

RANU JUNG, PhD

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RESEARCH

The research program in my laboratory has focused on using mathematical models and animal studies to address critical scientific and technological issues faced in the development of systems for neurological rehabilitation. Some of the key features of this research program and its success are:

- Multi-disciplinary research environment that has included engineers, mathematicians, neuroscientists, and clinicians. The laboratory also provides vertical integration of high school students, undergraduate students from life-sciences and engineering, graduate students, post-doctoral fellows, clinical fellows, and lead investigators.
- Broad research scope that has included the development of new techniques to process neural signals, the development and use of mathematical models of musculoskeletal signals, the extensive utilization of a chronic rodent model of neurotrauma, kinematic and kinetic analyses, electrophysiological recordings in behaving or anesthetized animals, computerized microscopy of spinal tissue, the design and development of novel electrode technologies, and real-time interaction of electronic hardware with spinal tissue.
- Diverse funding base that has included federal funding from the National Institutes of Health, National Science Foundation and Army Research Office as well as State and Private organizations. I have been Principle Investigator on 22 research projects totaling about \$8.3M, 4 research infrastructure equipment grants totaling about \$1.4M, and 3 planning and conference support grants for approximately \$148K. I have also been co-investigator on another seven funded grants.
- Leadership in the development of multi-disciplinary, multi-institutional partnerships between academic, industry and clinical units. I have led teams of multi-disciplinary investigators (successfully funded projects briefly described below). Collectively, these partnerships have included 8 universities, 4 companies and 3 clinical institutions.
- Publication of 25 journal articles, 15 peer-reviewed proceedings papers, 7 book chapters, invited commentaries and workshop reports, 35 reviewed abstracts and 55 other abstracts.
- Filing of one international patent.
- Invited seminar presentations that include 9 public forums, 10 international talks, 34 national presentations and 17 local presentations.
- Recipient of the 2002 Science and Engineering Award, Governors certificate of recognition, Commonwealth of Kentucky.
- Selected as one of 100 participants in the “4th Annual National Academies Keck Futures Initiative Conference on “Smart Prosthetics: Exploring Assistive Devices for the Body and Mind”.
- Election to Senior Member by the Institute of Electronics and Electrical Engineer, Inc.

TEACHING

My teaching experience has included formal classroom teaching and research mentorship to graduate and undergraduate students in engineering, mathematics and life sciences. I have mentored 7 postdoctoral fellows (2 MD/PhD, 2 Neuroscientists, 3 Biomedical Engineers), served as primary research advisor to 8 students in biomedical engineering with graduate degrees (7 MS, 1 PhD) and served on the committees of another 15 graduates (11 MS, 4 PhD). Currently, 2 doctoral and 1 MS students are under my direct tutelage and I serve on 8 other dissertation/thesis committees. It is my belief that active participation in research by undergraduate students is likely to engender in them a greater enthusiasm for acquiring new

knowledge thereby promoting both increased retention and life-long learning. Hence, over the years, I have directly mentored 56 undergraduate students. Graduate and undergraduate students under my mentorship have had opportunities to present their research and design work at international, national, and local scientific meetings and receive awards. All graduate students have published their research work. I have actively sought female and minority undergraduate students. Some of the key aspects of my teaching experience have been:

- Developed and taught courses in Computational Neuroscience and Neurotrauma to Biomedical Engineering graduate students.
- Lectured in courses on Advanced Neuroscience, Neural Engineering and Scientific Communication to graduate students in Biomedical Engineering.
- Lectured to graduate students majoring in Physiology, Mathematics and first year of Medical School.
- Developed a new course in Neural Engineering for Seniors in Electrical Engineering with hands-on robotics component.
- Taught courses with new material in Biomedical Control Systems and Biomedical Instrumentation for Seniors in Bioengineering.
- Lectured to Freshmen in “Introduction to Engineering” classes.
- Taught independent study classes for electrical engineering, mechanical engineering, bioengineering and biology undergraduates.
- Mentored bioengineering and electrical engineering senior capstone design projects.
- Mentored honors research theses for engineering and life-science students.
- Mentored undergraduate students in summer NSF-REU in Mathematics.
- Mentored high school students.

ADMINISTRATION

As an active member of the academic community, I have taken a leadership role on several initiatives and have served on several institutional and professional committees. Some of these experiences, as described below, have been particularly significant in providing me the opportunity to learn the process of strategic planning and develop administrative and organizational skills.

Co-Founder and Co-Director, Center for Adaptive Neural Systems (CANS), ASU

CANS is a transdisciplinary research center. Our mission is to seek new knowledge and develop engineering technology that addresses the complex physiological, medical and societal problems presented by neurological disability. Our approach is to obtain new insight from integrative forms of research and build knowledge that lies between disciplines for long-term impact that transcends disciplinary boundaries. Many of the research projects seek to address real world problems that lie in the interface between bioengineering, neuroscience and rehabilitation. Center members are tenured and tenure-track faculty from degree granting programs in the Schools of Engineering, School of Life Sciences and College of Liberal, Arts & Sciences, research track faculty and scientists with sole appointments in the Center, and clinical faculty affiliates from Phoenix valley medical institutions.

Dr. James Abbas and I co-founded the Center and we have co-directed it since its inception. As co-directors, we have worked together to define the mission and vision, build the research team, develop a research portfolio, build and develop clinical partnerships, establish research facilities, and lead the Center outreach effort.

- Fall 2002, Founded as Center for Rehabilitation Neuroscience and Rehabilitation Engineering in the Arizona Biomedicine Institute (Institute restructured as the Biodesign Institute in 2003). Center re-named to Center for Adaptive Neural Systems in 2006.
- Spring 2007: Center restructured with independent budgetary and human resource management responsibilities in the Ira A. Fulton School of Engineering.
- Spring 2008: Center receives recognition by Arizona Board of Regents (Five-year review cycle).

- Responsible for directing the mission, vision and daily operations (research agenda; human resources; budget; outreach).

President, Organization for Computational Neurosciences, Inc. (OCNS)

OCNS is a US based non-profit organization representing the interests of an international community of computational neuroscientists. The organization is run by an international Board and Executive committee. A Program committee reviews annual meeting abstract submissions and plans the meeting agenda with guiding input from the OCNS Board. (Elected- Jul '06; 3 year term),

- Initiated a distributed responsibility model by restructuring Board responsibilities.
- Led organizational structure improvements by instatement of standard operational procedures for international banking, record keeping, inviting and evaluating proposals to host the annual meeting, sponsorship solicitation procedures, branding (new web page, logo competition) and annual meeting awards (travel & poster).
- Negotiated pricing for publication of meeting abstracts by BioMed Central as supplements to BMC Neuroscience, an open access journal with a rising impact factor.
- Conducted fundraising for targeted sponsorship of annual meeting events.

Leadership in Developing Academic, Industrial, and Clinical Partnerships

- Successfully established a partnership between faculty from Bioengineering, Electrical engineering and Kinesiology with a clinical partner (Mayo), a clinical prosthetic practice (Artificial Limb Specialists) and industrial partners (Cochlear, Ltd. (Australia) and Motion Control Inc. Utah) to compete for a NIH Bioengineering Research Partnership (BRP) grant (the only lead BRP grant at ASU). This BRP, which was successful on its initial submission, provides funds for the engineering development and clinical implementation of an artificial hand that is directly interfaced with the nervous system via an implant into peripheral nerves.
- Successfully coalesced a collaboration between academic partners (ASU and Univ. of Michigan), clinical neuroscience partner (Barrow Neurological Institute) and industry (E^xponent, Inc). to compete for a joint NSF-NIH program on Collaborative Research in Computational Neuroscience.
- Identified potential users who would benefit from a Metro Phoenix valley-wide small animal imaging facility. Succeeded in obtaining funding from the NCR- High-End Instrumentation grant program for a 7-Tesla Magnetic Resonance Imaging System. The proposal presented potential projects from faculty from multiple ASU departments, and two local clinical facilities (Barrow Neurological Institute and Banner Regional Medical Center). Once established, this will be the only such capability in the area. Solicited bids and selected vendor (Bruker); Negotiated the pricing for a \$1.6M package.

