

## Scott A. Beardsley

Department of Biomedical Engineering,  
Marquette University  
P.O. Box 1881, Milwaukee, WI 53201

Phone: (414) 288-4448  
Fax: (414) 288-7938

E-mail: [scott.beardsley@marquette.edu](mailto:scott.beardsley@marquette.edu)

Webpage: [http://www.marquette.edu/engineering/biomedical/facstaff\\_beardsley.shtml](http://www.marquette.edu/engineering/biomedical/facstaff_beardsley.shtml)

### EDUCATION

---

Ph.D.	Biomedical Engineering, Boston University, Boston MA <i>"Complex motion processing mechanisms in the posterior parietal lobe: Psychophysics and computational modeling"</i>	May 2001
B.S.	Physics & Mathematics, <i>summa cum laude</i> , University of Wisconsin-Whitewater, Whitewater, WI	May 1995

### PROFESSIONAL EXPERIENCE

---

<b>Medical College of Wisconsin</b> , Milwaukee WI Assistant Adjunct Professor, Clinical and Translational Science Institute	Jan. 2011-present
<b>Boston University</b> , Boston MA Visiting Research Assistant Professor, Department of Biomedical Engineering	Jan. 2007-present
<b>Marquette University</b> , Milwaukee WI Assistant Professor, Department of Biomedical Engineering Director, Integrative Neural Systems Laboratory	Jan. 2006-present
<b>Boston University</b> , Boston MA Postdoctoral Research Associate, Department of Biomedical Engineering Research Assistant, Brain and Vision Research Laboratory	May 2001-Dec. 2005 June 1997-May 2001
<b>University of Wisconsin – Whitewater</b> , Whitewater WI Research Assistant, Physics Department	Sept. 1992- May 1995
<b>National Solar Observatory</b> , Sunspot NM Research Internship	Summer 1994
<b>University of Michigan</b> , Ann Arbor MI Research Internship, Department of Physics	Summer 1993

### TEACHING EXPERIENCE

---

<b>Marquette University</b> , Milwaukee WI	
BIEN 6210: Advanced Signal Processing	Fall 2014
BIEN 1100: Introduction to Biomedical Engineering Methods 1:	Fall 2014
BIEN 3310: Control Systems for Biomedical Engineers	Spring 2010-2012
BIEN 4600/5600: Neural Engineering	Fall 2011
BIEN 100/2300: Biomedical Circuits and Electronic	Fall: 2006, 2008-2010 Spring: 2007-2010, 2013-2014
BIEN 6931: Computational Neuroscience	Fall 2009
BIEN 151: Feedback and Control in Physiological Systems	Fall 2007, 2008

**Boston University**, Boston MA

BE 570: Introduction to Computational Vision,	Fall 2001, 2002
BME-REU Mentor	Summer 1998, 1999
Teaching Assistant: BE 512: Biomedical Instrumentation	Spring 1997
Teaching Assistant: BE 410/510: Biosignal Detection & Measurement	Fall 1996

**RESEARCH INTERESTS**

---

Neuroengineering – Neural coding/decoding  
 Neuroplasticity and learning  
 Human visuo-motor processing (integrated experimental/computational approaches)  
 Functional neuroimaging

**SCIENTIFIC AND PROFESSIONAL AFFILIATIONS**

---

IEEE-EMBS	2011-present
Biomedical Engineering Society	2006-present
Sigma Xi – Scientific Research Society	2006-present
Vision Sciences Society	2002-present
Society for Neuroscience	1996-present

**HONORS AND AWARDS**

---

Way Klingler Young Scholar Award, Marquette University	2012
National Academies Keck Futures Initiative Conference Fellowship	2006
GAANN Fellowship, Boston University	1995-1997
A. A. Upham Scholarship for Science, University of Wisconsin – Whitewater	1994
Marian Baldwin Schlicker Mathematics Award, University of Wisconsin – Whitewater	1994
Physics Department Scholarship, University of Wisconsin – Whitewater	1994
Johnson Wax Foundation Scholarship, University of Wisconsin – Whitewater	1991-1995
National Dean's List, University of Wisconsin – Whitewater	1991-1995

