (*Invited Chapter*).

J.J. Abbas, “Neural Networks for Physiological Control” in Handbook of Biomedical Engineering, 2<sup>nd</sup> Edition Vol II, CRC Press, Inc., Boca Raton, FL, pp. 162.1-162.10, 2000. (*Invited Chapter*).

J.J. Abbas and R.J. Full, “Neuromechanical Interaction in Cyclic Movements” in Biomechanics and Neural Control of Movement, Ed. by J.M. Winters and P.E. Crago, Springer-Verlag, pp. 177-191, 2000. (*Invited Didactic Chapter*).

Jayasundera, S.P\* and J.J. Abbas, “Control of Rhythmic Movements using FNS” in Biomechanics and Neural Control of Movement, Ed. by J.M. Winters and P.E. Crago, Springer-Verlag, pp. 632-641, 2000.

H. Dou, Z. Zhou, Y. Chen, J. Xu and J.J. Abbas, “Robust Control of Functional Neuromuscular Stimulation Systems by Discrete-time Iterative Learning” in Recent Advances in Iterative Learning Control, Ed. by Z. Bien and J. Xu, Kluwer Academic Pub., pp. 351-370, 1998, (*Invited Chapter*).

J.J. Abbas, “Using Neural Models in the Design of a Movement Control System”, in Computational Neuroscience, Ed. J. Bower, Academic Press, New York, pp. 305-310, 1996.

J.J. Abbas, “Neural Networks for Physiological Control” in CRC Handbook of Biomedical Engineering, CRC Press, Inc., Boca Raton, FL, pp. 2422-2431, 1995 (*Invited Chapter*).

**PEER-REVIEWED CONFERENCE PAPERS AND ABSTRACTS** (\* indicates students mentored)

A.L. Downing\*, K. Narayanan, and J.J. Abbas, “Postural control of self-initiated weight shifts in children and adults”, American Society of Biomechanics, Palo Alto, CA, 2007. (poster presentation by A.L.Downing)

S.J.Kim, M. Mukherjee, A. Iarkov, J. Abbas, and R. Jung, “Adaptive Control for Neuromuscular Stimulation Therapy in an Intermittent Training Paradigm”, Biomedical Engineering Society Annual Meeting, Los Angeles, CA, 2007. (poster presentation by S.J. Kim)

S.J. Kim, M. Mukherjee, A. Iarkov, J.J. Abbas, R. Jung. Adaptive control for neuromuscular stimulation movement therapy. 25<sup>th</sup> Annual National Neurotrauma Society Meeting. Missouri, KA 2007. (poster presentation by S.J. Kim)

A.T. Hayes\* and J.J. Abbas, “Effect of Wheelchair Seatback on Propulsion in Experienced Manual Wheelchair Users”, Proc. RESNA, 2006 (oral presentation by A. Hayes)

- T. Kanchiku, J.V. Lynskey, T. Taguchi, J.J. Abbas and R. Jung. "Rodent Model for Forelimb Neuromuscular Stimulation based Movement Therapy". pg. 274-276, 11<sup>th</sup> Annual Conference of the International Functional Electrical Stimulation Society, (Miyagi-Zao, Japan), 2006 (Poster presentation by T. Kanchiku and R. Jung).
- R. Jung, A. Belanger, T. Kanchiku, J. Lynskey, M. Mukherjee, D. Hagner, J.J. Abbas. "Hindlimb Neuromuscular Stimulation Therapy after Thoracic Contusion Injury Promotes Locomotor Recovery". pg. 118-120, 11<sup>th</sup> Annual Conference of the International Functional Electrical Stimulation Society, (Miyagi-Zao, Japan), 2006. (Oral presentation by R. Jung).
- K. Ichihara, G. Venkatasubramanian, A. LaBelle, E. Ashton, J.J. Abbas, R. Jung. "Muscle stimulation in a rodent model: electrode design, implantation and assessment". Proceedings of IFESS-FESnet 2004, 9<sup>th</sup> Annual IFESS Conf. (Online: www.ifess.org), pg. 404-406, Edts. Duncan Wood, Paul Taylor, (Bournemouth, UK), 2004. (Poster presentation by R. Jung)
- J.J. Abbas, J.L. Finley, J.C. Gillette, R.J. Triolo and J.A. Resig, "Standing with Functional Neuromuscular Stimulation: Effect of Foot Placement and Feedback Variables" *Proc. IEEE/EMBS*, (Cancun, Mexico), 2003. (oral presentation by J.J. Abbas)
- J. L. Finley\*, J. C. Gillette, J. A. Riess, R. J. Triolo and J. J. Abbas, "Feedback signals to adjust and control standing posture", *Proc. Joint Conf. IEEE/EMBS and BMES*, (Houston, TX), 2002. (oral presentation by J.L. Finley with J.J. Abbas)
- J.C. Gillette, N.E. Quick, J.L. Finley, and J.J. Abbas, "Postural Effects of Foot Placement During FNS-Assisted Standing", *Proc. IFESS Conf.* (Lubljanica, Slovenia), pp. 46-48, 2002. (oral presentation by J.C. Gillette with J.J. Abbas)
- J.C. Gillette, J.A. Riess, and J.J. Abbas, "Comparison of FNS-assisted and Able-bodied Quiet Stance", *Proc. IFESS Conf.* (Cleveland, OH), pp. 268-270, 2001. (poster presentation by J.C. Gillette with J.J. Abbas).
- J. Ou\*, J.A. Riess, and J.J. Abbas, "Adaptive Control of Cyclic Movements in a Multi-segment System", *Proc. IFESS Conf.* (Cleveland, OH), pp. 229-231, 2001. (oral presentation by J. Ou with J.J. Abbas).
- E. Hartman\*, R.J. Triolo, and J.J. Abbas, "Adaptive Linearization of Agonist/Antagonist Muscle Systems", *Proc. IFESS Conf.* (Cleveland, OH), pp. 297-299, 2001. (poster presentation by E. Hartman with J.J. Abbas).
- J.C. Gillette, J.A. Riess, A. Schwarting\*, J.L. McCrory, and J.J. Abbas, "Standing Posture During Functional Tasks: Effect of Foot Placement and Implications for FNS Standing", *Proc. IFESS Conf.* (Aalborg, Denmark), 2000. (poster presentation by J.C. Gillette with J.J. Abbas).
- E. Hartman\* , J. A. Riess, R.J. Triolo and J.J. Abbas, "A Real-time Simulation System to Evaluate User-Device Interaction: An Application for Development of FNS Control Systems", *Proc. RESNA Conf.*, 2000. (oral presentation by E. Hartman\* with J.J. Abbas).
- X. Zhang\*, R.J. Triolo and J.J. Abbas, "Task-dependent Adjustments to Co-stimulation Levels in Functional Neuromuscular Stimulation Systems", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 658, 1999. (oral presentation by X. Zhang\* with J.J. Abbas).