Participation in Strategic Planning and Hiring Committees at Arizona State University

- Graduate Faculty (Summer '07): ASU has restructured its faculty into a graduate faculty model, where faculty from multiple departments cluster to guide and manage graduate disciplinary degrees. Participated in a small group of faculty from across the University to help formulate the new structure.
- Faculty International Committee (May '07 –present): Member of the Office of the Vice President of Global Engagement at ASU. Participated in the strategic planning subcommittee of this new office and helped design a seed-grant program supporting faculty initiatives in global engagement activities.
- Member, Provost Search Committee (Dec '05-May '06): This committee submitted a final selection of candidates for consideration for the position of Provost and Vice President to the University President and upper administration.

Faculty Counselor to Society of Women Engineers (SWE) Student Chapter

This position as faculty counselor of the Student Chapter at Univ. of Kentucky from January 1997 to May 2002 allowed me to have strong interaction with the students in many different activities. The accomplishments of the Chapter were outstanding. In partnership with another advisor, I helped guide their monthly activities, planning procedures, report writing, annual off-site retreats for building camaraderie, fund-raising from industry, and organization of a Regional Conference. I accompanied them to the regional and national conferences, and helped set-up booths. I made multiple industry contacts to increase industry participation in the annual engineering career fair (run by the student SWE chapter) and to get information about summer internships and co-op opportunities for the students.

- Best student section in the nation (10 regions) (1998).
- National Team-Tech award (1997, 1998) (Multidisciplinary teams work thorough the year on a real-world problem identified by an industrial partner; solutions were adapted by the industrial partners).
- National TRW Foundation Scholarship (1997, 1998, 2000), National Best Audio-Visual Presentation (1998), National Scribe award (1997); Academic Scholarship (1998, 2000).
- Best student section Region-G (26 sections) (1997, 1998, 1999).
- Helped the students establish the “Margaret Ingels Society of Women Engineers Graduate Fellowship” through a \$50,000 endowment created by fundraising from industry at the engineering career fair run by the student chapter (2001).

Conference organization (selected examples)

Organized international, national and local conferences, symposia, workshop and meeting sessions

June'08	Steering Committee Member, <i>Neural Interfaces Conference</i> , & Chair and Organizer of Plenary Session 7, “ <i>Sensory Feedback for Prosthetic Limbs</i> ”, June 16-18, Cleveland, OH.
Feb' 08	Organizer and Chair, Symposium on “ <i>Promoting Neural Plasticity</i> ” at Arizona State University, Tempe, AZ.
July' 07	Co-Organized Workshop with Dr. Sharon Crook, <i>Neuro-Machine Interfaces: Integrating Biology and Technology to Develop Functionally Relevant Devices</i> , 16th Annual Computational Neuroscience Meeting, CNS*2007, Toronto, Canada. Invited speakers were from industry and universities.
Jun' 02	Session Organizer and Chair; “ <i>Development and Plasticity of Spinal Circuits</i> ”, Eighth Annual Kentucky Spinal Cord and Head Injury Research Symposium, June 24-26, 2002, Lexington, KY.
Oct ' 99	Session Organizer and Moderator; “ <i>NeuroEngineering Track: "Neural Recording II: Cells, Slice, Brain"</i> ” at the 21st Annual International Conference of the IEEE-EMBS joint meeting with the BMES, October 13-16, 1999, Atlanta, GA.
Nov' 98	Guide and organize Region-G Society of Women Engineers Regional Conference hosted by the University of Kentucky student chapter and the Bluegrass section.
April '97	Session Organizer and Chair; “ <i>Biomedical Engineering Education</i> ”. American Society for Engineering Education, North Central Section. Spring conference, Dayton, OH.

Co-founder of small business R&D company

In 2004, I co-founded a small business research and development company, Advensys, LLC. With Phase-I and Phase-II financial support from the ARMY, the company has designed and developed a patent-pending neuromorphic-orthotic control system (NOCS™) that includes “intelligent” biomimetic control-circuitry and a powered orthosis to provide crutch-less walking for soldiers with transtibial injuries.

RANU JUNG, PHD
CURRICULUM VITAE

PERSONAL

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EDUCATION

Ph.D., Biomedical Engineering, January 1991.

Case Western Reserve University, Cleveland, OH. Advisor: Peter G. Katona, Sc.D.

Thesis title: *Ventral Medullary Organization for Cardio-Respiratory Control*

M.S., Biomedical Engineering, May 1986.

Case Western Reserve University, Cleveland, OH. Advisor: Peter G. Katona, Sc.D.

Thesis title: *Arterial Pressure and Respiratory Responses to Slow Ramp Carotid Sinus Pressures in the Dog.*

B.Tech. with Distinction, Electronics and Communication Engineering, April 1982.

National Institute of Technology (previously Regional Engineering College), Warangal, Andhra Pradesh, India.

PROFESSIONAL INTERESTS

Neural Engineering

Computational Neuroscience

Neurophysiological control of motor systems
(Sensorimotor integration)

Neurotrauma (Spinal Cord Injury)

Dynamical Systems

Signal Processing

EXPERIENCE

ASU: Arizona State University; UKY: University of Kentucky; CWRU: Case Western Reserve University; UMD: University of Maryland

Sept'02 – Current **Co-Director**, Center for Adaptive Neural Systems, ASU (Previously, Center for Rehabilitation Neuroscience and Rehabilitation Engineering, Reportable to Arizona Board of Regents, January 2008)

Aug'02 – Current **Associate Professor (with tenure)**
Harrington Department of Bioengineering, ASU

Jan'08 – Current **Member of Graduate Faculty** of Mathematics, Bioengineering & Electrical Engineering, ASU

Aug'05 – Current **Affiliated Associate Professor**
Department of Electrical Engineering, ASU

Apr'04 – Current **President and Co-founder**
Advensys, LLC, Scottsdale, AZ.

Aug'02 – June'04 **Adjunct Associate Professor**
Center for Biomedical Engineering, UKY, Lexington, KY

July'01 – Aug'02 **Associate Professor (with tenure)**
Center for Biomedical Engineering, UKY, Lexington, KY
(Joint appointment in Dept. of Electrical and Computer Engineering)
(Joint appointment in Department of Physiology)

Nov '00 – Aug'02 **Affiliated Faculty**

Aug'97 - June'01 Spinal Cord and Brain Injury Research Center, UKY, Lexington, KY.
Assistant Professor
 Center for Biomedical Engineering, UKY, Lexington, KY
 (Joint appointment in Department of Electrical Engineering)
 (Joint appointment in Department of Physiology)

July'95- Aug'97 **Assistant Research Professor**
 Center for Biomedical Engineering, UKY, Lexington, KY
 (Joint appointment in Department of Physiology)

July '93-Aug'95 **Research Associate**
(NIH Individual National Research Service Award Fellow)
 Department of Zoology, UMD, College Park, MD.

Aug.'92 **Summer trainee (Computational Neuroscience)**
(NIH National Research Training Award Fellow)
 Marine Biological Laboratory, Woods Hole, MA.

Jan.'91-July'92 **Research Associate and Technical Director Small-Animal Lab.**
(N.E. Ohio American Heart Association Research Fellow)
 Department of Medicine (Cardiology), CWRU, Cleveland, OH.

Sept'89-Dec'90 **Research Assistant**
 Department of Medicine (Cardiology), CWRU, Cleveland, OH.

Oct'88-Nov'89 **Consultant**
 Gensia Pharmaceuticals Inc., San Diego, CA.

Oct'83-May'89 **Graduate Research Assistant,**
 Department of Biomedical Engineering, CWRU, Cleveland, OH.

1985-86, 88 **Instructor**
 Integrated Human Biology (cardiovascular laboratory)
 School of Medicine, CWRU, Cleveland, OH.

1985-1986 **Instructor**
 Undergraduate Biomedical Engineering Lab.(cardiovascular physiology)
 Department of Biomedical Engineering, CWRU, Cleveland, OH.

1980 **Summer trainee**
 Instrument Techniques Private Limited, Hyderabad, AP, India.