**GRANTS AND RESEARCH SUPPORT**

---

**Funded**

H133E100007	(Project Director: G.F. Harris)	10/1/13 – 9/30/15
U.S. Department of Education, National Institute on Disability and Rehabilitation Research: Rehabilitation Engineering Research Center on Technologies for Children with Orthopedic Disabilities		
R2 Diffusion tensor imaging and restoration of upper & lower limb function in children with CP <i>Role: Lead Investigator</i>		
R1 Microstructural characterization of soft and hard tissue in the pediatric osteogenesis imperfecta and clubfoot populations <i>Role: Investigator</i>		
Advancing a Healthier Wisconsin		4/1/13 – 4/1/14
Assessment of coupling between mass neural activity and the hemodynamic response in humans <i>Role: PI</i>		

Scott Beardsley

- Alvin W. and Marion Birnschein Foundation 1/1/13 – 12/31/13  
Re-training strategies to improve arm function in persons with Multiple Sclerosis  
Role: PI
- Marquette University - Way Klingler Young Scholar Award 9/1/12 – 12/31/12
- CTSA UL1RR031973-02 4/1/11 - 3/31/12  
Impairments in sensorimotor control and their contribution to tremor and dysmetria in persons with MS  
Role: PI
- Alvin W. and Marion Birnschein Foundation 1/1/11 – 12/31/11  
Sensorimotor control metrics of tremor and dysmetria in persons with Multiple Sclerosis  
Role: PI
- R01 NS64100-01A1 (PI: Vaina) 7/17/09 - 7/16/11  
Perception and recovery of motion for visually guided behavior in humans  
Role: Co-I
- College of Engineering, Junior Faculty Research Incentive Program 1/1/07 - 10/1/07  
A systems identification approach to characterizing sensory feedback during reach and its deficits in patients with Multiple Sclerosis  
Role: PI
- Marquette University, Regular Research Grant / Summer Faculty Fellowship 1/1/07 - 7/15/07  
Adaptive decoding of neural signals for long-term control of an assistive device  
Role: PI

**PEER REVIEWED JOURNAL PUBLICATIONS** (\* indicates student)

---

**Published & In Press**

1. Liebhenthal E., Sabri M., **Beardsley S. A.**, \*Mangalathu J., Desai A., (2013), Neural dynamics of phonological processing in the dorsal auditory stream, *J. Neurosci.*, 33(39):15414-15424.
2. \*Mangalathu J., **Beardsley S. A.**, Liebhenthal, E., (2012), Within-subject joint independent component analysis of simultaneous fMRI / ERP in an auditory oddball paradigm, *NeuroImage*, 60(4): 2247-57. *PMCID: PMC3321114*.
3. Calabro F. J., **Beardsley S. A.**, Vaina L. M. (2011), Different motion cues are used to estimate time-to-arrival for frontoparallel and looming trajectories, *Vision Res.* (23-24): 2378-85. *PMID: 22056519*.
4. **Beardsley S.A.**, Sikoglu E. M., Hecht H., Vaina L.M. (2011) Global flow impacts time-to-passage judgments based on local motion cues, *Vision Res.*, 51: 1880-1887. *PMCID: PMC3171144*.
5. \*Herzfeld D. J., **Beardsley S.A.**, (2010) Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering, *J Neural Eng.*, 7(4): 046012. *PMID: 20644245*.
6. \*Sikoglu E. M., \*Calabro F. J., **Beardsley S. A.**, Vaina L. M. (2010), Integration mechanisms for heading perception, *Seeing and Perceiving*, 23(3): 197-221. *PMCID: PMC2935514*.
7. **Beardsley S. A.**, Vaina L. M., (2008), An effect of relative motion on trajectory discrimination, *Vision Res.*, 48(8): 1040-1052. *PMCID: PMC3171136*.
8. **Beardsley S. A.**, Vaina L. M., (2006), Global motion mechanisms compensate local motion

deficits in a patient with a bilateral occipital lobe lesion, *Exp. Brain Res.*, 173: 724-732. PMID: 16673065.