- E. Hartman\* , R.J. Triolo and J.J. Abbas, "Effects of System Nonlinearities on Posture Adjustments Using Functional Neuromuscular Stimulation", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 659, 1999. (oral presentation by E. Hartman\* with J.J. Abbas).
- P. Kataria\* and J.J. Abbas, "Adaptive User-specified Control of Movements with Functional Neuromuscular Stimulation", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 604, 1999. (poster presentation by P. Kataria\* with J.J. Abbas).
- J.A. Riess and J.J. Abbas "Control of Cyclic Movements as Muscles Fatigue Using Functional Neuromuscular Stimulation", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 659, 1999. (oral presentation by J.A. Riess with J.J. Abbas).
- E.J. Brauer, R. Jung, J.J. Abbas, B. Thompsen, S. Hilchie and A. Tran, "Experimental Results of 6 Neuron VLSI Circuit of Lamprey Unit Pattern Generator", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 372, 1999.
- R. Jung, E.J. Brauer, J.J. Abbas and S. Grandhe "Analog VLSI-Spinal Cord Interface for Motor Control", *Proc. IEEE/BMES Conf.*, (Atlanta, GA), pp. 488, 1999.
- E.J. Brauer, J.J. Abbas, B. Callaway, J. Colvin and J. Farris, "Hardware Implementation of a Neural Network Pattern Shaper Algorithm", *Proc. IJCNN*, paper no. 590, 1999.
- E.J. Brauer, R. Jung, B. Thompsen and J.J. Abbas "aVLSI circuit of lamprey unit pattern generator", *Proc. IJCNN*, paper no. 591, 1999.
- J.A. Riess\* and J.J. Abbas, "Evaluation of Adaptive Neural Network Controller in Cyclic Movement Using Functional Neuromuscular Stimulation", *Proc. RESNA*, (Minneapolis, MN), pp. 220-223, 1998. (oral presentation by J.A. Riess\* with J.J. Abbas).
- E. Stites\*, J.J. Abbas and R.J. Triolo "Adaptive Mapping for the Control of Standing with Functional Neuromuscular Stimulation", *2<sup>nd</sup> Conf. of Intl. FES Society*, (Vancouver, BC), pp. 83-84, 1997. (poster presentation by E. Stites\* with J.J. Abbas).
- J.A. Riess\* and J.J. Abbas, "Evaluation of Adaptive and Feedback Controllers for use in Functional Neuromuscular Stimulation Systems", *Proc. 2<sup>nd</sup> Conf. of Intl. FES Society*, (Vancouver, BC), pp. 79-80, 1997. (poster presentation by J.A. Riess\* with J.J. Abbas).
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- J.J. Abbas, "Neural Networks for Control of Posture and Locomotion", *Proc. American Control Conf.*, (Albuquerque, NM), 1997 (*Invited Paper*). (oral presentation by J.J. Abbas).
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S.P. Jayasundera\* and J.J. Abbas, “Strategies for Controlling Coupled Segments Using a Network of Pattern Generators,” *Proc. 1<sup>st</sup> Conf. of Intl. FES Society*, (Cleveland, OH), 1996. (poster presentation by S.P. Jayasundera\* with J.J. Abbas).

S.P. Jayasundera\* and J.J. Abbas, “Adaptive Feedforward Control of Coupled Systems”, *Proc. World Congress on Neural Networks*, (Washington, DC), Vol. 1; pp. 400-404, 1995. (oral presentation by S.P. Jayasundera\* with J.J. Abbas).

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J.J. Abbas “Using Neural Models in the Design of a Movement Control System”, *Proc. Computation and Neural Systems Conf.* (Monterey, CA), 1995. (poster presentation by J.J. Abbas).

J.J. Abbas and H.J. Chizeck, “Phase-dependent Reflexes in a Neural Network Control System”, *Proc. 13<sup>th</sup> Southern Biomedical Eng. Conf.*, (Washington, DC), pp. 494-497, 1994 (oral presentation by J.J. Abbas).

J.J. Abbas and R.J. Triolo, “Experimental Evaluation of an Adaptive Feedforward Controller for Use in Functional Neuromuscular Stimulation Systems”, *Proc. 15<sup>th</sup> IEEE/EMBS Conf.*, (San Diego, CA), pp. 1326-1327, 1993. (poster presentation by J.J. Abbas).

J.J. Abbas and H.J. Chizeck, “Neural Network Control of Two-segment Skeletal Movements”, *Proc. World Congress on Neural Networks*, (Portland, OR), 1993.

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J.J. Abbas and H.J. Chizeck, “FNS Control System Tuning and Clinical Ratings of Performance”, in *Proc. 11<sup>th</sup> IEEE/EMBS Conf.*, (Seattle, WA), pp. 1494-1495, 1989. (poster presentation by J.J. Abbas).

J.J. Abbas, H.J. Chizeck, G. Borges, P. Chow, P. Lambert and M. Moynahan, “A Software Structure for Implementing Multi-state Feedback Controllers in FNS Systems”, in *Proc. 10<sup>th</sup> IEEE/EMBS Conf.*, (New Orleans, LA), pp. 1653-1654, 1988. (poster presentation by J.J. Abbas).

K. Barnicle, J.J. Abbas, Q.Y. Du, C.L. Miao, W. Ko, P. Muccio, E.B. Marsolais and H.J. Chizeck, “Using Stretch Sensors to Measure Knee and Hip Angles”, in *Proc. RESNA 10<sup>th</sup> Annual Conf.*, (San Jose, CA), pp. 603-604, 1987.

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**ABSTRACTS** (\* indicates students mentored)

N. Krishnamurthi, A. Sitek\*, P. Mahant, J. Samanta, and J. J. Abbas, "Effects of Deep Brain Stimulation Amplitude on Gait in Parkinson's Disease" Society for Neuroscience 37<sup>th</sup> Annual Meeting, San Diego, CA, 2007.

M. Bhowmik-Stoker\*, R. Herman, S. Allison, and J. J. Abbas, "Adaptive control of electrical stimulation to supplement locomotor retraining after spinal cord injury" Society for Neuroscience 37<sup>th</sup> Annual Meeting, San Diego, CA, 2007.

A.L. Downing\*, D.R. Fay, and J.J. Abbas, "Force Coordination Training in Children with Spastic Diplegia", Society for Neuroscience 37<sup>th</sup> Annual Meeting, San Diego, CA, 2007.

B.K. Hillen, J.J. Abbas, G. Yamaguchi and R. Jung, "Effects of spinal cord injury on musculoskeletal parameters in the rodent.", Society for Neuroscience 37<sup>th</sup> Annual Meeting, San Diego, CA, 2007.

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A. J. Sitek\*, J. J. Abbas, D. M. Lieberman, P. Mahant, J. Samanta, "Location and orientation of active contacts in deep brain stimulation systems", Society for Neuroscience 36<sup>th</sup> Annual Meeting, Atlanta, Georgia, 2006.

R. Jung, A. Belanger, T. Kanchiku, J. Lynskey, M. Mukherjee, D. Hagner, J.J. Abbas, "Hindlimb neuromuscular stimulation therapy after thoracic contusion injury promotes locomotor recovery", 11th Annual Conference of the International Functional Electrical Stimulation Society, Miyagi-Zhao, Japan, 2006.

T. Kanchiku, J.V. Lynskey, T. Tagachi, J.J. Abbas, R. Jung, "Rodent model for forelimb neuromuscular stimulation based movement therapy". 11th Annual Conference of the International Functional Electrical Stimulation Society, Miyagi-Zhao, Japan, 2006.

A. Sitek\*. D. Liberman, and J.J. Abbas, "DBS Electrode Location and Clinical Outcomes in Parkinson's Disease", American Society of Stereotactic and Functional Neurosurgery, 2006, Boston, MA.

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S. Mulligan\*, K. Narayanan, P. Mahant, J. Samanta and J.J. Abbas, "*Effect of deep brain stimulation on posture control in Parkinson's disease*", 9<sup>th</sup> International Congress of Parkinson's disease and Movement Disorders, March 5-8, 2005, New Orleans, Louisiana.