AWARDS

Feb '02 2002 Science and Engineering Award, Governors certificate of recognition,
 Commonwealth of Kentucky, USA.

Aug '93-July '95 National Institutes of Health (NINDS); Individual National Research Service
 Award.

Aug '92 National Institutes of Health; National Research Trainee Award; *Methods in
 Computational Neuroscience Workshop (Marine Biological Laboratory, Woods
 Hole, MA 02543).*

Jan'91-June'92 Research Fellow. American Heart Association (N.E. Ohio Affiliate)

Summer '88 Award for slide and poster presentation, Biomedical Engineering Research Day,
 Case Western Reserve University, Cleveland, Ohio.

June '77-Apr '82 Gandhi Memorial Centenary Merit Scholarship, Bhilai Steel Plant; Steel Authority
 of India, Ltd.

Fall '81 Finalist; All India student seminar and paper contest in electronics, held at Dept. of
 Electronics Engineering, Osmania University, Hyderabad, India.

Fall '81 First prize, Technical talk. Competition held by Electronics and Communication
 Engineering Association, Regional Eng. College, Warangal, India.

Fall '81 First prize, Technical Quiz. Competition held by Electronics and Communication
 Engineering Association, Regional Eng. College, Warangal, India.

AWARDS TO MENTORED STUDENTS*Graduate:*

- Brian K. Hillen, Travel award, Organization for Computational Neurosciences, Inc. 2008.
 Joe Graham, Travel award, Organization for Computational Neurosciences, Inc. 2007.
 Mallika Mukherjee, Wakonse-Arizona Fellowship; Arizona State University; March 2006.
 Anil Thota, Best Paper (2nd prize), Rocky Mountain Bioengineering Symposium, April 2001.
 Dan Li, Graduate Fellowship Award, 3rd International Workshop on BioSignal Interpretation, June 1999.
 Sarvani Grandhe, President's Choice, Rocky Mountain Bioengineering Symposium, April 1999.

Undergraduate:

- Stefani Mulligan, Best Paper (2nd prize), Rocky Mountain Bioengineering Symposium, April 2002.
 Casey McIntosh, Research Paper Award. Rocky Mountain Bioengineering Symposium, April 1998.
 Casey McIntosh, Undergraduate Research and Creativity Award, University of Kentucky, May 1996.
 Bradley Brewer, Research Paper Award. Southern Biomedical Engineering conference, *16th Southern Biomedical Engineering Conference*, Biloxi, MS, 1997.
 Bradley Brewer, Second place Award for Presentation. Southern Biomedical Engineering conference, *16th Southern Biomedical Engineering Conference*, Biloxi, MS, 1997.
 Bradley Brewer, Howard Hughes Medical Institute Undergraduate Research Fellowship, University of Kentucky, August 1995.

HONORS**INTERNATIONAL**

- Jan '07- present Associate Editor; IEEE Transactions on Biomedical Engineering
 Jan '06-present Senior Member (Elected); Institute of Electrical and Electronics Engineers, Inc
 Jan '06 -present Expert Assessment Committee for Appointments and Promotions (Member); Department of Health Science and Technology, Aalborg University, DK.
 June 14, '07 Opponent, PhD defense of Mikael Huss, Royal Institute of Technology, Stockholm, Sweden
 Mar '02 Grand Awards Judge, Intel International Science and Engineering Fair, Louisville, KY, USA.

NATIONAL

- June '08 Steering Committee Member, Neural Interfaces Conference, & Chair and Organizer of Plenary Session 7, "Sensory Feedback for Prosthetic Limbs", June 16-18, Cleveland, OH.
 July '07 Invited Workshop Participant. "Future Challenges for the Science and Engineering of Learning" sponsored by the US National Science Foundation, July 23-25, 2007, Washington, D.C.
 March '07 NIH- Peer Review Advisory Committee; Center for Scientific Review-Neurotechnology Working Group Member.
 April '07 UCSD Site Visit Team member, NSF-Science of Learning Centers Advisory Board. April 29-30, 2007, San-Diego, CA.
 Oct '02- June '06 Regular Member, Respiratory Integrative Biology and Translation Research, Study Section; NIH.
 Nov '06 Selected Participant; 4th Annual National Academies Keck Futures Initiative Conference on "Smart Prosthetics: Exploring Assistive Devices for the Body and Mind"; November 9-12, 2006, Irvine, CA.
 Oct '05 NSF-Science of Learning Centers Advisory Board. Oct 26-28, 2005, Washington DC
 Oct '05 Invited Participant; Integrated Research Team meeting "NeuroProsthetics: Emerging Solutions for the Soldier and Society", U.S. Army Medical Research & Materiel Command's (USAMRMC) Telemedicine & Advanced Technology Research Center (TATRC), Oct 10-12, Marina del Rey, CA

Jan'02-Nov '04 Site Visit Team member, NSF-Engineering Research Centers (Center for Neuromorphic Systems Engineering, CalTech). Pasadena, CA. (Four site visits)
Jan' 98 Invited participant; Institute for Mathematics and its Applications: *Computational Neuroscience*, University of Minnesota, Minnesota, MN.

STATE

July'08- present Technical Advisory Board, Arkansas Science & Technology Authority, EPSCoR (Wireless Nano-Bio-Info Sensors & Systems). Little Rock, AR.

UNIVERSITY

February 15 '08 Organizer and Chair, Symposium on "Promoting Neural Plasticity" at Arizona State University, Tempe, AZ.

October' 07 Ira A. Fulton School of Engineering 2006-2007 Faculty Honoree. Arizona State University, Tempe, AZ.

March 22-23, '07 Organizer and Chair, Symposium on "Adaptation and Learning in Neuro-BioMechatorinic Systems" at Arizona State University, Tempe, AZ.

GRANTS & CONTRACTS

Successfully formed multi-institution partnerships between academia, industry and clinical units; led teams of multi-disciplinary investigators; secured funding for infrastructure development (instrumentation and education) and research projects.

Infrastructure Development

Active (Total as PI: \$1,442,668)

SBE-0518697 Supplement (**PI: Jung**)

Catalyst- Minisymposium and Workshop on "Co-Adaptive Learning: Technology for the Aged"

National Science Foundation, 08/15/2005-01/31/2009, \$22,174

1S10RR019945-01 (**PI:Jung**)

7T/30 Bruker BioSpec Magnetic Resonance Imaging/Spectroscopy System (Previously: PharmaScan 70/16 In-Vivo Spectroscopy/Imaging System).

National Institutes of Health (NCRR); 06/01/2005-05/31/2009, \$1,309,550

(Small animal imaging; Participants: ASU faculty from Engineering and College of Liberal Arts & Sciences; Banner Good Samaritan Medical Center ; Barrow Neurological Institute faculty)

SBE-0518697 (**PI: Jung**)

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

National Science Foundation, 08/15/2005-01/31/2009, \$110,944

(Planning grant; ASU faculty from Bioengineering, Electrical Engineering, Chemical Engineering, Kinesiology, Mathematics, Computer Science, Biodesign Institute)

Completed

0114712 (**PI: He**)

IGERT: Musculoskeletal & Neural Adaptations in Form & Function

National Science Foundation, 6/30/2000- 7/31/2005; \$2,503,931

Co-I: **Jung** amongst several others; Member of the steering committee (~'03-'05)

PHASE III: Western Alliance to expand student opportunities. (PI: Garcia)

National Science Foundation (Directorate for Education & Human Resources)

11/01/2001-10/31/2006; \$878,422

Participant: **Jung** amongst several others

LSAMP: Biodesigned Bridges to the Doctorate. (PI: Garcia)

National Science Foundation (Directorate for Education & Human Resources), 11/01/2001-10/31/2006 \$770,000

Participant: **Jung** amongst several others

ASU LTR 09/29/00 (PI: Guilbeau)

Neural & molecular, cell, & tissue bioengineering: a theme for the new department of bioengineering at

The Whitaker Foundation; 7/1/00-6/30/05; Total Budget: (\$1,744,580)