9. **Beardsley S. A.**, Vaina L. M., (2005), Psychophysical evidence for a radial motion bias in complex motion discrimination, *Vision Res.*, 45(12): 1569-1586. PMID: 15781074.
10. **Beardsley S. A.**, Vaina L. M., (2005), How can a patient blind to radial motion discriminate shifts in the center-of-motion?, *J. Comput. Neurosci.*, 18: 55-66. n PMID: 15789169.
11. **Beardsley S. A.**, Vaina L. M. (2004), A Functional Architecture for Motion Pattern Processing in MSTd, In: Thrun S, Saul K, and Scholkopf B (Eds.), *Advances in Neural Information Processing Systems 16*, The MIT Press, pp. 1451-1458.
12. **Beardsley S. A.**, Ward R. L., Vaina L. M., (2003), A neural network model of spiral-planar motion tuning in MSTd, *Vision Res.*, 43: 577-595. PMID: 12595004.
13. **Beardsley S. A.**, Vaina L. M. (2001), A laterally interconnected neural architecture in MST accounts for psychophysical discrimination of complex motion patterns, *J. Comput. Neurosci.*, 10: 255-280. PMID: 11443285.
14. Clifford C. W. G., **Beardsley S. A.**, Vaina L. M. (1999), The perception and discrimination of speed in complex motion, *Vision Res.*, 39: 2213-2227. PMID: 10343803.
15. **Beardsley S. A.**, Vaina L. M. (1998), Computational modeling of optic flow selectivity in MSTd neurons, *Network: Comput. Neural Syst.* 9: 467-493.

#### PEER REVIEWED CONFERENCE PROCEEDINGS (\* indicates student)

---

1. \*Herzfeld D. J., **Beardsley S.A.**, (2011) Synaptic weighting for physiological responses in recurrent spiking neural networks, *Conf. Proc. IEEE Eng. Med. Biol. Soc.*: 4187-90. PMID: 22255262.
2. \*Heenan M., Scheidt R. A., **Beardsley S.A.**, (2011) Visual and proprioceptive contributions to compensatory and pursuit tracking movements in humans, *Conf. Proc. IEEE Eng. Med. Biol. Soc.*: 7356-59. PMID: 22256038.

#### BOOKS AND CHAPTERS

---

1. *Optic Flow and Beyond*. (2004), Vaina L. M. V., **Beardsley S. A.**, and Rushton S. (Eds.), Synthese Library, Kluwer Academic Press, pp. 528.
2. **Beardsley, S. A.**, and Vaina L. M. (2004), Linking perception and neurophysiology: the computational power of inhibitory connections in cortex, In: Vaina L.M.V., Beardsley S.A., and Rushton S. (Eds.), *Optic Flow and Beyond*, Synthese Library, Kluwer Academic Press, pp. 183-221.
3. Sundareswaran V., **Beardsley, S. A.**, and Vaina L. M. (2004), Fast processing of image motion patterns arising from 3-D translational motion, In: Vaina L.M.V., Beardsley S.A., and Rushton S. (Eds.), *Optic Flow and Beyond*, Synthese Library, Kluwer Academic Press, pp. 273-287.
4. Vaina L. M. and **Beardsley S. A.** (2003), Optic Flow, In: Adelman G., & Smith B. H. (Eds.), *Encyclopedia of Neuroscience 3<sup>rd</sup> ed.*, Elsevier Science.

#### CONFERENCE ABSTRACTS

---

1. \*Heenan M., Scheidt R. A., **Beardsley S. A.**, (2013) Age-related differentiation of sensorimotor control strategies during pursuit and compensatory tracking. Soc. Neurosci., San Diego, Program No. 650.14/TT10, Online.

