

Brian K. Hillen

Education

8/2004 - 8/2012 ASU Tempe, AZ

Ph.D. Biomedical Engineering

- Dissertation Title: Experimental and computational assessment of locomotor coordination and complexity following incomplete spinal cord injury in the rat

8/2004 – 12/2010 ASU Tempe, AZ

MS Biomedical Engineering

8/2002 – 5/2004 SDSU San Diego, CA

Graduate Coursework in Bioengineering

- Thesis Topic: Effect of LVAD outflow conduit location and orientation

9/1997 – 6/2001 U. C. San Diego La Jolla, CA

BS Bioengineering: Pre-Medical

- Emphasis on mechanics and mammalian physiology
- Minor in Japanese Studies

Experience

8/2016 – present Adaptive Neural Systems Lab Miami, FL
Florida International University

Research Assistant Professor

- Student mentoring
- Manuscript and grant preparation
- Animal and human experimental design for various neuroprosthesis studies
- Teaching: Statistics and Physiology

8/2012 – 8/2016 Adaptive Neural Systems Lab Miami, FL
Florida International University

Visiting Postdoctoral Associate

- Student mentoring
- Manuscript and grant preparation
- Animal and human experimental design for various neuroprosthesis studies
- Teaching: Physiology

1/2012 – 5/2012 Life Sciences Mesa, AZ
Mesa Community College

Adjunct Faculty

- Prepared and taught Anatomy and Physiology
- Included labs and lectures

8/2011 – 5/2012 Kinesiology Program Tempe, AZ
School of Nutrition and Health Promotion (ASU)

Faculty Associate – Barrett Honors Faculty

- Prepared and taught Electromyographic Kinesiology
- Included labs, data analysis, and writing instruction
- Undergraduate Honor Thesis Chair: *Ultrasound on the Central Nervous System*

9/2010 – 8/2011 Dept. of Animal Care and Technologies (ASU) Tempe, AZ

Animal Technician

- Daily husbandry of mice, chickens, and rabbits, including ABSL2
- Cleaning and maintenance of animals rooms and facilities

7/2007 – 8/2012 Center for Adaptive Neural Systems (ASU) Tempe, AZ

Research Assistant

- Kinematic and electrophysiological analysis and modeling of rat gait.
- Lab management and technical support.
- Behavioral testing, surgery and extensive post surgical care of rodents
- Supervised and trained undergraduate and high school students in lab research

6/2005 -6/2007 The Biodesign Institute (ASU) Tempe, AZ

Research Assistant

- Center for Rehabilitation Neuroscience and Rehabilitation Engineering
- As above, center name and location change.

8/2004 – 5/2005 Information Technology (ASU) Tempe, AZ

Computing Assistant

- Provided customer service for computing sites on campus

1/2003-5/2003 Mechanical Engineering (SDSU) San Diego, CA

Teaching Assistant

- Introduction to Materials
- Led occasional classes and graded all coursework and exams

8/2002 – 5/2004 Cardiovascular Biomechanics Lab (SDSU) San Diego, CA

Research Assistant

- CFD analysis of LVAD outflow conduit insertion location and orientation on flow and stress dynamics in the aorta.
- Guided undergraduates with physical modeling of same system.

10/2001 – 12/2002 Chemosensory Perception Lab (UCSD) La Jolla, CA

Research Assistant

- Recruited and ran human subjects in various experiments on the chemical senses.
- Performed lab managerial tasks, project research, and technical support.
- Computational modeling of dust deposition in nasal mucous and psychophysical outcomes

6/2001-12/2001 Orth. Biomech. Research Center (CHSD) San Diego, CA

Research Assistant

- Children's Hospital San Diego
- Studied biomechanical properties of pediatric bone tissue.

9/1999 – 9/2001 Academic Computing Services (UCSD) La Jolla, CA

Microcomputer Support

- Maintained PC and Macintosh labs for course-specific use.
- Provided technical assistance on PC and Macintosh computers for individuals associated with the University on a per-hour basis.

**Teaching
Experience**

KIN414/598 Electromyographic Kinesiology Arizona State University

3 sections Fall 2011, 1 section Spring 2012: Lecture, writing instruction, and lab
Graduate/undergraduate cross listed

BIO201 Human Anatomy and Physiology I Mesa Community College

2 sections Spring 2012: Lecture and lab
Undergraduate

BME5993/5411 Biomedical Physiology & Engineering II Florida Int. Univ.