Lynskey, J.V., A. Belanger, T. Kanchiku, G.Venkatasubramanian, M.Mukherjee, A. Thota, J. Abbas, R. Jung. Therapeutic Neuromuscular Stimulation Therapy Improves Recovery of

- Locomotion after Incomplete Spinal Cord Injury in Adult Rats. (Poster presentation at the 11<sup>th</sup> International Symposium on Neural Regeneration, December 14-18, 2005, Asilomar, CA,
- Venkatasubramanian, G., T. Kanchiku, M. Mukherjee, J.J. Abbas, R. Jung. Functional neuromuscular stimulation after spinal cord injury: a rodent model. 23<sup>rd</sup> Annual National Neurotrauma Society Meeting, Washington DC, Nov 10-11, 2005.
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- Ravi, N., V. Booth, J.J. Abbas and R. Jung, “A two-compartment vertebrate motoneuron model to investigate effects of afferent nerve stimulation”, *Soc. Neurosci. Abs.*, 2002.
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- Grandhe, S., J.J. Abbas and R. Jung. Periodic perturbation effects on locomotor rhythm and motor pattern generation in the lamprey. *Soc. for Neuroscience Abstracts*, 26(2):834.1, 2000. (poster presentation by R. Jung).

R. Jung, E.J. Brauer and J.J. Abbas, "A Real-time Neuromorphic Analog VLSI-Spinal Cord Interface for Rhythmic Motor Control", *Soc. for Neuroscience Abstracts*, Vol. 25, 422.3, p. 1038, 1999.

J.A. Riess\*, Neiser, J.D.\*, E. Hartman\* and J.J. Abbas "Evaluation of Input Devices for Use in Functional Neuromuscular Stimulation", *Annals BME Suppl.*, pp. S-132, 1998. (oral presentation by J.A. Riess with J.J. Abbas).

X. Zhang\*, J.J. Abbas and R.J. Triolo, "The Effects of Co-stimulation Map Parameters on FNS System Performance", *Annals BME Suppl.*, pp. S-133, 1998. (oral presentation by X. Zhang\* with J.J. Abbas).

P. Kataria\* and J.J. Abbas, "Estimating Body Segment Orientation Using a Lightweight, Inexpensive Gyroscope", *Annals BME Suppl.*, pp. S-133, 1998. (oral presentation by P. Kataria\* with J.J. Abbas).

E. Hartman\* and J.J. Abbas, "Time Delays and Model Reference Adaptive Control in Function Neuromuscular Stimulation", *Annals BME Suppl.*, pp. S-133, 1998. (oral presentation by E. Hartman\* with J.J. Abbas).

R. Jung, J.J. Abbas and E.J. Brauer, "Entrainment Of An Analog VLSI Model of Lamprey Unit Pattern Generator", *Annals BME Suppl.*, pp. S- 99, 1998.

L. Knapp, J. Atchison, R. Shapiro, R. Salcido and J.J. Abbas, "Electromyographic and Kinematic Analysis of the Painful Hemiplegic shoulder Before and After Subscapularis Motor Point Block", *Proc. AAPM&R*, (Chicago), 1996.

E. Stites\* and J.J. Abbas, "Parameter Selection in an Adaptive Control System for Biomedical Applications", *KY Acad. Sciences*, (Frankfort, KY), 1996. (oral presentation by E. Stites\* with J.J. Abbas)

L. Knapp, J. Atchison, R. Shapiro, R. Salcido and J.J. Abbas, "Electromyographic and Kinematic Analysis of the Painful Hemiplegic shoulder Before and After Subscapularis Motor Point Block", *Gait and Posture*, Vol. 4, p. 182, 1996.

J.J. Abbas and S.P. Jayasundera\* "Adaptive Control of Movement Using Models of Neural Circuitry", *Soc. for Neuroscience Abstracts*, p. 147, (San Diego, CA), 1995. (poster presentation by J.J. Abbas)

S.P. Jayasundera\* and J.J. Abbas, "Adaptive Neural Network Control of a Stepping Movement in a Three Segment Model", *Proc. BMES Society Conf.*, (Phoenix, AZ), 1994. (poster presentation by S.P. Jayasundera\* with J.J. Abbas)

J.J. Abbas and H.J. Chizeck, "Processing Skin Stretch Sensor Measurements of Hip and Trunk Angles", in *Proc. 40<sup>th</sup> ACEMB Conf.* (Niagara Falls, NY), pp. 222, 1987. (oral presentation by J.J. Abbas)

## **INVITED PRESENTATIONS AT NATIONAL/INTERNATIONAL MEETINGS**

“Neuromorphic Design of Smart Prosthetic and Therapeutic Systems”, presented at Institute for Neuromorphic Engineering 14<sup>th</sup> Annual Workshop (Telluride, CO), July 2007.

“Control of movement using electrical stimulation of paralyzed muscles: a medical problem suited for a neuromorphic solution?” presented at the Institute for Neuromorphic Engineering Workshop, Zurich, Switzerland, 2005.

"Functional Neuromuscular Stimulation", presented at *1st Annual Neurorehabilitation Symposium, "Clinical Advanced in Neurorehabilitation Science"*, (Lexington, KY), Sept. 2001. (organized workshop and gave oral presentation for clinicians on current practice and new research in the use of electrical stimulation systems)

"Using Mathematical Models and Advanced Control Systems Techniques to Enhance Neuroprosthesis Function", presented with R. Riener at *6<sup>th</sup> Annual Conference of the International Functional Electrical Stimulation Society*, (Cleveland, OH), June 2001.

“Adaptive Algorithms to Custom-fit the Neuroprosthesis to the User”, presented at the *NIPS\*2000 Workshop*, (Breckenridge, CO), Dec. 2000.

“Neural Networks for Control of Posture and Locomotion”, presented at the *American Control Conference*, (Albuquerque, NM), June, 1997.

“Justifying Technology in the Managed Care Environment”, presented at *9<sup>th</sup> Annual Interdisciplinary Rehabilitation Conference*, (Lexington, KY), August, 1996.

“Application of Neural Pattern Generators for the Restoration of Motor Function using Functional Neuromuscular Stimulation”, presented at *Biomechanics & Neural Control of Movement Conference* (Mt. Sterling, OH), June 1996.

“Functional Electrical Stimulation Ambulation Techniques”, presented at *Spinal Cord Injury: Issues and Advances*, (Washington, DC), Nov. 1994.

“The Use of Neural Network Algorithms in Functional Neuromuscular Stimulation Control Systems”, presented at *Neural Prostheses: Motor Systems IV Conference* (Mt. Sterling, OH), July 1994.

## **INVITED SEMINARS**

“Improving neuromotor function after incomplete spinal cord injury”, Neurorehabilitation Unit, Barrow Neurological Institute, (Phoenix, AZ), Sept.. 2007.

"Parkinson's Disease: Treatment Using Deep Brain Stimulation" Arizona Grand Democrats, (Sun City, AZ), March 2007.

"Traumatic Spinal Cord Injury: Adaptation and Recovery" President's Community Enrichment Program, Arizona State University, (Tempe, AZ), March 2007.

"Adaptive Neural Systems", Arizona State University Foundation, (Tempe, AZ), Oct. 2006.

"Designing Adaptive Systems to Promote Adaptation in Neural Systems", The Biodesign Institute at Arizona State University, (Tempe, AZ), June 2006.

"Technology to Promote Adaptation in Neural Systems", Discovery Tour, The Ira A. Fulton School of Engineering, Arizona State University, (Tempe, AZ), April 2006.

"Neuroengineering and Neurorehabilitation", The Biodesign Institute, Arizona State University, (Tempe, AZ), Feb. 2006.

"Unlocking the Mysteries of the Brain" ASU Adventures in Learning Program (ASU, Tempe), November 2005. (presented with Thomas Hamm from Barrow Neurological Institute)

"Spinal Cord Injury Research", presented at the Annual Meeting of the Arizona Spinal Injury Association, (Phoenix, AZ), Oct. 2005.