2. \*Heugel N., Liebenthal E., **Beardsley S. A.**, (2013) JICA integration of MEG with fMRI and EEG to improve neural source reconstruction within subjects. Soc. Neurosci., San Diego, Program No. 679.05/NNN4, Online.
3. **Beardsley S. A.**, Calabro F. J., Vaina L. M., (2013) Identification of an intercept trajectory among multiple moving objects in a scene is enhanced by self-motion. Soc. Neurosci., San Diego, Program No. 458.15/WW4, Online.
4. \*Heenan M., Scheidt R. A., Woo D., **Beardsley S. A.**, (2013) Impairments in sensorimotor control in individuals with Multiple Sclerosis [CMSC abstract P44]. *Int J MS Care*. 2013;15(suppl 3):37.
5. \*Magalathu J., Liebenthal E., **Beardsley S. A.**, (2012) Theoretical evaluation of Joint-Independent Component Analysis for the integration of multi-channel ERP and fMRI data. Soc. Neurosci., New Orleans, Program No. 301.01/DDD75, Online.
6. \*Heenan M., Scheidt R. A., Woo D., Bobholz J., **Beardsley S. A.**, (2012) Impairments in sensorimotor control during pursuit and compensatory tracking tasks in individuals with Multiple Sclerosis. Soc. Neurosci., New Orleans, Program No. 680.01/NN8, Online.
7. \*Herzfeld D. J., **Beardsley S. A.**, (2011) Nonlinear relationships between mean firing rates and simulated hemodynamic responses, *Soc. Neurosci.*, Washington DC, Program No. 507.23/WW61, Online.
8. \*Magalathu J., Liebenthal E., **Beardsley S. A.**, (2011) Experimental and theoretical evaluation of joint-independent component analysis for the integration of multi-channel ERP and fMRI data. Soc. Neurosci., Washington DC, Program No. 647.08, Online.
9. \*Heenan M., Scheidt R. A., Woo D., Bobholz J., **Beardsley S. A.**, (2011) Characterizing the sources of impaired sensorimotor control in patients with Multiple Sclerosis. Soc. Neurosci., Washington DC, Program No. 589.05/LL10, Online.
10. \*Sukerkar P. J., Scheidt R. A., **Beardsley S. A.**, (2010) Source localization of sensory error signals during goal-directed movement using EEG. Soc. Neurosci., San Diego, CA, Program No. 582.11/VV5, Online.
11. \*Magalathu J., Liebenthal E., **Beardsley S. A.**, (2010) Integration of EEG-fMRI in an auditory oddball paradigm using joint-independent component analysis. Soc. Neurosci., San Diego, CA, Program No. 838.3, Online.
12. \*Magalathu J., Liebenthal E., **Beardsley S. A.**, (2010) Integration of EEG-fMRI in an auditory oddball paradigm using joint-independent component analysis. *Advances and Perspectives in Auditory Neurophysiology*. San Diego, CA.
13. \*Galbraith B., Struble C., **Beardsley S. A.**, Ge R., (2009) CUSUMMA: Scalable Matrix-Matrix Multiplication on GPU's with CUDA, The 21st ACM/IEEE International Conference on High Performance Computing and Communications.
14. \*Herzfeld D. J., **Beardsley S. A.**, (2009) Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering, *Soc. Neurosci.*, 33. Chicago, IL.
15. \*Wakde S., **Beardsley S. A.** (2009), Task dependent learning of complex motion across visual motion areas, *Soc. Neurosci.*, 33. Chicago, IL.
16. \*Poladia C., Scheidt R. A., **Beardsley S. A.**, (2009) Characterizing sensorimotor integration during wrist stabilization: a systems identification approach. *Soc. Neurosci.*, 33. Chicago, IL.
17. \*Magalathu J., Liebenthal E., **Beardsley S. A.**, (2009) Within subject joint independent component analysis of simultaneous fMRI/EEG in an auditory oddball paradigm. *Soc. Neurosci.*, 33. Chicago, IL.
18. \*Poladia C., Scheidt R. A., **Beardsley S. A.**, (2008) Systems Identification of Sensory-Motor

Control for Visually Guided Wrist Movements, *Soc. Neurosci.*, 32, Washington DC.