- Co-I: Jung** amongst several others
Program development award third year progress report and extension and continuation grant proposal (PI: Guilbeau)
The Whitaker Foundation ;7/1/00-6/30/05; \$250,000
- Co-I: Jung** amongst several others
Biomedical Engineering Approaches to Spinal Cord Injury (Conference Support for a special session at 6th Annual Kentucky Spinal Cord and Head Injury Research Symposium) (PI: Abbas)
The Whitaker Foundation, May 2000-July 2000, \$10,000
- Co-I: Jung & Geddes** (Univ. of Kentucky, Anat. & Neurobiol.)
Peak Motus[®] System for Kinematic Analysis (Equipment funds through Commonwealth Research Equipment Bond) (**PI:Jung**)
University of Kentucky, Medical Center, Oct. 2000, \$72,000
- EE-579: *Neural Engineering (Merging Engineering with Neuroscience)* (Instructional funds for hardware for project work). (**PI:Jung**)
University of Kentucky, College of Engineering, Oct. 2000, \$2440
- EE-599: *Neural Engineering* (Instructional funds for hardware/software for project work in a new course taught in Electrical Engineering). (**PI:Jung**)
University of Kentucky, College of Engineering, Jan. 1998, \$3000
- Methods in Computational Neuroscience Workshop (Marine Biological Laboratory, Woods Hole, MA 02543)* (Directors: J. Bower, C. Koch, CalTech)
National Institutes of Health. National Research Trainee Award, August 1992.

Research Projects

Active (Total: \$5,823,732; as PI: \$4,954,159)

- CAA0282-08 (**PI: Jung**)
Promoting Plasticity after Spinal Cord Injury using Neuromuscular Stimulation (**PI:Jung**)
Science Foundation Arizona, 07/01/2008- 06/30/2009, \$274,000
- NIBIB/NCMRR: R01-EB008578 (**PI: Jung**)
Neural-Enabled Prostheses with Sensorimotor Integration (**PI:Jung**)
Bioengineering Research Partnership
National Institutes of Health (NIBIB), 09/30/2007- 06/30/2012, \$3,281,759 3366360
ASU Faculty Co-I: Bioengineering, Electrical Engineering, Kinesiology
Sub-Contracts: Mayo Clinic Arizona, USA;
Cochlear Ltd., Australia;
Motion Control, Inc., Utah, USA;
Artificial Limb Specialists, Phoenix, USA
- NINDS: 5R01NS054282 (**PI:Jung**)
CRCNS-Modeling Neuromusculoskeletal Alterations after Spinal Cord Injury
National Institutes of Health (NINDS) 08/15/2005-05/31/2009 \$1,314,799
ASU Faculty Co-I: Bioengineering, Computer Science)
Sub-contract: Barrow Neurological Institute (Neuroscience)
Sub-contract: E^xponent, Inc.
Sub-contract: U. Michigan, Mathematics
- NICHD(NCMRR): 1R01HD049773 (PI: Abbas)
Adaptive Electrical Stimulation for Locomotor Retraining
National Institutes of Health (NCMRR_NICHD)
07/01/2005-04/30/2009, \$868,573

Pending

- Science & Technology Center- Center for Co-Adaptive Systems: Synergies between Biology & Technology*
National Science Foundation (pre-proposal) (**PI: Jung**)
Submitted, October 14th, 2008, \$24,996,437

A Novel Approach to Investigate Neural Disruption after Traumatic Brain Injury (Co-PIs: O. Graudejus, **R. Jung**)

DOD: W81XWH-08-DRMRP-HAD (DR080069)

Submitted, October 8th, 2008, 09/01/2009-02/28/2011, \$219,760

Promoting Plasticity after Spinal Cord Injury using Neuromuscular Stimulation (**PI: Jung**)

National Institutes of Health, (NCMRR-NICHD; R01HD054614-01A1)

Submitted, July 5th, 2007, 04/01/2008-03/31/2013, \$1,413,724 (Scored, pending)

ASU Faculty Co-I: Bioengineering, ANS

Completed (Total: \$3,404,878)

NIBIB: R21 EB003629-A1 (**PI: Jung**)

Active MEMS Neural Clamps.

National Institutes of Health (NIBIB)

04/01/2005-03/31/2008, \$403,756

ASU Faculty Co-I: Bioengineering, Electrical Engineering

W911NF-05-C-0122 (**PI: Jung**)

Neuromorphic Control of Powered Limb Splints (Phase II)

ARMY- Phase II STTR through AdveNSys, LLC, 09/28/2005-09/27/2007, \$750,000

Subcontract: ASU (sub-contract PI: Abbas)

NICHD(NCMRR): R01HD40335 (**PI: Jung**)

A Rodent Model for Locomotor Training with FNS

National Institutes of Health (), 1/17/2002- 6/30/2006, \$775,418

Effects of Incomplete Spinal Injury on Reflex and Motoneuron Properties (**PIs: Jung & Hamm**)

Barrows Neurological Institute (St. Josephs Hospital), 6/1/2003- 9/1/2005; (\$19,600)

W911NF-04-L-0071 (**PI: Jung**)

Neuromorphic Control System for Powered Limb Splints

ARMY-Phase 1 STTR to AdveNSys, LLC, \$99,949 (08/01/2004-01/31/05)

Co-I: V. Jung, MBA (Advensys, LLC)

Subcontract: ASU (sub-contract PI: Abbas)

Monitoring Recovery from Spinal Cord Injury Using Magnetic Resonance Imaging (**PIs: Hardy & Jung**)

Kentucky Science & Engineering Foundation, 4/2002- 4/ 2004, \$185,739

0-9A (**PI: Jung**)

Locomotor Training in a Rodent Model of Incomplete Spinal Cord Injury

Kentucky Spinal Cord and Head Injury Research Trust (0-9A), 1/15/2001- 1/14/2004, \$268,637.

Co-I: S. Carlson, Ph.D. (University of Kentucky, Anat. & Neurobiol.)

Contractile and Metabolic Adaptations of Skeletal Muscle to Spinal Cord Injury and Rehabilitation (**PIs: Huey (Kinesiology), Willis (Kinesiology), Jung (Bioengineering)**)

Arizona State University- Multi-Investigator Proposal Development Grant Program, 1/1/2003-12/31/2003; \$18,000

NCRR: R21-RR12588 (**PI: Jung**)

Analog VLSI-Spinal Cord Interface for Motor Control

National Institutes of Health 09/01/1998-08/31/2000, \$184,901.

Co-I: J.J. Abbas, Ph.D. (University of Kentucky, Biomedical Eng.)

subcontract to: E.J. Brauer, Ph.D. (Northern Arizona Univ., Elect Eng. & Comp. Sci.)

IBN-9601345 (**PI: Jung**)

Dynamical Analysis of Brain-Spinal Cord Interaction in the Lamprey

National Science Foundation; Aug. 1996-July 2000, \$115,485.

Co-I: E.N. Bruce, Ph.D. (University of Kentucky, Biomedical Eng)

Brain-Spinal Cord Interactions in the Control of Locomotion (**PI: Jung**)

The Whitaker Foundation, Jan. 1997-Dec.1999, \$209,866

Co-I: E.N. Bruce, Ph.D. (University of Kentucky, Biomedical Eng)