1 section each: Spring 2014, Spring 2015, Spring 2016, Spring 2018, Spring 2020:
Lecture
Graduate

BME3721 Data Evaluation Principles Florida Int. Univ.

2 sections each: Fall 2016, Spring 2017, Fall 2017, Spring 2018: Lecture and tutorial
Undergraduate

BME3404 Eng. Analysis of Biol. Systems II Florida Int. Univ.

1 section Fall 2017: Lecture
Undergraduate

BME4211 Orthopedic Biomechanics Florida Int. Univ.

1 section Spring 2020: Lecture
Undergraduate

Publications

Publications

Cain WS, Jalowayski AA, Kleinman M, Lee NS, Lee BR, Ahn BH, Magruder K, Schmidt R, Hillen BK, Warren CB, Culver BD. Sensory and associated reactions to mineral dusts: sodium borate, calcium oxide, and calcium sulfate. *J Occup Environ Hyg.* 2004 Apr;1(4):222-36.

May-Newman KD, Hillen BK, Sirona CS, Dembitsky W. Effect of LVAD outflow conduit insertion angle on flow through the native aorta. *J Med Eng Technol.* 2004 May-Jun;28(3):105-9.

May-Newman K, Hillen B, Dembitsky W. Effect of left ventricular assist device outflow conduit anastomosis location on flow patterns in the native aorta. *ASAIO J.* 2006 Mar-Apr;52(2):132-9.

Hillen BK, Abbas JJ, Jung R. Accelerating Locomotor Recovery After Spinal Contusion. *Ann N Y Acad Sci.* 2013 Mar;1279:164-74.

Hillen BK, Yamaguchi G, Abbas JJ, Jung R. Joint-specific changes in locomotor complexity in the absence of muscle atrophy following incomplete spinal cord injury. *J Neuroeng Rehabil.* 2013 Aug 15;10:97.

Hillen B, Jung R. Peripheral Nerve Interface Applications, Respiratory Pacing. In *Encyclopedia of Computational Neuroscience.* Edited by Jaeger D, Jung R: Springer New York; 2015: 2284-2288

Hillen BK, Jindrich DL, Abbas JJ, Yamaguchi GT, Jung R. Effects of spinal cord injury-induced changes in muscle activation on foot drag in a computational rat ankle model. *J Neurophysiol.* 2015 Apr 1;113(7):2666-75

Zbrzeski A, Bornat Y, Hillen B, Siu R, Abbas J, Jung R, Renaud S. Bio-Inspired Controller an FPGA Applied to Closed-Loop Diaphragmatic Stimulation. *Front Neurosci.* 2016 Jun 16;10:275.

Siu R, Abbas JJ, Hillen BK, Gomes J, Coxe S, Castelli J, Renaud S, Jung R. *J Neurotrauma.* 2019 Dec 15;36(24):3363-3377.

Publications (Submitted)

Jung, R*, Abbas JJ *, Kuntaegowdanahalli SS, Horch KW, Berger AJ, Thota AK, Pena AE, Rincon-Gonzalez L, Hillen BK, Aguilar D, Bukacheski T, Horstmeyer JL, Swanson B, Leavens J, Patrick JF. Neurostimulation in real-world environments to restore sensation after amputation. *equal contribution

Abstracts

Hillen BK, Dembitsky W, May-Newman KD. The Influence Of LVAD Aortic Anastomosis Location On Blood Flow In The Aorta (BMES Annual Fall Meeting, Philadelphia, PA. Oct 13-16, 2004, Poster presentation #628).

Kurian M, Crook S, Hillen B. Modeling motoneurons after spinal cord injury in acute and chronic stages (Okinawa Computational Neuroscience Course, OIST, Okinawa, Japan, Jun 26-Jul 7, 2006. Poster presentation.).

Hillen BK, Abbas JJ, Yamaguchi G, Jung R;. Effects of spinal cord injury on musculoskeletal parameters in the rodent. Program No. 404.20. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.

Hillen BK, Abbas J, Jindrich D, Jung R. Effects of muscle strength and activation profile on foot drag in a simulated SCI rat. *BMC Neuroscience* 2008, 9(Suppl 1):P27 (11 July 2008) (Poster at 17th Annual Computational Neuroscience Meeting, July 19th-24th, 2008, Portland, Oregon)

Hillen BK, Jindrich DL, Abbas JJ, Jung R. Computational model of the effects of muscle activation profile on foot drag in the SCI rat. Program No. 469.8. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.