19. \*Dharampal T., **Beardsley S. A.**, (2008) An adaptive filtering approach for long term decoding of nonstationary neural signals, *Soc. Neurosci.*, 32, Washington DC.
20. \*Dharampal T., **Beardsley S. A.**, (2008), Adaptive real-time decoding of nonstationary signals at the neuronal-electrode interface for long-term control of cortical neuroprostheses, *International Conference on Cognitive and Neural Systems*, May 14-17, Boston, MA.
21. \*Wakde S., **Beardsley S. A.**, (2007) Determining the Site of Perceptual Learning: Task Dependent Learning of Complex Motion, National Society of Black Engineers, March 19-23.
22. **Beardsley, S. A.** (2006), Population-temporal decoding of multi-unit signals at the brain-machine interface, *Smart Prosthetics: Exploring Assistive Devices for the Body and Mind, The National Academies Keck Futures Initiative*, Nov. 9-11, Irvine CA.
23. \*Sikoglu E., **Beardsley S. A.**, Calabro, F. J., Vaina L. M. (2006), Comparison of 2D and 3D ideal observers to characterize heading perception with directional range noise, *J. Vision*, 6(6): 632a.
24. Calabro, F. J., **Beardsley, S. A.**, Vaina, L. M. (2005), The contribution of disparity to motion contrast segmentation, *J. Vision*, 5(8): 726a.
25. **Beardsley, S. A.**, Vaina, L. M. (2004), Improved complex motion discrimination in a patient with a bilateral occipital lobe lesion, *J. Vision*, 4(8): 855a.
26. Calabro, F. J., **Beardsley, S. A.**, Vaina, L. M. (2004), Effects of disparity and noise on motion transparency, *J. Vision*, 4(8): 857a.
27. **Beardsley S. A.**, Vaina L. M. (2003), A Functional Architecture for Motion Pattern Processing in MSTd, *Neural Information Processing Systems*, Vancouver, British Columbia, Canada.
28. Sikoglu E., **Beardsley S. A.**, Vaina L. M. (2003), A generalized mathematical model of feed-forward neural structures in the MT-MST complex, *Seventh International Conference on Cognitive and Neural Systems*, Boston, MA, p 20.
29. **Beardsley S. A.**, Vaina L. M. (2002), Discrimination of shifted centers-of-motion in a patient that cannot perceive radial motion, *Vision Sciences Society*, Sarasota FL, p 226.
30. Kao W. Y., **Beardsley S. A.**, Vaina L. M. (2002), Perceptual learning of motion pattern discrimination: Psychophysics and computational modeling, *Vision Sciences Society*, Sarasota FL, p 30.
31. **Beardsley S. A.**, Vaina L. M. (2001), Psychophysical evidence for a relative object motion mechanism in humans, *Assoc. Res. Vis. Ophthalmol.*, 42(4): S618.
32. Vaina L. M., **Beardsley S. A.**, Goldberg M. E., Rizzo J. (2000), Impaired complex motion perception in two patients with Balint-Holmes Syndrome, *Amer. Neurol. Assoc.*
33. **Beardsley S. A.**, Vaina L. M. (2000), Processing relative object motion in complex patterns of motion, *Assoc. Res. Vis. Ophthalmol.*, 41(4): S722.
34. Giulianini, F., Vaina, L., **Beardsley, S. A.** (1999), Memory for angular velocity: a psychophysical study, *Perception*, 28(S), p 79.
35. **Beardsley S. A.**, Clifford C. W. G., Vaina L. M. (1999), Discrimination of complex motion patterns is consistent with an interconnected population code in MST, *Assoc. Res. Vis. Ophthalmol.*, 40(4): S422.
36. **Beardsley S. A.**, Clifford C. W. G., Vaina L. M. (1998), Discrimination of shifted centers of motion in complex stimuli, *Assoc. Res. Vis. Ophthalmol.*, 39(4): S621.
37. **Beardsley S. A.**, Vaina L. M. (1997), Computational modeling of optic flow selectivity in MSTd neurons, *Assoc. Res. Vis. Ophthalmol.*, 38(4): S80.