"Improving Deep Brain Stimulation System Parameter Selection", Wintech, Department of Electrical Engineering, Arizona State University, (Tempe, AZ), Nov. 2005.

"Deep Brain Stimulation after Parkinson's Disease: Developing Strategies for Improved Clinical Outcomes", presented with N. Krishnamurthi and A. Sitek at the Biodesign Institute, Arizona State University, (Tempe, AZ), Sept. 2005.

"Neuroprostheses and neuromotor therapy after spinal cord injury", Neurorehabilitation Unit, Barrow Neurological Institute, (Phoenix, AZ), Feb. 2005.

"Neuromuscular electrical stimulation for exercise and neuromotor therapy after spinal cord injury", The NeuroInstitute, (Tempe, AZ), Feb. 2005.

"New Strategies for Using Electrical Stimulation in Neurorehabilitation", Barrow Neurological Institute, (Phoenix, AZ), Jan. 2004.

"Standing after spinal cord injury: strategies for improving functional performance", Biomedical Engineering Program, University of Arizona, (Tucson, AZ) April 2003.

"Posture Control in Parkinson's Disease", Department of Kinesiology, Arizona State University, (Tempe, AZ), Dec. 2003.

"Adaptive Control of Systems for Neurorehabilitation", Department of Mathematics and Statistics, Arizona State University, (Tempe, AZ) Nov. 2003.

"Standing after spinal cord injury: strategies for improving functional performance", NSF IGERT Program on Neural & Musculoskeletal Adaptation in Form & Function, Arizona State University, (Tempe, AZ) Feb. 2003.

"Standing after spinal cord injury: strategies for improving functional performance", Scottsdale Community College, (Tempe, AZ) Feb. 2003.

"Engineering a new era in medical rehabilitation", Biomedical Engineering Department Seminar, Arizona State University, (Tempe, AZ) Sept. 2002.

"Advanced in Neurorehabilitation: Functional Electrical Stimulation for Standing, Exercise and Therapy after Spinal Cord Injury" presented at the annual research symposium at the Rehabilitation Hospital of Indiana (Indianapolis, IN), June 2002.

"Neural Stimulation for Motor Control" presented to the Lexington Chapter of the IEEE (Lexington, KY), May 2001.

"Bioengineering the Nervous System: approaches to investigate, replace and repair the injured spinal cord" presented to the KY-IN Chapter of the Paralyzed Veterans of America (Louisville, KY), Sept. 2000.

"Fitting the Neural Prosthesis to the User", Department of Electrical Engineering, University of Twente, (Enschede, The Netherlands), July, 2000.

"Fitting the Neural Prosthesis to the User", Center for Biomedical Engineering, University of Kentucky (Lexington, KY), April 1999.

"Customizing the FNS Control System for the User", Neural Prosthesis Seminar, FES Center, Case Western Reserve University, (Cleveland, OH), March 1999.

"Using Mathematics in the Rehabilitation of People with Spinal Cord Injury", presented to 1996 NSF Mathematics Research Experience for Undergraduates (REU) Program at The University of Kentucky, (Lexington, KY), July 1996.

"Laboratory Methods for Implementing and Evaluating Neural Control Systems", presented to 1996 NSF Mathematics Research Experience for Undergraduates (REU) Program at The University of Kentucky, (Lexington, KY), July 1996.

"Closed-Loop Control of FNS Walking", presented at FES Center,(Cleveland,OH), March 1995.

"Modulated Reflexes and Multi-joint Control of FNS Systems", presented at the Rehabilitation Engineering Center, MetroGeneral Health Center, (Cleveland, OH), March 1995.

"Neural Network Control of Functional Neuromuscular Stimulation Systems", presented at Center for Biomedical Engineering, University of Kentucky, (Lexington, KY), Jan. 1995.

"Using Neural Models in the Design of a Biomedical Engineering Control System", presented at The Mathematical Research Branch, NIH, (Bethesda, MD), Aug. 1994.

"Neural Network Control of Cyclic Movements Using Functional Neuromuscular Stimulation", presented at Dept. of Physiology, Howard Univ. Medical School, (Washington, DC), Feb. 1994.

"Control of Functional Neuromuscular Stimulation Systems", presented at Shriver Laboratory, University of Maryland at College Park, (College Park, MD), Oct. 1993.

"Neural Network Control of Cyclic Movements Using Functional Neuromuscular Stimulation", presented at Dept. of Mechanical Engineering, The Catholic University of America, (Washington, DC), March 1993.

"Neural Network Control of Cyclic Movements Using Functional Neuromuscular Stimulation", presented at Dept. of Bioengineering, Univ. of Pennsylvania, (Philadelphia, PA), October 1992.

"Neural Network Control of Functional Neuromuscular Stimulation Systems", presented at Dept. of Biomedical Engineering, Case Western Reserve Univ.,(Cleveland, OH), May 1992.

"Neural Network Control of Cyclic Movements Using Functional Neuromuscular Stimulation", presented at Dept. of Bio, Chemical and Materials Engineering, Arizona State University, (Tempe, AZ), April 1992.

“Feedback Control of Coronal Plane Hip and Trunk Angles Using Functional Neuromuscular Stimulation”, presented at Dept. of Biomedical Engineering, Case Western Reserve University, (Cleveland, OH), Sept. 1989.

## **PROGRESS REPORTS TO FUNDING AGENCIES**

“Catalyst: Center of Excellence for Adaptive Neuromechatronic Systems (CEANS)”, Science of Learning Centers (SLC) Annual PI Meeting, October 19-20, 2006, Washington DC. (poster presentation with R. Jung)

“Modeling Neuromusculoskeletal Alterations after Spinal Cord Injury”, CRCNS- Collaborative Research in Computational Neuroscience, NSF-NIH, Spring 2006 PI meeting, June 4-6, Washington DC. (poster presentation with R. Jung)

“Rehabilitation Engineering Research: Applications for Individuals with Spinal Cord Injury”, Whitaker Foundation Site Visit, Arizona State University, (Tempe, AZ), Oct. 2002.

"Recovery of Cardiovascular Control in Spinal Cord Injury" *Kentucky Spinal Cord and Head Injury Research Symposium*, (Lexington, KY), June 2002. (oral presentation by J.J. Abbas).

"Recovery of Cardiovascular Control in Spinal Cord Injury" *Kentucky Spinal Cord and Head Injury Research Symposium*, (Louisville, KY), June 2001. (oral presentation by J.J. Abbas).

“Control of Standing by Functional Neuromuscular Stimulation”, *NIH Neural Prosthesis Workshop*, (Bethesda, MD), Oct. 2001. (oral presentation by R.J Triolo, R.F. Kirsch and J.J. Abbas).

"Bioengineering the Nervous System: approaches to investigate, replace and repair the injured spinal cord" *Kentucky Spinal Cord and Head Injury Research Symposium*, (Lexington, KY), June 2000. (oral presentation by J.J. Abbas).

“Control of Standing by Functional Neuromuscular Stimulation”, *NIH Neural Prosthesis Workshop*, (Bethesda, MD), Oct. 2000. (oral presentation by R.J Triolo, R.F. Kirsch and J.J. Abbas).

“Control of Limb Position Using Functional Neuromuscular Stimulation”, *The Whitaker Foundation Annual Meeting*, (LaJolla, CA), Aug. 2000. (poster presentation by J.J. Abbas).

“Control of Standing by Functional Neuromuscular Stimulation”, *NIH Neural Prosthesis Workshop*, (Bethesda, MD), Oct. 1999. (oral presentation by R.J Triolo, R.F. Kirsch and J.J. Abbas).