Hamm T, Venugopal D, Turkin V, Hillen B, Abbas JJ, Yamaguchi G, Iarkov A, Jung R. Modeling Neuromusculoskeletal Alterations after Spinal Cord Injury. CRCNS09, Collaborative Research in Computational Neuroscience PI meeting, Pittsburgh, June 7-9, 2009.

Turkin VV, O'Neill D, Subramanian S, *Hillen BK*, Fairchild MF, Iarkov A, Jung R, Hamm T. Discharge properties and persistent currents in hindlimb motoneurons of rats with incomplete spinal injury. Program No. 378.8. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010. Online.

Jung R, *Hillen BK*, Fairchild M, Iarkov A, Bartell J, Subramanian S, Belanger A, Abbas J. Accelerating Locomotor Recovery After Spinal Contusion. (Cellular and Network Functions in the Spinal Cord, Madison, Wisconsin May 22-25, 2012, Symposium Presentation).

Hillen BK, Jung R. Changes in locomotor complexity in the absence of muscle atrophy following iSCI in the rat. Program No. 678.16. 2012 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2012. Online.

Hillen BK, Jung R. Computational model of human ventilation for electrical stimulation following cervical spinal cord injury. (Poster at 23rd Annual Computational Neuroscience Meeting, July 26th-31st, 2014, Québec City, Canada)

Davis B, Siu R, *Hillen B*, Vale C, Jung R. Assessment of Ventilatory Function and Respiratory Muscle Electromyograms in Rodents for Design of an Adaptive Ventilatory Neuromuscular Pacing Device. Florida International University's McNair Scholars Research Conference 2014. Miami, FL Oct. 16-18 2014 (Poster)

Jung R, Renaud S, Abbas J, Bornat Y, *Hillen B*, Zbrzeski A, Siu R, Castelli J, Davis B, Kolbl F. Computation-Enabled Ventilatory Control System(CENAVEX). 2014 CRCNS PI Meeting, Tempe, AZ.

Davis B, Siu R, *Hillen B*, Vale C, Jung R. Assessment of Ventilatory Function and Respiratory Muscle Electromyograms in Rodents for Design of an Adaptive Ventilatory Neuromuscular Pacing Device. Biomedical Engineering Society Annual Meeting 2014. San Antonio, Texas Oct. 22-25 2014. (Poster)

Zbrzeski A, Siu R, Bornat Y, *Hillen B*, Jung R, Renaud S. A versatile fast-development platform applied to closed-loop diaphragmatic pacing. Proceedings of the 7th International IEEE EMBS Conference on Neural Engineering. Number 109.

Hillen BK, Abbas JJ, Zbrzeski A, Renaud S, Jung R. Adaptive control of ventilation using electrical stimulation in a biomechanical model. 24th Annual Computational Neuroscience Meeting, 2015.

Siu R, *Hillen B*, Thota A, Abbas J, Renaud S, Jung R. Adaptive control of lung volume for respiratory pacing in the rodent model. 2015 CRCNS PI Meeting, Seattle, WA. (Poster)

Jung R, Renaud S, Abbas J, Bornat Y, *Hillen B*, Zbrzeski A, Siu R, Castelli J, Davis B, Kolbl F. Computation-Enabled Ventilatory Control System(CENAVEX). 2015 Collaborative Research in Computational Neuroscience PI Meeting, Seattle, WA. (Poster)

Hillen BK, Abbas JJ, Zbrzeski A, Renaud S, Jung R. Effect of initial conditions on adaptation time in adaptive control of ventilation. Program No. 430.01. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015. Online.

Siu R, *Hillen BK*, Abbas JJ, Renaud S, Jung R. Neuromuscular stimulation of respiratory muscles for respiratory pacing in the rat model. Program No. 430.02. 2015. Neuroscience Meeting Planner (Society for Neuroscience Chicago, IL; 2015). Online. (Poster)

Jung R, Renaud S, Abbas J, Bornat Y, *Hillen B*, Zbrzeski A, Siu R, Castelli J, Kolbl F.