## INVITED PRESENTATIONS

---

- University of Wisconsin – Milwaukee, Bioengineering Seminar, “Impairments in sensorimotor control during goal-directed movement in Multiple Sclerosis”, Feb. (2013).
- University of Wisconsin – Whitewater, Frontiers of Engineering and Physics, “Everything you wanted to know about Biomedical Engineering but were afraid to ask”, Oct. (2012).
- Marquette University, Office of Research and Sponsored Programs - One Thing Led to Another, “From the universe without to the universe within”, Sept. (2012).
- Marquette University, High Performance Computing Seminar, “Population-temporal decoding of multi-unit signals at the brain-machine interface”, March (2009).
- University of Wisconsin – Whitewater, Physics Colloquium, “Frontiers of engineering and physics: Biomedical engineering”, November (2007).
- Marquette University, INRC Seminar Series, “Real-time adaptive neural decoding for long-term control of a smart prosthesis”, October (2007).
- Illinois Institute of Technology, Pritzker Institute of Biomedical Science and Engineering Seminar, “Linking neurons and behavior: A tale of two cities” September (2007).
- University of Wisconsin – Whitewater, Physics Colloquium, “What were you thinking? Decoding neural signals at the brain-machine interface”, October (2006).
- Marquette University, Brotz Seminar Series, “Linking neurons and behavior: Integrating psychophysics and computational modeling to understand the nature of complex motion processing”, April (2005).
- Massachusetts Institute of Technology, Cognitive Lunch Seminar, Dept. of Brain and Cognitive Sciences, “How can a patient blind to radial motion discriminate shifts in the center-of-motion?”, February (2004).
- University of Massachusetts – Boston, Talks in Cognitive Science, “Motion pattern processing in MSTd: a computational model”, May (2003).
- Boston University, Brain Hurricane: Vision and the Brain, “A computational model for a surprising global motion deficit found in a patient”, June (2002).
- Boston University, Brain Hurricane: Vision and the Brain, “Opponent inhibition can account for discrimination in complex motion patterns”, June (2002).
- Massachusetts Institute of Technology, Cognitive Lunch Seminar, Dept. of Brain and Cognitive Sciences, “Perceptual discrimination of graded motion patterns: Modeling psychophysical performance using a laterally interconnected neural architecture in MST”, September 19 (2000).

## **Symposia**

- Tutorial: Computational neurophysiology of vision – Coding and decoding in the visual system, *Sampling Computational Vision Mini-Symposium, to the Symposium Functional Plasticity and Cortical Reorganization in the Human Visual and Motor Systems*, Bologna, Italy, December 12-16 (2003).
- Symmetric complex motion perception in a biased neural representation, *Sampling Computational Vision Mini-Symposium, to the Symposium Functional Plasticity and Cortical Reorganization in the Human Visual and Motor Systems*, Bologna, Italy, December 12-16 (2003).
- Quantitative methods for diagnosing neurovisual deficits, *35<sup>th</sup> Annual Oak Ridge Conference, New Approaches to Diagnosing Neurological Diseases: Brainstorming for Clinical Laboratories*, Arlington VA, April (2003).

Linking the perception and physiology of motion pattern processing: The computational power of a laterally interconnected neural architecture in MST, *Optic Flow and Beyond Symposium*, Boston University, May (2001).

---

## PROFESSIONAL SERVICE

**Reviewer:** *PLOS One*; Journal of Neural Engineering; Journal of Vision; Annals of Biomedical Engineering; Attention, Perception and Psychophysics; Journal of Neurophysiology; Journal of Computational Neuroscience; Perception and Psychophysics

**Grant Reviewer:** **Regular member:** Grant Writing Fellowship Advisory Board, UW-Whitewater  
**Ad-hoc:** Army Research Office, NIH – ARRA

---

## UNIVERSITY SERVICE

**University:** High Performance Computing Governance Committee (Chair; Fall 2012-present)  
High Performance Computing Task Force (Spring 2012)

**College:** Undergraduate Research Committee (Spring 2013-present)  
College Curriculum Committee (Spring 2011-present)  
Academic Honesty College Panel (Fall 2011-present)

**Department:** Undergraduate Curriculum Committee (Chair; Fall 2010-present)  
(Member: 2006-present)

Senior Design Team Advisor (2006-present)

---

## PROFESSIONAL DEVELOPMENT

Lafferty seminar on active learning, Marquette University (February 15, 2013)

Methods in grant preparation course, (March - May 2012)  
Clinical and Translational Science Institute

NSF CAREER workshop, Marquette University (Feb. - May 2012)

Faculty seminar in catholic higher education, Marquette University (Jan. – April 2009)

---

## MENTORSHIP AND EDUCATION

### Current Students

#### **Graduate:**

Megan Heenan – Ph.D. candidate,

**Awarded:** Johnson's Wax Research Assistantship, 2011; Arthur J. Schmitt Fellowship, 2012.

Dylan Snyder (co-directed w/ Brian Schmit) – Ph.D. student

Nicholas Heugel – Ph.D. student

Shane Hesprich – MS student

Devon Holley – MS student

#### **Undergraduate:**

Samuel Farmer

Valay Shah

Richard Schroeder

David Kaftan

Jaden Burns



### **Past Students**

#### **Graduate:**

Vincent Dang (M.S., 2013);	Nebraska-Western Iowa VA Medical Center
Jain Mangalathu (Ph.D., 2012);	Senior Systems Engineer, Siemens Healthcare
David Herzfeld (M.S., 2011);	Ph.D. Program in Biomedical Engineering, Johns Hopkins
Tushar Dharampal (M.S., 2011);	Senior Design Assurance Engineer, St. Jude Medical
Sampada Wakde (M.S., 2011);	Instructor, Medi-Caps Institute of Technology and Management, Indore, India
Prajakta Sukerkar (M.S., 2010);	
Chintan Poladia (M.S., 2009);	Application Development Engineer, Cientive Group Inc.