“Control of Limb Position Using Functional Neuromuscular Stimulation”, *The Whitaker Foundation Annual Meeting*, (LaJolla, CA), Aug. 1999. (abstract by J.J. Abbas).

“Effects of Phasic Neuromuscular Electrical Stimulation on Functional Recovery in Incomplete Spinal Cord Injury”, *Kentucky Spinal Cord and Head Injury Research Symposium*, (Louisville, KY), June 1999. (oral presentation by J.J. Abbas).

“Control of Standing by Functional Neuromuscular Stimulation”, *NIH Neural Prosthesis Workshop*, (Bethesda, MD), Oct. 1998. (oral presentation by R.J Triolo, W. Zhao and J.J. Abbas).

“Control of Standing by Functional Neuromuscular Stimulation”, Quarterly Progress Reports, NIH Neural Prosthesis Contract #N01-NS-6-2351, (12 reports), 1997 - 1999, written reports submitted by R.J Triolo, R.F. Kirsch, J. Davis, J.J. Abbas, and S. Delp.

## **POSTER PRESENTATIONS AT NATIONAL/INTERNATIONAL MEETINGS**

(\**indicates student mentored*)

(the following presentations were given at workshops and meetings that do not publish proceedings)

“Control of Limb Position Using Functional Neuromuscular Stimulation”, *The Whitaker Foundation Annual Meeting*, (LaJolla, CA), Aug. 2000. (poster presentation by J.J. Abbas).

S.P. Jayasundera\* and J.J. Abbas, “Nonlinear Analysis of Central Pattern Generators Used for Controlling Locomotion,” *Biomechanics & Neural Control of Movement*, (Mt. Sterling, OH), 1996.

S.P. Jayasundera\* and J.J. Abbas, “Neural Network Control of a Multi-Segmented Musculoskeletal System,” *Neural Prostheses: Motor Systems IV*, (Mt. Sterling, OH), 1994.

J.J. Abbas and R.J. Triolo, “Experimental Evaluation of an Adaptive Feedforward Controller for Use in Functional Neuromuscular Stimulation Systems”, *NIH Neural Prosthesis Workshop*, (Bethesda, MD), Oct. 1993.

J.J. Abbas and H.J. Chizeck, “A Neural Network Controller for Functional Neuromuscular Stimulation Systems”, poster presentation at *Neural Prostheses: Motor Systems III*, (Banff, Alberta, Canada), August 1991.

## **ABSTRACTS AND PRESENTATIONS AT LOCAL WORKSHOPS AND MEETINGS** (\**indicates student mentored*)

"Adaptive Electrical Stimulation for Locomotor Retraining", *6<sup>th</sup> Arizona Biosciences Leadership Symposium*, (Phoenix, AZ), April 2006. (oral presentation by J.J. Abbas).

"Parkinson's Disease, Deep Brain Stimulation, and Posture Control" *Mayo Parkinson's Disease Research Forum*, (Scottsdale, AZ), Oct. 2003. (oral presentation by J.J. Abbas).

"Rehabilitation Neuroscience and Rehabilitation Engineering" *Mayo/ASU Joint Research Forum*, (Scottsdale, AZ), Dec. 2002. (oral presentation by J.J. Abbas and R. Jung).

"Control of standing posture using electrical stimulation in spinal cord injured individuals" *Mayo/ASU Joint Research Forum*, (Scottsdale, AZ), Dec. 2002. (poster presentation by J.J. Abbas).

J. Gillette, N. Quick, J. Finley and J.J. Abbas, “Quantitative Assessment of FNS-assisted Standing with Alternative Foot Placements”, *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2002. (poster presentation by J. Gillette with J.J. Abbas).

J. Finley, J. Gillette, J. Riess and J.J. Abbas, “Evaluation of postural variables for feedback in FNS standing”, *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2002. (oral presentation by J. Finley with J.J. Abbas).

- J. Ou\*, J. Riess, and J.J. Abbas, "Adaptive Control of Cyclic Movements in a Multi-Segment System Using Functional Neuromuscular Stimulation", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2001. (oral presentation by J. Ou\* with J.J. Abbas).
- E. Hartman\*, R. Triolo and J.J. Abbas, "Adaptive Linearization of Agonist/Antagonist Muscle Systems", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2001. (oral presentation by E. Hartman\* with J.J. Abbas).
- J. Gillette, J. Riess and J.J. Abbas, "Standing with Functional Neuromuscular Stimulation as Compared to Able-bodied Quiet Standing", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2001. (poster presentation by J. Gillette with J.J. Abbas).
- J. Finley, J. Gillette, J. Riess and J.J. Abbas, "Regulating the Center of Pressure While Standing", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2001. (oral presentation by J. Finley with J.J. Abbas).
- J.J. Abbas, J.A. Riess, J.C. Gillette, P. Kataria\*, X. Zhang\*, E. Hartman\*, and J. Ou\*. "Improved Control of Posture and Movement using Functional Neuromuscular Stimulation", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), June, 2000. (abstract and poster presentation by J.J. Abbas).
- X. Zhang\*, R.J. Triolo and J.J. Abbas, "Task-dependent Adjustments to Co-stimulation Levels in Functional Neuromuscular Stimulation Systems", *Life Sciences Day*, University of Kentucky, (Lexington, KY), 1999. (abstract and poster presentation by X. Zhang\* with J.J. Abbas).
- E. Hartman\* , R.J. Triolo and J.J. Abbas, "Effects of System Nonlinearities on Posture Adjustments Using Functional Neuromuscular Stimulation", *Life Sciences Day*, U. of Kentucky, (Lexington, KY), 1999. (abstract and poster presentation by E. Hartman\* with J.J. Abbas).
- P. Kataria\* and J.J. Abbas, "Adaptive User-specified Control of Movements with Functional Neuromuscular Stimulation", *Life Sciences Day*, University of Kentucky, (Lexington, KY), 1999. (abstract and poster presentation by P. Kataria\* with J.J. Abbas).
- J.J. Abbas, J.A. Riess, P. Kataria\*, X. Zhang\*, E. Hartman\* and S. McDowell, "Fitting the Functional Neuromuscular Stimulation System to the User - an Approach to Improved Motor Function in Spinal Cord Injured Adults", *Physical Medicine and Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), 1999. (abstract and poster presentation by J.J. Abbas).
- Grandhe, S., J.J. Abbas and R. Jung. "Dynamic Brain-Spinal Cord Interactions Stabilize Locomotor Rhythm." *Kentucky Society for Neuroscience Day*, Lexington, KY. April 1999 (poster presentation by S. Grandhe).
- J.J. Abbas, J.A. Riess and S. McDowell, "Control of Posture and Movement Using Electrical Stimulation in Spinal Cord Injured Adults", *Physical Medicine & Rehabilitation Research Day*, University of Kentucky, (Lexington, KY), 1998. (abstract and poster presentation by J.J. Abbas).

J.A. Riess\* and J.J. Abbas, "Evaluation of Adaptive and Feedback Controllers for use in Functional Neuromuscular Stimulation Systems", *Life Sciences Day*, University of Kentucky, (Lexington, KY), 1997. (poster presentation by J.A. Riess\* with J.J. Abbas).

J.J. Abbas and H.J. Chizeck, "Control of the Rhythmic Movements Using Neural Networks", *Applied Neural Control Research Day*, Case Western Reserve University, (Cleveland, OH), May, 1992. (abstract and poster presentation by J.J. Abbas).