- Consultant: J.T. Buchanan, Ph.D. (Marquette University, Biology)
 MAR-9606-K3 (PIs: Magnuson & **Jung**)
Pathways and Neurons in the Mammalian Spinal Cord Involved in the Generation of Locomotor Output
 Kentucky Spinal Cord and Head Injury Research Trust (PI: Magnuson, University of Louisville) Jan. 1997-Jan. 2000, \$270,278
Subcontract: Signal Analysis of Neural Activity in Mammalian Locomotor Output. Jan.1997-Jan. 2000, \$52,150 (**PI: Jung**)
Fos Expression as a Neuronal Activity Marker in the Lamprey (Research Experience for Undergraduates). (**PI: Jung**)
 National Science Foundation (IBN: Computational Neuroscience), Jan 1998-Aug.1998, \$5,749.
Effects of Environmental Conditions on Lamprey Swim Behavior (Research Experience for Undergraduates). (**PI: Jung**)
 National Science Foundation (IBN: Computational Neuroscience), Feb.1997-Aug.1997, \$5,000.
 NINDS, F32NS09462 (**PI: Jung**)
Sensorimotor Integration in the Lamprey (Individual National Research Service Award for Postdoctoral Fellows)
 National Institutes of Health, Aug. 1993-July 1995; \$58,500.
 Sponsor: A.H. Cohen, Ph.D. (University of Maryland, Zoology)
Caudal Ventrolateral Medulla and Ventilation in the Rat (Pilot Projects in Neurobiology) (**PI: Jung**)
 University Sleep Center, University Hospitals, Cleveland, Ohio.1992, \$4,000.
Baro- and Chemoreflexes in Heart Failure (Competitive renewal) (**PI: Jung**)
 American Heart Association (N.E. Ohio Affiliate). Jan. '92- June'92; \$10,000.
 Sponsor: M.D. Thames, M.D. (Cardiology)
Baro- and Chemoreflexes in Heart Failure (**PI: Jung**)
 American Heart Association (N.E. Ohio Affiliate). Jan. '91- Dec.'91; \$20,000.
 Sponsor: M.D. Thames, M.D. (Cardiology)

RESEARCH AWARDS TO STUDENTS MENTORED

- The Barrett Honors College: Thesis Research Grants Program*
 Arizona State University, Aug '03- May '04, \$1300
 Student: Taryn Jensen, Bioengineering.
Undergraduate Research and Creativity Grant.
 University of Kentucky, College of Engineering, May '96-April '97, \$500
 Student: Casey McIntosh, Mechanical Engineering.
Howard Hughes Medical Institute Undergraduate Research Fellowship.
 University of Kentucky, Arts and Sciences, August '95-May '96, \$850
 Student: Bradley Brewer, Biology.

REVIEWED JOURNAL PUBLICATIONS (TOTAL 25) (* indicates mentored student, # indicates mentored postdoctoral fellow)

- #Kim, S-J, M. Fairchild*, A. Iarlov, J.J. Abbas, **R. Jung**. Adaptive control for neuromuscular stimulation-assisted movement therapy. (IEEE-TBME – In Press)
- #Ichihara, K., G. Venkatasubramanian*, J.J. Abbas, and **R. Jung**. Neuromuscular electrical stimulation of the hindlimb muscles for movement therapy in a rodent model (J Neurosci Methods (2008) doi:10.1016/j.jneumeth.2008.09.015
- #+Lynskey, J.V., *+A. Bellanger, **R. Jung**. Activity dependent plasticity in spinal cord injury. *JRRD* 45(2): 229-240, 2008 (Invited review; +These authors contributed equally)
- #+Kanchiku, T, #+J.V.Lynskey, D. Protas*, J.J. Abbas and **R. Jung**. Neuromuscular electrical stimulation induced forelimb movement in a rodent model. *J Neurosci Methods*, 167(2):317-26, 2008, doi:10.1016/j.jneumeth.2007.08.002 (+ These authors contributed equally)
- *Thota, A., S. Carlson-Watson, E.J. Knapp, B.T. Thompson, and **R. Jung**. Neuromechanical control of locomotion in the rat. *Journal of Neurotrauma*. 22(4): 442-465, 2005.

6. *Graham, J., V. Booth and **R. Jung**. Modeling motoneurons after spinal cord injury: Persistent inward currents and plateau potentials. *Neurocomputing* 65-66, 719-726, 2005.
7. *Wang, H. and **R. Jung**. Variability analyses suggest that supraspino-spinal interactions provide dynamic stability in motor control, *Brain Res.*,930(1-2):83-100, 2002. (Figure used for cover of vol. 933(2), April 2002)
8. *Li, D. and **R. Jung**. Tracking rhythmicity in nonstationary quasiperiodic biomedical signals using adaptive time varying covariance, *Computers in Biology and Medicine*, 32(4):261-282, 2002.
9. *Mulligan, S.J., B. Thompson, E. Knapp, and **R. Jung**. A method for assessing balance control in rodents. *Biomedical Sci. Instrum*, 38:77-82, 2002.
10. **Jung, R.**, E.J. Brauer, and J.J. Abbas. Real-time interaction between a neuromorphic electronic circuit and the spinal cord, *IEEE Trans. Neural Systems. Rehab. Eng.*,9(3):319-326, 2001.
11. *Grandhe, S. and **R. Jung**. Presence of brain-spinal cord interactions alters lamprey locomotor response to periodic perturbation. *Neurocomputing*, 38-40:1249-1259, 2001.
12. *Thota, A.K., S. Carlson and **R. Jung**. Recovery of locomotor function after treadmill training of incomplete spinal cord injured rats. *Biomedical Sci. Instrum*, 37:63-68, 2001.
13. *Li, D. and **R. Jung**. Quantifying co-evolution of nonstationary biomedical signals using time varying phase spectra. *Annals of Biomed. Eng.*, 28:1101-1115, 2000.
14. **Jung, R.** and *M. Shao. Robustness of coarse graining spectral analysis in estimating frequency and Hurst exponent from mixed time series with harmonic and fractal components. *Neurocomputing*, 32-33, 1055-1063, 2000.
15. *Li, D., D.S.K. Magnuson, and **R. Jung**. Non-stationary analysis of extracellular neural activity. *Neurocomputing*, 32-33, 1083-1093, 2000.
16. *Grandhe, S., J.J. Abbas, and **R. Jung**. Brain-spinal cord interactions stabilize the locomotor rhythm to an external perturbation *Biomedical Sci Instrum*, 35: 175-180, 1999.
17. **Jung, R.**, J.T. Buchanan, and *D. Li. Brain-spinal cord feedforward-feedback interactions affect output pattern and intracellular properties of motor networks in the lamprey. *Neurocomputing*, 26-27:749-759, 1999.
18. **Jung, R.**, *J. Jung, and *B. Losch. Increased variability in motor output with brain-spinal cord interaction. *Biomedical Sci. Instrum.*, 34:107-112, 1998.
19. *McIntosh, C. M., C.F. Knapp, and **R. Jung**. Design of a closed system swim mill for lamprey swimming analysis, *Biomedical Sci. Instrum.*, 34: 87-92, 1998.
20. **Jung, R.**, T. Kiemel, and A.H. Cohen. Dynamic behavior of a neural network model of locomotor control in the lamprey. *J. Neurophysiol.*, 75(3):1074-1086, 1996.
21. Cohen, A.H., L. Guan, J. Harris, **R. Jung**, and T. Kiemel. Interaction between the caudal brainstem and the lamprey central pattern generator for locomotion. *Neurosci.*, 74(4):1161-1173, 1996.
22. **Jung, R.**, M.E. Dibner-Dunlap, *M.A. Gilles, and M.D. Thames. Cardiorespiratory baroreflex control in rats with left ventricular dysfunction. *Am. J. Physiol. (Heart. and Circ.)*, 268 (1 pt 2): H218-225, 1995.
23. **Jung, R.**, E.N. Bruce, and P.G. Katona. Cardiorespiratory responses to glutamatergic antagonists in the caudal ventrolateral medulla of rats. *Brain Res.*, 564:286-295, 1991.
24. **Jung, R.** and P.G. Katona. Cardiovascular and respiratory responses to slow ramp carotid sinus pressures in the dog. *J. Appl.Physiol.*, 68(4):1465-1474, 1990.
25. **Jung, R.**, E.N. Bruce, P.G. Katona. Tonic and baroreflex effects on arterial pressure and ventilation of pentobarbital and nicotine on the rat ventral medullary surface. *Brain Res*, 485:399-402, 1989.

PATENTS FILED

July, 2008; PCT/US2008/070683. (Self-Anchoring MEMS Intrafascicular Neural Electrode) Ranu Jung, Stephen Phillips, James Abbas.

REVIEWED PROCEEDINGS PAPERS (TOTAL 15) (*indicates mentored student, # indicates mentored postdoctoral fellow)

1. Abbas, J.J., #S-J, Kim, *M.Fairchild, S. Allison, N.Krishnamurthi, and **R.Jung** On the Use of Adaptive Control in Stimulation-Assisted Neuromotor Therapy. (Accepted: 13th Annual Conference of the International Functional Electrical Stimulation Society, 21st-25th September, 2008, Freiburg, Germany).