#### **Undergraduate:**

Miguel Sotelo	
Daniel Comaduran (B.S., 2012);	Technical Professional Development Program, Hospira
Andrew Weingart (B.S., 2012);	Research Assistant, Clinical Research Advantage
Emily Foley/Waller (B.S., 2011);	Ph.D. Program in Biomedical Engineering, Johns Hopkins
David Herzfeld (B.S., 2010);	Medical School, Medical College of Wisconsin
Mohammad-Ali Jazayeri (B.S., 2009);	

### **Thesis and Dissertation Committees**

#### **Director:**

Megan Heenan, Ph.D. candidate

Yagna Pathak, Ph.D. candidate

Jain Mangalathu, Ph.D. in Biomedical Engineering (July 2012), *Integration of EEG-fMRI in an auditory oddball paradigm using joint independent component analysis.*

David Herzfeld, M.S. in Biomedical Engineering (July 2011), *Modeling and computational framework for the specification and simulation of large-scale spiking neural networks.*

Tushar Dharampal, M.S. in Biomedical Engineering (July 2011), *Adaptive real-time decoding of brain signals for long-term control of a neuro-prosthetic device.*

Sampada Wakde, M.S. in Biomedical Engineering (July 2011), *Asymmetric transfer of task dependent perceptual learning in visual motion processing.*

Prajakta Sukerkar, M.S. in Biomedical Engineering (Dec. 2010), *EEG source localization of visual and proprioceptive error processing during visually-guided target tracking with the wrist.*

Chintan Poladia, M.S. in Biomedical Engineering (July 2009), *Systems identification of sensorimotor control for visually guided wrist movements.*

#### **Member:**

Benjamin Kalinosky, Ph.D. candidate

Joseph Lee, Ph.D. candidate

Yan Ma, Ph.D. candidate

Brian Goodwin, Ph.D. candidate

Nichole Salowitz, Ph.D. candidate

Ryan McKindles, 2013 Ph.D. – Biomedical Engineering

Mathew Chua, 2013 Ph.D. – Biomedical Engineering

Nutta-On Promjunyakul, 2012 Ph.D. – Biomedical Engineering  
Jeannette Vizuete, 2012 Ph.D. – Biomedical Engineering  
Kakanand Srungboonmee, 2011 Ph.D. – Biomedical Engineering  
Cjhiran Doshi, 2011 M.S. – Biomedical Engineering  
Bani Gadhoke, 2011 M.S. – Biomedical Engineering  
Elif Sikoglu, 2010 Ph.D. – Biomedical Engineering (Boston University),  
Finnegan Calabaro, 2010 Ph.D. – Biomedical Engineering (Boston University)  
Byron Galbraith, 2010 MS – Mathematics and Computer Science  
Megan Conrad, 2009 Ph.D. – Biomedical Engineering  
Supriya Asnani, 2008 M.S. – Biomedical Engineering  
Promita Hazra, 2008 M.S. – Biomedical Engineering  
Brinda Ramachandran, 2008 M.S. – Biomedical Engineering  
Mary Jo Maciejewski, 2007 Ph.D. – Biomedical Engineering

### **Other Graduate Research Directed**

Lance Grahm, (M.S. Thesis), Dec. 2008 – May 2009, *Design of an actively controlled lower limb prosthesis controlled by naturally occurring electromyographic signals. MSOE and Lübeck University of Applied Sciences.*

### **Undergraduate Research**

#### ***Individual Research:***

Miguel Sotelo, (Summer 2013), *Development of a multi-display virtual environment to provide immersive visual feedback during human walking and navigation.*

Richard Schroeder, (Summer 2013), *Continuous myoelectric prediction of leg kinematics across mobility tasks for control of a trans-tibial prosthesis.*