Computation-Enabled Ventilatory Control System(CENAVEX). 2015 Collaborative Research in Computational Neuroscience PI Meeting, Paris, France. (Poster)

Siu R, *Hillen B*, Thota A, Abbas J, Renaud S, Jung R. Closed-loop adaptive controller for respiratory pacing in a rodent model. 2016 UM Neural Engineering Symposium, Miami, FL. (Poster)

Castelli J, Siu R, Kolbl F, N'Kaoua G, Bornat Y, Mangalore A, *Hillen B*, Abbas J, Lewis N, Jung R, Renaud S, An IC-based controllable stimulator for in vivo experiments. 2016 Collaborative Research in Computational Neuroscience PI Meeting, Paris, France. (Poster)

Siu R, *Hillen BK*, Thota A, Renaud S, Abbas J, Jung R. Parametrization of a closed-loop adaptive controller for respiratory pacing in a rodent model. Program No. 249.18. 2016 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016. Online.

Jung R, R Siu, *B Hillen*, and JJ Abbas. Adaptive closed-loop neuromotor control after spinal cord injury, IX Congreso Cubano de Ingenieria Mecánica y Metalúrgica, Havana, Cuba, November 21-25, 2016.

Castelli, J., Kolbl, F., Siu, R., N'Kaoua, G., Bornat, Y., Mangalore, A., *Hillen, B.*, Abbas J., Renaud S., Jung R., Lewis, N. (2017). An IC-based controllable stimulator for respiratory muscle stimulation investigations. In 2017 39th Annual International Conference of the IEEE/EMBS: Smarter Technology for a Healthier World, EMBC 2017 - Proceedings (pp. 1970-1973). DOI: 10.1109/EMBC.2017.8037236

Siu R, Abbas J, *Hillen B*, Renaud S, Jung R. A neuromorphic system for adaptive closed-loop control of ventilation after spinal cord injury. 2017 CRCNS PI Meeting, Providence, RI. (Poster)

Siu R, Abbas J, *Hillen BK*, Jung R. A neuromorphic system for adaptive closed-loop control of ventilation after spinal cord injury. 2017 Biomedical Engineering Society Meeting, Phoenix, AZ. (Oral Presentation)

Siu R, Abbas J, *Hillen BK*, Jung R. Adaptive control of ventilation through respiratory pacing following spinal cord injury. Program No. 779.04. 2017 Neuroscience Meeting Planner. Washington, D.C. Society for Neuroscience, 2017. (Poster)

Siu R, Abbas J, *Hillen B*, Renaud S, Jung R. Adaptive control of ventilation through ventilatory pacing. 2018 Annual Neuromuscular Plasticity Symposium. Gainesville, FL. (Poster)

Siu R, Abbas J, *Hillen BK*, Jung R. Adaptive closed-loop control of ventilation. Conference of Florida Graduate Schools. Tallahassee, FL. 2018 (Oral Presentation)

Siu, R, Abbas J, *Hillen B*, Jung R. Computational assessment of a neuromorphic closed-loop controller for ventilatory pacing. (Poster (Siu) at Biomedical Engineering Society (BMES), 2018, 17-20th October, Atlanta, GA, USA.)

Siu R, Abbas JJ, *Hillen BK*, Jung R. In-vivo implementation of a neuromorphic controller for ventilatory pacing. (Program No. 674.09. 2018 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2018. Online (Poster: Siu)

Abbas JJ, Kuntaegowdanahalli SS, Horch K, Rincon Gonzalez L, Pena AE, Thota AK, *Hillen BK*, Aguilar D, Jung R. Assessment of functional benefits afforded by sensory-enabled prostheses to upper-limb amputees. (Program No. 404.09. 2018 Neuroscience

Meeting Planner. San Diego, CA: Society for Neuroscience, 2018. Online (Poster: Abbas)

Siu R, Abbas JJ, Hillen BK, Jung R. Adaptive respiratory pacing restores ventilatory function in incomplete spinal cord injured rats. (Program No. 231.14. 2019 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2019. Online. (Poster)

**Other Activities,
Memberships,
and Awards**

Judge: FIU Biomedical Engineering Annual Graduate Research Day 2012

Undergraduate Honors Thesis Chair 2011-2012

Ultrasound on the Central Nervous System

Nikki Castel

Ultrasound on the Central Nervous System

Brett Hughes

Judge: ASU Bioengineering CAPSTONE Design 2005 - 2012

Organization for Computation Neuroscience Travel Award 2008, 2014

Member Society for Neuroscience 2007 – 2016

Member Organization for Computational Neuroscience 2014 - 2016

Student Member ASAIO 2004-2005

ASAIO Bioengineering Student Fellowship 2004

Judge: SDSU College of Sciences Undergraduate Research Symposium 2003