2. **Jung, R.**, *A. Belanger, #T. Kanchiku, #J. Lynskey, *M. Mukherjee, D. Hagner, J.J. Abbas. Hindlimb Neuromuscular Stimulation Therapy after Thoracic Contusion Injury Promotes Locomotor Recovery. (Online: www.ifess.org; ISBN 4-9980783-1-3), pg. 118-120, *Proceedings of the 11th Annual Conference of the International Functional Electrical Stimulation Society*, 12th-15th September, 2006, Miyagi-Zao, Japan (Oral presentation by R. Jung).
3. **Jung, R.** and *H. Wang. Variability in Motor Control: Supraspino-Spinal Interactions underlie Fractal Locomotor Rhythms. *Proceedings of the 25th Annual International IEEE- EMBS Conference, EMBC 2003: 3826-3829; Sept 17-21, 2003, Cancun, Mexico USA* (Oral presentation by R. Jung)
4. **Jung, R.**, E.A. Knapp, *A.K. Thota, B.T. Thompson, *S. Mulligan, *N. Ravi, and *A. Quick, Quantitative outcome measures for assessing motor control in a rodent model of spinal contusion injury. *Proceedings of the 2nd Joint EMBS-BMES Conference*, pg. 2556-2557, Oct 23-26, 2002, Houston, TX, USA (Oral presentation by R. Jung)
5. **Jung, R.**, E.J. Brauer, J.J. Abbas, and *S. Grandhe. Analog VLSI-Spinal Cord Interface for Motor Control. *Proceedings of the First Joint EMBS-BMES conference*, pg. 488, Oct 13-16, 1999, Atlanta, GA, USA (Moderated poster presentation by R. Jung)
6. *Li, D. and **R. Jung**. Time-varying analysis of rhythmic neurological signals. *Proceedings of the 3rd International Workshop on Biosignal Interpretation*, pg.226-229, June 12-14, 1999, Chicago, USA. (Poster presentation by *D. Li with R. Jung, student D. Li won an award for the paper).
7. *Brewer, B. and **R. Jung**. Sensitivity analysis of a hybrid neural network for locomotor control in the lamprey. *Proceedings of the 16th Southern Biomedical Engineering Conference*, pg. 353-356, 1997, Biloxi, MS, (Poster presentation by *B. Brower. The paper won an award. The student received an additional award for the presentation).

BOOK CHAPTERS/INVITED COMMENTARIES/WORKSHOP REPORTS (Total 7) (* indicates mentored student)

1. **Jung, R.** "Adaptive Learning Technology" in National Science Foundation Final Workshop Report: Future Challenges for the Science and Engineering of Learning July 23-25, 2007. pg. 33-34
<http://www.nsf.gov/sbe/SLCWorkshopReportjan08.pdf>
2. National Academies Keck Futures Initiative: Smart Prosthetics: Exploring Assistive Devices for the Body and Mind: Task Group Summaries, The National Academies Press. 2007, .ISBN-10: 0-309-10466-1 (Contributing task group member [Create Hybrid Prostheses That Exploit Activity-Dependent Processes](#), pp77-86)
3. Venkatasubramanian*, G., **R. Jung**, J. D. Sweeney. "Functional Electrical Stimulation", In: The Wiley Encyclopedia of Medical Devices and Instrumentation, 2nd Edition, Editor. J. G. Webster, Wiley, March 2006. ISBN: 0-471-26358-3; 3666 Pages
4. **Jung, R.** The fractal nature of the locomotor rhythm may be due to interactions between the brain and the spinal pattern generator. Invited Commentary on Chapter 4.7 (Fractal analysis of human walking rhythm). In: *Biomechanics and Neural Control of Movement*. Eds. J.M. Winter and P.E. Crago, Springer-Verlag, pp 263-264, 2000.
5. **Jung, R.** and *S. Generazzo. Response to perturbations of a neural network model of locomotor control in the lamprey. In: *Computational Neuroscience:Trends In Research* Ed. James Bower, Plenum Publishing, New York, pp. 415-421, 1998.

DISSERTATIONS

- Jung, R. *Ventral Medullary Organization for Cardio-Respiratory Control*. Doctoral Dissertation. Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH. January 1991.
- Jung, R. *Arterial pressure and Respiratory Responses to Slow Ramp Carotid Sinus Pressures in the Dog*. Masters Thesis. Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH. May 1986.

REVIEWED ABSTRACTS (TOTAL 35); OTHER ABSTRACTS (TOTAL 55) (* indicates mentored student, # indicates mentored postdoctoral fellow)

1. Hillen, B.K.*, J.J. Abbas, D. Jindrich, R.Jung. Effects of muscle strength and activation profile on foot drag in a simulated SCI rat; *BMC Neuroscience* 9 (suppl 1): P27, 2008 (Poster presentation # 27 at the

- 17th Annual Computational Neuroscience Meeting, July 19th-24th, 2008, Portland, Oregon, 2008; Travel award to B.K. Hillen)
2. Graham, J.W.* and R. Jung. Modeling morphological changes in spinal motoneurons following spinal cord injury to explore changes in electrical behavior. (Poster presentation # 242 at the 16th Annual Computational Neuroscience Meeting, July 7th-12th, 2007, Toronto Canada, 2007; Travel award to J. Graham). *BMC Neuroscience* 8 (suppl 2): P27, 2007
 3. Mukherjee M.*, A. Belanger*, T. Kanchiku[#], J. Lynskey[#], A. Thota, J.J. Abbas, R. Jung. Functional neuromuscular stimulation after incomplete spinal cord injury in rodents promotes recovery of locomotion. *J. Neurotrauma*, 22(10):P222 pg.1220, 2005. (Poster presentation at 23rd Annual National Neurotrauma Society Meeting, Washington DC, Nov 10-11, 2005).

INVITED SEMINARS & PRESENTATIONS (TOTAL 71)

- a. Public Forums (selected; Total: 9)
 - "What Do You Think About a Technology You Can't Even See?" Public discussion as part of the "Science Café" at Arizona Science Center, April 18th, 2008, Phoenix, AZ.
 - "Adaptive Technologies for the Central Nervous System: Are We Changing What it means to be Human?" Public discussion and talk by bioengineer Ranu Jung and bioethicist Jason Robert as part of the "Science Café" sponsored by the Consortium for Science Policy & Outcomes, ASU at Arizona Science Center, January 19th, 2007, Phoenix, AZ.
 - "Bioengineering", Arizona Bio-EXPO 2005, March 29, 2005, Phoenix, AZ.
- b. International Talks (selected; Total: 10)
 - "Adaptive Neurotechnology for Making Neural Circuits Functional", 2008 APS Annual March Meeting, New Orleans, LA, March 14, 2008. (Invited Speaker in Session on "Artificial Neurons")
 - "Making Neural Circuits Functional". The Nobel Institute for Neurophysiology, Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden, June 15, 2007.
 - "Neuromorphic Engineering: Cognitive and Behaving Systems- Applications". 2007 Neuromorphic Spring Meeting, Porto Conte Ricerche, April 13-15, 2007, Tramariglio, Italy.
 - "Designing Adaptive Engineered Systems To Promote Adaptation in Neural Systems", Department of Orthopedic Surgery, Yamaguchi University, September 16th, 2006, Hofu, Japan.
- c. National Presentations (selected; Total: 35)
 - 2008 Neurotech Leaders Forum: Technology Transfer Panel; Oct 23-24, 2008, San Francisco, CA.
 - "Co-Adaptive (Synergistic) Learning", position statement presentation and participation at the "Future Challenges in Science and Engineering of Learning" workshop, Directorate for Social, Behavioral & Economic Sciences, National Science Foundation, Washington DC, July 23-25, 2007
 - "Making Neural Circuits Functional". Center for Neural Computation and Neural Engineering Seminar Series, University of Chicago, March 13, 2007.
 - Selected Participant; 4th Annual National Academies Keck *Futures Initiative* Conference on "Smart Prosthetics: Exploring Assistive Devices for the Body and Mind"; November 9-12, 2006, Irvine, CA. (Poster)
 - "Medical Instrumentation", Dept. of Electronics Engineering "All India student seminar and paper contest in electronics", Osmania University, Hyderabad, India, 1981. (Seminar; Finalist in paper contest)
- d. Local (selected; Total: 17)
 - "SAIF- A Small Animal Imaging Facility", Sensor, Signal and Information Processing Workshop on New Applications of Signal Processing in Magnetic Resonance Imaging, Arizona State University, April 28, 2006, Tempe, AZ. (Seminar)
 - "Rehabilitation Neuroscience and Rehabilitation Engineering", Mayo/ASU Joint Research Forum, Scottsdale, AZ, Dec. 7, 2002.