Samuel Farmer, (Sept. 2012 – Dec. 2013), *Discrimination and classification of gait patterns using myoelectric signals in trans-tibial amputees.*

Daniel Comaduran, (Fall 2011), *Quantitative analysis of goal-directed movement and its impairment in Multiple Sclerosis.*

Andrew Weingart (Summer 2011), *An automated algorithm for the characterization of intermittency during visually-guided movement.*

Emily Foley (Spring 2010), *Motion segmentation during a two-alternative forced-choice center of motion discrimination task.*

David Herzfeld (June 2009 – Aug. 2010), *Multi-unit decoding at the brain-machine interface using population temporal linear filtering.*

Mohammad-Ali Jazayeri (Sept. 2008 – May 2009), *Measurement and characterization of eye movements during visual motion processing.*

Jacqueline Locke (Summer 2007), *Generation and transmission of neural signals for performance assessment of a decoding algorithm.*

#### ***Extracurricular Group Research:***

Virtual Space Project - An omnidirectional platform for locomotion through virtual environments  
(Student-centered design project; 6 student team) 2/2011 - present

**Senior Design Research Projects:**

Adapted game system for spinal cord injury patients	9/2013 - present
NG tube placement verification	9/2013 - 1/2014
MCFI communication device (EEG/EOG-to-tablet interface)	9/2012 - 5/2013
Electronic fishing reel	9/2011 - 5/2012
GE Healthcare: Scanner independent phantom holder/lift device for next generation CT devices (Phantom Assist)	9/2010 - 5/2011
Method for testing electronic stethoscopes	9/2009 - 5/2010
Portable electronic system for real-time neural control of a prosthetic device	9/2008 - 5/2009
Femoral head resection guide and tissue protector	9/2006 - 5/2007

**Curriculum Development**

- Fall 2013:* BIEN 6210 – Advanced Signal Processing. Graduate course developed to introduce modern advanced methods for signal processing in the biomedical field including parametric modeling, modern spectral estimation, multivariate analysis, adaptive signal processing, decimation/interpolation, and two-dimensional signal analysis
- Spr. 2013:* BIEN 2300 - Biomedical Circuits and Electronics. Implemented integrated lecture/lab format utilizing NI ELVIS II systems. Three full lecture labs and weekly 4-phase assignment-based labs – (1) Prelab analysis of circuit as part of assignment, (2) in-lecture lab to build and test circuit using NI ELVIS II, (3) in-lecture review of circuit analysis, (4) student identification and correction of errors in assignment.
- Fall 2011:* BIEN 4600/5600 – Neural Engineering. Mixed undergraduate/graduate course developed to introduce basic principles of neural engineering including, properties of excitable tissues, quantitative models used to characterize natural and artificial stimulation, neural coding/decoding, and design of neuroprosthetic devices for sensory, motor and therapeutic applications.
- Fall 2010:* BIEN 3310 - Control Systems for Biomedical Engineers. Implemented as a new core undergraduate course to examine the characterization and design of control systems in physiology and biomedical applications. Case-based simulations and hands-on experiences are used to explore the dynamics and control of physiological and robotic systems, on topics including respiration, insulin-glucose control, sensorimotor control, and robotic assay systems.
- Fall 2010:* BIEN 1100 - Introduction to Biomedical Engineering Methods I. Developed a 2-week undergraduate course module on data acquisition and signal processing. Designed an interactive Matlab demo that enables students to explore concepts of data sampling, aliasing, and quantization. Implemented an accompanying laboratory sequence in which students use EEG to measure and analyze electrical brain activity in the context of a rudimentary brain-computer interface.
- Fall 2009:* BIEN 6931 - Computational Neuroscience (graduate standing). Special topics graduate course developed to introduce students to the tools and techniques used to model nervous system function and characterize computation in complex neural systems. Concepts associated with neural coding, computation, representation and dynamics in neurobiological systems are discussed with an emphasis on developing quantitative models of neural processing.
- Spr. 2007:* BIEN 2300 - Biomedical Circuits and Electronics. Created outside laboratory experiences and incorporated in-class examples of biomedical applications to better illustrate the importance of electrical circuit theory and design to non-bioelectrical engineering majors.