J.J. Abbas, "A Neural Network Controller for Functional Neuromuscular Stimulation Systems", *Biomedical Engineering Research Day*, Case Western Reserve University, (Cleveland, OH), August 1991. (abstract, oral and poster presentation by J.J. Abbas).

H.J. Chizeck, J.J. Abbas, D.E. Willemin, P. Chow and Z. Jin, "Control Methods for Lower Extremity Functional Neuromuscular Stimulation Systems", *Applied Neural Control Research Day*, Case Western Reserve University, (Cleveland, OH), May 1990. (abstract and poster presentation by J.J. Abbas with H.J. Chizeck).

H.J. Chizeck, J.J. Abbas, E. Simon, M. Moynahan and P. Chow "Control Strategies for Lower Extremity Function", *Applied Neural Control Research Day*, Case Western Reserve University, (Cleveland, OH), May 1988. (abstract and poster presentation by J.J. Abbas with H.J. Chizeck).

J.J. Abbas, H.J. Chizeck, G. Borges, P. Chow, P. Lambert and M. Moynahan, "A Software Structure for Implementing Multi-state Feedback Controllers in FNS Systems", *Biomedical Engineering Research Day*, Case Western Reserve Univ., (Cleveland, OH), Aug. 1988. (abstract and poster presentation by J.J. Abbas).

J.J. Abbas and H.J. Chizeck, "Control of the Hip Using Functional Neuromuscular Stimulation", *Applied Neural Control Research Day*, Case Western Reserve University, (Cleveland, OH), May, 1987. (abstract and poster presentation by J.J. Abbas).

### **PATENTS (PENDING)**

"Lower extremity exercise device with stimulation and related methods", E. Hartman, J. Abbas, & J. Resig; patent pending.

"Devices for use in exercising and related methods"; E. Hartman, J. Alton, J. Resig, & J. Abbas; patent pending.

"Self-Anchoring MEMS Intrafascicular Neural Electrode"; R. Jung, S. Phillips, & J. Abbas; patent pending.

**NATIONAL/INTERNATIONAL HONORS AND OFFICES**

Sept. '07	Session Co-Chair, Neural Stimulation and Rehabilitation Session, BMES Annual Meeting, Los Angeles, California.
Nov '06	Selected Participant; 4 <sup>th</sup> Annual National Academies Keck <i>Futures Initiative</i> Conference on “Smart Prosthetics: Exploring Assistive Devices for the Body and Mind”; Nov 9-12, Irvine, CA.
Sept. '03	Session Co-Chair, Functional Electrical Stimulation Session, IEEE/EMBS Conference, Cancun, Mexico.
June '03 - present	Editorial Board, Journal of Neuroengineering and Rehabilitation
Jan '03 – June 03	Member, Scientific Program Committee, Annual Conference of the Internal Functional Electrical Stimulation Society (IFESS), Queensland, Australia.
Jan '02 – present	Member, Rehabilitation Engineering Advisory Panel, Rehabilitation Engineering Research Center on Recreational Technologies, University of Illinois, Chicago.
Oct. '02	Session Co-Chair, Functional Electrical Stimulation Session, Joint EMBS/BMES Conference, Houston, TX.
Jan. '02 – Dec. 04	Treasurer, Internal Functional Electrical Stimulation Society (IFESS)
June '01	Session Co-Chair, Biomechanics, Modeling and Control Session, Annual Conference of Internal Functional Electrical Stimulation Society (IFESS), Cleveland, OH.
July '00 – June 01	Member, Scientific Program Committee, Annual Conference of the Internal Functional Electrical Stimulation Society (IFESS), Cleveland, OH.
Sept. '00 - Sept. '03	Chair, Special Interest Group on Functional Neuromuscular Stimulation, RESNA.
June '00	Invited Participant, NIH-NINDS sponsored Workshop: "Functional and Dysfunctional Spinal Circuitry: Role for Rehabilitation and Neural Prostheses" UCLA, Los Angeles, CA
April '00	Session Chair, Computational Models of Neural Control of Movement: Failure and Recovery Session. Neural Control of Movement Conference, Key West, FL

- Sept. '99 - Sept. '00 Chair-elect,  
Special Interest Group on Functional Neuromuscular Stimulation,  
RESNA.
- Sept. '99 Assistant Editor,  
*Assistive Technology*,  
Special Issue on Functional Electrical Stimulation.
- October '98 Session Co-Chair,  
Musculoskeletal Modeling Session,  
BMES Conference, Cleveland, OH.
- October '98 Session Co-Chair,  
Measurement Devices and Control Session,  
BMES Conference, Cleveland, OH.
- June - Dec. '96 Section Co-Editor,  
“Section IV: Neuromechanical Interaction in Rhythmic Systems” in  
Biomechanics and Neural Control of Movement,  
Ed. by J.M. Winters & P.E. Crago, Springer-Verlag, 2000.
- October '94 Session Co-Chair,  
Young Investigator Symposium, Neural Prosthesis Workshop,  
National Institutes of Health, Bethesda, MD.
- April '94 Session Co-Chair,  
Neuromotor Control Systems Session,  
13<sup>th</sup> Southern Biomedical Engineering Conference, Washington, DC.

### **INSTITUTIONAL AWARDS**

- August '91 Best Poster Presentation, Advanced Category,  
Biomedical Engineering Research Day,  
Case Western Reserve University, Cleveland, OH.
- July '89 Superior Performance Award,  
Research Dept., Cleveland Veterans Administration Medical Center.
- July '88 Superior Performance Award,  
Research Dept., Cleveland Veterans Administration Medical Center.
- Sept. '88 - Oct. '89 Representative to Faculty Graduate Education Committee,  
Department of Biomedical Engineering,  
Case Western Reserve University.
- May '86 - May '87 Representative to Graduate Student Senate from the Department of  
Biomedical Engineering, Case Western Reserve University.

**INVITED REVIEWER**

*Funding Agencies:*

National Institutes of Health:

Function, Integration and Rehabilitation Subcommittee,  
National Center for Medical Rehabilitation Research,  
Standing Member (2006-2009)

National Institute of Neurological Disorders and Stroke Initial  
Review Group (2006)

Clinical Neuroscience and Disease Study Section (2006 a,b)

National Center for Medical Rehabilitation Research, Special  
Study Section (2005, 2006)

Brain Disorders and Clinical Neurosciences-1, Ad-hoc  
member (2007; 2006; 2005a,b,c; 2004a, b,c; 2001)

Medical Rehabilitation Research Subcommittee Study Section  
(2002)

Human Brain Project Special Emphasis Study Section (2002)

Geriatrics and Rehabilitation Medicine Study Section (2001,  
2002)

Multidisciplinary Clinical Sciences Special Emphasis Study  
Section (9 panel meetings, 1995-1999).

Department of Education:

National Institute for Disability and Rehabilitation Research  
Rehabilitation Engineering Research Center Panel, (2004)

National Institute for Disability and Rehabilitation Research  
Field Initiated Research Review Panel Standing Member,  
(1999- 2003)

National Institute for Disability and Rehabilitation Research  
Small Business Innovation Research Review Panel, (2000-  
2001)

National Science Foundation:

Biomedical Engineering Career Awards Review Panel (2001)

Integrative Biology and Neuroscience, Ad-hoc Review (2001)

Biomedical Engineering Research to Aid Persons with  
Disabilities Panel (2001)

Biomedical Engineering Research to Aid Persons with  
Disabilities Panel (2000)

Instrument Devel. for Biol. Research, Ad-hoc Review (2000)

Computational Neuroscience, Ad-hoc Reviewer (1996)

Behavioral Neuroscience. Ad-hoc Reviewer (1996)

Biological Systems Analysis & Control Panel (1995)

Biomechanics & Rehabilitation Panel (1994)

Department of Veterans Affairs, Rehabilitation Research &  
Development (2003)

University of Southern California: Internal Funding.