INVITED CLASSROOM LECTURES (TOTAL:17)

Invited lecturer, "Organization of the neuromuscular plant and spinal reflexes" in Advanced Neuroscience II: Human Systems Neuroscience, Arizona State University, Tempe, AZ. February 26, 2008

Invited lecturer, “Spinal Neurotrauma: Regeneration, Repair & Recovery” in Course on Neural-Endocrine and Immune Systems to First year medical students, University of Arizona College of Medicine, Phoenix in partnership with Arizona State University. Phoenix, AZ, October 29, 2007

Lecture series; Lecture 1: ‘Spinal Neurotrauma’; Lecture 2: ‘The complexity of addressing recovery and repair of a nonlinear system’; 4th International Workshop on “Biocomplexity from System to Gene”, July 18-24, 2004, Dartmouth College, Hanover, NH.

Invited lecturer, “Bioengineering” in ECE 100: Introduction to Engineering Design for Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ. July 8, 2004

Panel on Ethics in Neurobiology Research, Bio 416/HPS 410: Professional Values in Science Class, School of Life Sciences, Arizona State University, Tempe, AZ, April 28, 2004.

“Analysis of Neural Excitability Lecture I: Neuron Behavior, Lecture II: Phase Resetting”. Dept. of Mathematics, University of Kentucky, Lexington, KY. April, 1997. Guest Lecture in graduate class titled “Bifurcations and Chaos.”

OFFICES

INTERNATIONAL FEDERAL COMMITTEES

August 2004 Canada Foundation for Innovation/Fondation canadienne pour l'innovation, Canada;
Reviewer for New Opportunities Fund.

INTERNATIONAL NON-PROFIT ORGANIZATIONS

Aug '06-July '09 Organization for Computational Neuroscience, Inc.; President.
April '97-current Rocky Mountain Bioengineering Symposium, Inc.; Board of Directors
Jan '03-July '06 Organization for Computational Neuroscience, Inc.; Board of Directors
July '97-July '00 Computational Neuroscience Meeting; Program Committee.

NATIONAL (US) FEDERAL COMMITTEES

National Institutes of Health (selected; Reviewer since 2000)

Regular study section member, 10/2002-9/2006 (Four year term; 3 review panels a year in February, June and October); Respiratory Integrative Biology and Translational Research (RIBT), previously termed RAP and RESP.

Center for Scientific Review Advisory Panel: Neurotechnology Working Group; March 12, 2007

Site reviewer: Special Emphasis Panel- ZRG1-SBIB-C (40) P, University of Southern California Biomedical Simulations Resource, Los Angeles, CA, March 7-9, 2008

Temporary reviewer for multiple Special Emphasis Panels and Study sections (e.g. ZRG1-BST-E(51) on Predictive Multiscale Models of the Physiome in Health and Disease, May 21, 2008; SMI; IFCN-C (02); ZRG1- IFCNB 05; IFCN-8)

National Science Foundation (selected; Reviewer since 1998)

Science of Learning Centers, Site visit advisory board, 2007, 2005

Directorate for Engineering, Division of Engineering Education and Research Centers, Site visit team member (Neuromorphic Engineering Research Center at California Institute of Technology), 2004, 2003, 2002.

Panel Member (IGERT pre-proposal (2007); Collaborative Research in Computational Neuroscience (2006); Integrative Biology and Neuroscience (2004); Cognitive Neuroscience (2002))

Ad-hoc reviewer (Frontiers in Integrative Biological Research (FIBR), 2003; DMS: Special Programs Reserve, 2002; Integrative Animal Biology, 2001; Office of Integrative Activities (Science and Technology Centers), 2001; Information Technology Research/IBN, 2001; Applied Mathematics, 2001; Biocomplexity, 2000; Computational Neuroscience, 2000; Instrumentation and Instrument Development, 1999; Computational Neuroscience, 1998.)

National Aeronautics and Space Administration, USA

Life and Biomedical Sciences and Applications Division panel member; 1995, 1994

NATIONAL ORGANIZATIONAL COMMITTEES

- July'07- present NIH: Neural Interfaces Conference; Steering Committee member. Conference supported by U13 NS060636 (PI: Hunter Peckham, PhD Case Western Reserve University).
- '98-'02 Women in Engineering Programs & Advocates Network (Univ. of Kentucky representative).
- June'97-June'99 Society of Women Engineers; Women in Academia (Region G representative).
- '95-'98 Society of Women Engineers; Council of Section Representatives (Bluegrass Section, Region G).

STATE GOVERNMENT COMMITTEES

- July'08- present Technical Advisory Board, Arkansas Science & Technology Authority, EPSCoR (Wireless Nano-Bio-Info Sensors & Systems). Little Rock, AR.

PRIVATE FOUNDATION COMMITTEES

- Feb'03-present Flinn Foundation, Bioengineering Technology Platform Engagement Committee Member (Alternate Chair), Phoenix, AZ
- Nov' 04- present Flinn Foundation, Bioimaging Platform Engagement Committee Member, Phoenix, AZ

INSTITUTIONAL COMMITTEES

ASU: ARIZONA STATE UNIVERSITY, TEMPE, AZ; HDBE; Harrington Dept. of Bioengineering

UKY: UNIVERSITY OF KENTUCKY, LEXINGTON, KY

- '06- present President's Academic Advisory Council, ASU (Office of the President) 3-year term
- May'07-present Faculty International Committee; Member, ASU (Office of the VP for Global Engagement) 3-year term
- May'07- Aug'07 Graduate Faculty Committee; Member, ASU (Office of the Graduate School)
- '03-Aug'07 Promotion & Tenure Committee member, HDBE, ASU.
- '03-'07 International Academic Programs; Committee member, ASU.
- Sept'06-May'07 Faculty Women's Association, Executive Board Member, ASU
- July'06-June'07 Asian American Faculty and Staff Association, Board Member, ASU
- Dec '05-May '06 Provost Search Committee, Member, ASU
- Fall '05- April'07 Personnel Committee for Research Faculty. Member, The Biodesign Institute, ASU
- Fall '03-Spring '04 Office of Research and Sponsored Programs Search Committee member, ASU.
- '03-'06 Dean's Advisory Council member, Ira A. Fulton School of Engineering, ASU.
- '96-'02 Society of Women Engineers; Faculty Counselor for student chapter, UKY.
- '93-'95 Society of Women Engineers; Counselor for student chapter at The Catholic University of America, Washington D.C., '93-'95.
- '80-'81 Treasurer for IEEE student chapter, National Institute of Technology (then REC), Warangal, A.P., India.