Barrow Neurological Institute (2007).

The National Academies (2003).

*Journals:* Journal of Neuroengineering and Rehabilitation  
IEEE Transactions on Biomedical Engineering  
IEEE Transactions on Rehabilitation Engineering  
Annals of Biomedical Engineering  
Assistive Technology  
Intelligent Systems Engineering  
Biomedical Instrumentation and Technology  
Advances in Skin and Wound Care  
Physics in Medicine & Biology  
Journal of Rehabilitation Research and Development  
Experimental Neurology

*Conferences:* Internal Functional Electrical Stimulation Society Annual Conference  
IEEE Engineering in Medicine & Biology Conference  
Rehabilitation Engineering Society of North America Conference

## **UNIVERSITY SERVICE**

### Arizona State University

2006-2007 Member, Biosensors Search Committee.  
2005-2006 Member, Bioengineering Dept Chair Search Committee.  
2003-2004 Chair, Neuroprosthesis Search Committee.  
2003-2004 Member, BioMEMS Search Committee.  
2003-2004 Member, Motor Control Search Committee.  
2003-2004 Member, Biomechanics Search Committee.  
2003-2007 Member, HDBE Personnel Committee.  
2005-2006 Member, HDBE Safety Committee.

### University of Kentucky: Center for Biomedical Engineering

Jan. 2001 – Dec. 2001 Chair, Search Committee for New Faculty.  
Spring 2001 Directed the upgrade of bioinstrumentation teaching lab facilities.  
Sept. 1997 – Aug. 02 Member, Research Program Development Committee.  
Participated in the planning and preparation of multi-investigator research initiatives from CBME.  
Sept. 1997 – Aug. 02 Member, Educational Program Development Committee.  
Participated in the planning of new educational initiatives to be offered as part of our program.  
Oct. 1995 – 1999 Coordinator, Website Development Committee.  
Initiated, developed and maintained the CBME website.

### University of Kentucky: Department of Physical Medicine & Rehabilitation

Dec. 2001 - Aug. 02 Chair, Research Committee.  
Dec. 2001 - Aug. 02 Chair, Multi-disciplinary Spinal Cord Injury Research Committee.

- May 2000 - Aug. 02 Member, Search Committee for Endowed Chair, Department of Physical Medicine & Rehabilitation.
- Summer, 2000 Research Day Planning and Organization.
- Jan. 1997 – Dec.2001 Member, Multi-disciplinary Spinal Cord Injury Research Committee.
- Jan. 1996 - Dec.2001 Member, Research Committee.
- Summer, 1999 Research Day Planning and Organization.
- Summer, 1998 Research Day Planning and Organization.

University of Kentucky: Spinal Cord and Brain Injury Research Center

- Sept. 2000 – Aug. 02 Member, Internal Advisory Board
- Nov. 2000 – Sept. 01 Member, Conference Organizing Committee, *Clinical Advances in Neurorehabilitation Science*
- Spring, 2000 Member, Planning Committee, *KY Spinal Cord and Head Injury Research Conference*

University of Kentucky: Department of Kinesiology and Health Promotion

- Nov. 2000 - Aug. 02 Member, Doctoral Program Advisory Board.

University of Kentucky: Department of Special Education and Rehabilitation Counseling

- Sept. 1995 - Aug. 02 Member, Consumer Advisory Board, Technology Subcommittee.

University of Kentucky: Multi-disciplinary

- Summer, 1997 Faculty Mentor,  
NSF Mathematics Research Experience for Undergraduates (REU) Program at The University of Kentucky (2 students).
- Summer, 1996 Faculty Mentor,  
NSF Mathematics Research Experience for Undergraduates (REU) Program at The University of Kentucky.
- Summer, 1994 Instructor, "Engineering 2000" summer program for high school seniors, School of Engineering, The Catholic University of America.

University of Kentucky: Graduate School

- Spring, 2000 –2002 Member, Biomedical Sciences Panel of the Graduate Council Committee on Fellowships and Traineeships

**PROFESSIONAL SOCIETIES**

Institute of Electrical and Electronics Engineers: Engineering in Medicine and Biology Society.  
International Functional Electrical Stimulation Society  
Rehabilitation Engineering Society of North America  
Biomedical Engineering Society.  
Society For Neuroscience.

## **COURSES TAUGHT**

The Catholic University of America: 1993-1995

Neural Stimulation in Rehabilitation (BE 531)  
Biological Systems & Control (BE 516)  
Human Locomotion (BE 522)  
Engineering Mechanics I (ENGR 201)  
Modelling Neural Systems (BE 532)  
Neural Control Systems (BE 732)  
Nonlinear Dynamics of Physiological Systems (BE 733)

The University of Kentucky: 1995- 2002

Biomedical Control Systems I (BME 610)  
Biomedical Applications of Neural Networks (BME 699-002)  
Advanced Biomedical Control Systems (BME 699-004)  
Neural Networks for Biomedical Control (BME 781-004)  
Measurement and Characterization of Muscle Function (BME 481-G)  
Independent Work in Biology (BIO 395)  
Engineering Techniques for Assessment and Treatment of Adult Neurological Disorders  
(BME 781-006; team taught)  
Biomedical Instrumentation (BME 530; team taught)  
Foundations of Biomedical Engineering (BME 501; team taught)  
Neural Engineering (EE 599; invited lectures)  
Muscle Physiology (KHP 781; invited lectures)

Arizona State University: 2002-present

Neural Prostheses (BME 598)  
Modeling and Simulation of Physiological Systems (BME 598)  
Biomechanics (BME 416)

Lectures in:

Introduction to Bioengineering (BME 101)  
Bioengineering Product Design (BME 300)  
Biocontrol Systems (BME 419)  
Scientific Communications (BME 598)  
Computational Neuroscience (BME 598)  
Systems Neurophysiology (BME 598)  
Anatomy & Biomechanics (BME 598)

## **STUDENTS MENTORED**

*Primary advisor for:*

### **GRADUATE STUDENTS**

#### **Harrington Department of Bioengineering, Arizona State University:**

Stefani Mulligan, M.S., 2005,

Thesis title: *Effect of Deep Brain Stimulation on Postural Control in Parkinson's Disease*

Brian Glaister, M.S., 2005

Thesis title: *Analysis of Prosthetic Feet in Above Knee Amputees*

Andrew Hayes, M.S., 2005

Thesis title: *Effect of Wheelchair Seatback on Propulsion in Experienced Manual Wheelchair Users*

Shelly Allison, M.S., 2006

Thesis title: *Adaptive Control of Locomotion During Partial Weight Bearing Therapy*

Almir Halilcevic, M.S., 2006

Project title: *Evaluation of PDA Platform for Development of Closed-Loop Functional Neuromuscular Stimulation Systems*

Anjali Gupta, M.S., 2006 (co-advised with Kristi Csavina, PhD)

Thesis title: *The Effect of Screw Diameter on the Fixation of a Lateral Plateau Split Fracture*

Elliot Downing, M.S., 2006 (co-advised with Neil Crawford, PhD)

Thesis title: *Subject-Specific Finite Element Modeling of the Lower Cervical Spine*

John McCamley, M.S., 2007 (co-advised with Kristi Csavina, PhD)

Thesis title: *Kinematics and Kinetics of Stair Climbing in Elderly Subjects: The effects of Minimally Invasive Total Knee Arthroplasty*

Kimberly Yarnall, M.S. 2007 (co-advised with Kristi Csavina, PhD)

Thesis title: *Functional changes in gait during level walking and stair climbing after intertrochanteric hip fractures*

Alex Pacanowsky, M.S., expected 2007

Andrea Downing, PhD, expected 2008

Alison Sitek, PhD, expected 2008

#### **Center for Biomedical Engineering, University of Kentucky:**

JoAnne A. Riess, M.S., 1997

Thesis title: *Evaluation of Adaptive Neural Network and Feedback Controllers in Cyclic Movement using Functional Neuromuscular Stimulation*

Pankaj Kataria, M.S., 1999

Thesis title: *User Controlled Functional Neuromuscular Stimulation System with an Adaptive Neural Network*

Eric Hartman, M.S., 2000

Thesis title: *Evaluation of a Neural Network Controller for an Antagonist Muscle System: An Approach for Control of Coronal Plane Standing Using FNS*

Xia Zhang, M.S., 2000

Thesis title: *The Effects of Hip Muscle Properties and Co-stimulation on the Control of Standing Using Functional Neuromuscular Stimulation*

Junli Ou, M.S., 2001

Thesis title: *Adaptive Control of Multi-segment Movements Using Functional Electrical Stimulation.*

Joseph Finley, M.S., 2002

Thesis title: *Feedback Signals to Adjust and Control Standing Posture*

#### **POST-DOCTORAL FELLOWS**

Jason C. Gillette, Ph.D. 1999-2002.

#### **UNDERGRADUATE STUDENTS**

##### **Harrington Department of Bioengineering, Arizona State University:**

Modesto Lopez, Minority Access to Research Careers Fellow, 2007-08

Luis Landgrave, Fulton Undergraduate Research Initiative, 2005

Charles McCartney, Honors Thesis Committee Member, 2005 (Advisor: J. Davidson)

Anjali Gupta, Advisor for Barrett Honors College Thesis, 2004

Taryn Jansen, BS, Honor Thesis Comm. Member, 2004 (Advisor: Ranu Jung, PhD)

Crystal Ong, Advisor for Barrett Honors College Thesis, 2003.

##### **Speech & Hearing Sciences, Arizona State University:**

Cynthia Dana, BS, 2003 Honor Thesis Committee Member (Advisor: Michael Dorman, PhD)

##### **Department of Kinesiology, Arizona State University:**

Travis Johnson, BS, 2005 Honor Thesis Committee Member (Advisor: Kathleen Matt, PhD)

##### **Harrington Department of Bioengineering, Senior Design Project Mentor:**

Anjali Gupta (2003-2004)

Karen Lewis (2003-2004)

Darius Sanders (2003-2004)

Kellen Van Ausdal (2003-2004)

David Breedlove (2004-2005)

Tyson Padgett (2004-2005)

Edhem Sadikovic (2004-2005)

Kimberly Yarnall (2004-2005)

Mark Schmitz (2005-2006)

Leela Doppalapudi (2005-2006)

Darjan Emkic (2005-2006)

Luis Landgrave (2005-2006)

Simon Lubek (2005-2006)

Samira Mirtalaei (2005-2006)

Mark Schmitz (2005-2006)

Chi-Hui Wang (2005-2006)  
Nikhil Sadhwani (2005-2006)

Jaime Stovall (2006-2007)  
Noel Pense (2006-2007)  
Kevan Bayne (2006-2007)  
Jessie Helsey (2006-2007)  
Michael Germain (2006-2007)

University of Kentucky:

Lawrence Jackson (undergraduate Kinesiology student; mentored independent research project, fall 2001-spring 2002)  
Julia Parakkat (undergraduate Biosystems and Agricultural Engineering student; mentored independent research project, summer-fall 2001)  
Lucas Kennedy (undergraduate Biology student; mentored independent research project, fall 2000)  
Anne Schwarting (undergraduate Biology student; mentored independent research project, fall 1999)  
Udesh deSilva (undergraduate Biology student; independent research project, fall 1998)  
Edward C. Stites (undergraduate Math student; 1996 NSF REU program, 1997 sponsored independent research project; University of Kentucky)  
Jason Neiser (undergraduate Physics student; 1997 NSF REU program).  
Sarah Dean (undergraduate Math/Biomed. Eng. student; 1997 NSF REU program).

*Served on Thesis/Dissertation Committee:*

Harrington Department of Bioengineering, Arizona State University:

Ryan Knight, M.S., 2003, (Advisor: Jiping He, Ph.D.)  
Matthew Dixon, M.S., 2003, (Advisor: Gary Yamaguchi, Ph.D.)  
Jeremy Crandell, M.S., 2003, (Advisor: Gary Yamaguchi, Ph.D.)  
Patrick Koegler, M.S., 2004, (Advisor: Gary Yamaguchi, Ph.D.)  
Adam Bellanger, M.S., 2005 (Advisor: Ranu Jung, Ph.D.)  
Ganapriya Venkatasubramanian. M.S., 2005 (Advisor: Ranu Jung, Ph.D.)  
Helen Huang, PhD, 2006 (Advisor: Jiping He, Ph.D.)  
Joseph M. Guericabeitia, M.S., 2006, (Advisor: James Sweeney, Ph.D.)  
Jeremy Crandell, M.S., 2007, (Advisor: Stephen Helms-Tillery, Ph.D.)  
Jacob Goble, PhD, 2007 (Advisor: Natalia Dounskia, PhD)  
Kimberly Tan, M.S., expected 2007, (Advisor: James Sweeney, Ph.D.)  
Joseph Graham, PhD, expected 2007 (Advisor: Ranu Jung, Ph.D.)  
Lubna Ahmad, PhD, expected 2008 (Advisor: Lokesh Joshi, Ph.D.)  
Mallika Mukherjee, PhD, expected 2008 (Advisor: Ranu Jung, Ph.D.)  
Brian Hillen, PhD, expected 2008 (Advisor: Ranu Jung, Ph.D.)  
Lisa Raleigh, PhD, expected 2008 (Advisor: Marco Santello, PhD)  
Sivakumar Balasubramanian, PhD, expected 2006 (Advisor: Jiping He, Ph.D.)

Department of Electrical Engineering, Arizona State University:

Niranjan Charkravarthy, PhD, expected 2007 (Advisor: Leon Iasemidis, PhD)

Shivkumar Sebasan, PhD, expected 2007 (Advisor: Leon Iasemidis, PhD)

Department of Mathematics, Arizona State University:

Mini Kurian, PhD, expected 2008 (Advisor: Sharon Crook, PhD)

Center for Biomedical Engineering, University of Kentucky:

Sarvani Grandhe, M.S., 1999, (Advisor: Ranu Jung, Ph.D.)

Xiaobin Zhang, Ph.D., 2000, (Advisor: Eugene Bruce, Ph.D.)

Heng Wang, M.S., 2000, (Advisor: Ranu Jung, Ph.D.)

Nicole Cleary, M.S., 2002, (Advisor: Eugene Bruce, Ph.D.)

Kegang Hua, M.S., 2002, (Advisor: Dayong Gao, Ph.D.)

Department of Electrical Engineering, University of Kentucky:

Hock Jin Lee, M.S., 1997, (Advisor: Elizabeth J. Brauer, Ph.D.)

Department of Kinesiology and Health Promotion, University of Kentucky:

Elizabeth A. Knapp, M.S. 1996, (Advisor: Robert Shapiro, Ph.D.)

Timothy Brindle, Ph.D., 2001, (Advisor: Robert Shapiro, Ph.D.)

Department of Mechanical Engineering, The Catholic University of America:

Thang Dang, M.S., 1994, (Advisor: Jack Winters, Ph.D.)