EDITORIAL SERVICES

ASSOCIATE EDITOR:

IEEE Transactions on Biomedical Engineering (January 2007-present)

REVIEWER:

Journals:

Annals of Biomedical Engineering	IEEE Transactions on Neural Systems and Rehabilitation Engineering
American Journal of Physiology (Heart and Circulatory Physiology)	IEEE Transactions on Neural Networks
Biomedical Science and Instrumentation	Journal of Applied Physiology
Behavioral and Cognitive Neuroscience Reviews	Journal of Neuroscience
Experimental Neurology	Journal of Neurophysiology
IEEE Transactions on Biomedical Engineering	Journal of Neuroscience Methods

Journal of Pharmacology and Experimental
Therapeutics

Neurocomputing
Synapse

Conferences:

Computational Neuroscience Conference
IEEE Engineering in Medicine and Biology

Rocky Mountain Bioengineering Conference
National Conference for Undergraduate Research

RECENT MEDIA EXPOSURE (SELECTED)

- Neurotech business report, vol. 8, No. 3., March 2008. “Adaptive Control Methods Transform Neuroprosthetics”, <http://www.neurotechreports.com/>
- Newswise: Released Wed 05-Mar-2008; “Largest Physics Meeting of the Year, in New Orleans’”. <http://www.newswise.com/articles/view/538345/>
- 2007 Dean’s Report, Ira A. Fulton School of Engineering, ASU; Fall ’07; Signature Research: Repairing Damaged Nervous Systems
http://www.fulton.asu.edu/fulton/news/documents/deansREPORT_2007_000.pdf
- Full Circle Magazine, Ira A Fulton School of Engineering, ASU; Fall ’07; “To Walk Again”
http://www.fulton.asu.edu/fulton/news/publications/Fall2007_Full%20Circle.pdf
- Arizona Bioscientist (blog). July 30, 2007; “Ranu Jung and the 16th Annual International Computational Neuroscience meeting” <http://azbioscientist.blogspot.com/2007/07/ranu-jung-and-16th-annual-international.html>
- NIBIB- E-Advance; April 28, 2006; “Tiny Neural Clamps Make Connections”
<http://www.nibib.nih.gov/publicPage.cfm?pageID=4510>
- Arizona Republic Feb 9, 2006; Pair Look to Reboot the Brain
- Flinn Foundation, Jan 23, 2006; Meet the Players-Two Family....
http://www.flinn.org/bio/article.cms/itemid=b_mtp_jung_kinetic
- Crain’s Cleveland Business- on the web, Editor’s Choice: Feb 13, 2006
- ASU Foundation “Researcher Ranu Jung Receives Honor”, 2006 (web posting)
- Biodesign News Detail: August 9, 2006 (web posting) “Biodesign's Ranu Jung Elected President of the Organization for Computational Neuroscience”
- EMBO reports 6, 2, 108–110, 2005; When Mind Meets Machine
<http://www.nature.com/embor/journal/v6/n2/full/7400344.html>
- NCRR, July 12, 2005; “High End Instrumentation Grants”
<http://www.nih.gov/news/pr/jul2005/ncrr-12.htm>
- Flinn Foundation, Oct 5, 2005; “ASU Researchers Receive 3.9 million in NIH Grants”
http://www.flinn.org/bio/article.cms/itemid=b_fn_asu_3_9m_nih

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Association for the Advancement of Science (Member, ‘91)
- Biomedical Engineering Society (Member)
- Institute of Electrical and Electronics Engineers Inc. (Student Member, Member, Senior Member 01/06)
- International Functional Electrical Stimulation Society (Member)
- National Neurotrauma Society (Member)
- Society for Neuroscience (Member)
- Society of Women Engineers (Senior Member, 1993)

UNIVERSITY SERVICE (ARIZONA STATE UNIVERSITY: 2002-PRESENT)

Arizona State University

- Oct’ 06 - present Member of the ASU President’s Academic Advisory Council
- May ’07 - present Member of the Faculty International Committee (Three year term)
- April ’07 – Aug’07 Member of the Graduate Faculty Committee
- Sept’ 06 - May’07 Member of the Executive Board, Faculty Women’s Association
- July’ 06 - July’07 Member of the Board, Asian American Faculty and Staff Association
- Dec ’05 - Aug’06 Member, Provost Search Committee, Arizona State University

- Feb '03 - present Co-Chair (alternate from '03-'06 Fall) and Representative from ASU to the Bioengineering Technology Platform Engagement Committee, organized by the Battelle Research Institute for the Flinn Foundation, Phoenix, AZ
- Nov' 03- present Representative from ASU to the Bioimaging Platform Engagement Committee, organized by the Battelle Research Institute for the Flinn Foundation, Phoenix, AZ
- Spring '03-'07 Member, Committee on International Academic Programs

The Biodesign Institute

- October '05- April'07 Member, Personnel Committee for Research Faculty, The Biodesign Institute
- Fall 2003 Member, Office of Research and Sponsored Projects Administration search committee

Ira A. Fulton School of Engineering

- Fall 2003-Spring 2006 Member, Deans Advisory Council
- Fall 2003-Spring 2007 Member, Fulton School of Engineering Academic Standards Committee
- April 19, 2006 Fulton Discovery Series Tour- Presentation to lay public

Harrington Department of Bioengineering

- Fall 2003 – Sept, 2007 Member, Promotion and Tenure Personnel Committee
- 2003-present Doctoral defense committee chair (Current:2; Graduated:1)
- 2003-present Doctoral defense committee member (Current:7; Graduated:3)
- 2003-present MS defense committee chair (Current: 0; Graduated 3)
- 2003-present MS defense committee member (Current:2; Graduated:10)
- 2003-present Prospectus exam committee (Chair: 2; Member: 5)
- 2003-present Comprehensive exam committees (Total: 3)
- April 25, 2003 Judge, Biomedical Engineering Research Day

Service to Interdisciplinary Education

- Fall 2003- present Steering Committee member in NSF IGERT Program on Neural & Musculoskeletal Adaptation in Form & Function
- Fall 2004- present Mentor in SOLUR (School of Life Sciences Undergraduate Research) program
- Fall 2007-present Mentor in ASU/NASA Space Grant intern program
- Fall 2002-present Mentor for research experience to undergraduate students from the Barrett Honors College

UNIVERSITY SERVICE (UNIVERSITY OF KENTUCKY: 1995-2002)

Center for Biomedical Engineering (CBME)

- Spring, Fall 2001 Member, Faculty Search Committee
- August 2000 Member, Website Development Committee.
- Fall 1999-Summer 2000 Member, Research and Program Development Committee for submission of Special Opportunities Research Proposal to The Whitaker Foundation.
- Fall 1999 Wrote draft of part of the report for Self-Assessment for CBME.
- Sept. 1997-Summer 1998 Member, Research and Program Development Committee for planning and submission of Special Opportunities Research Proposal to The Whitaker Foundation.
- Fall 1998 Responsible for leading the group and developing the student recruitment flyer for CBME.

Service to Interdisciplinary Education

- Fall 2000-Spring 2002 Mentor to high school junior/seniors from the Math, Science and Technology program run by Paul Dunbar High School, Lexington, KY.
- June 1996, 1997, 1998 Research mentor for national summer fellows accepted by the 'NSF-REU program in Math and Engineering' at the University of Kentucky.
- June 1996-May 2002 Research Mentor for several undergraduate students from Departments of Electrical Engineering, Biosystems and Agriculture Engineering, and Biology
- July 1998 Anatomy and Neurobiology; Mentor, 8-week doctoral student research rotation.

- September 1997 Presentation to incoming graduate students in the Department of Physiology to provide them information and options for research in Computational Neuroscience
- Fall 1995-Spring 1998 Liaison between Department of Biosystems and Agriculture Engineering (BAE) and CBME for establishing a pre-biomedical engineering option for BAE undergraduates.
- July 1996 Organized presentation of Biomedical Engineering Research (three laboratories) to middle school students participating in the Pre-Freshman Enrichment Program (PREP'96) held in the College of Engineering at the University of Kentucky.

Service to retention of Women in Engineering (selected)

- Counselor to the Society of Women Engineers student chapter (1997-2002). Guided them through multiple activities that were rewarded by recognition as Best Chapter in the Nation, Academic Scholarships, and high levels of recruitment by industry.
- Participated in "Young Women in Science" University of Kentucky program for the state of Kentucky by including high-school girls in laboratory research work.
- Helped established an endowed graduate fellowship for women in engineering at University of Kentucky, through the Society of Women Engineers student chapter.
- Represented the Professional Bluegrass Section of Region G at the National Society of Women Engineers Conference (1997 & 1998; responsible for submitting section reports; required to attend Regional and National meetings).

STAFF & STUDENTS SUPERVISED AND MENTORED

ADMINISTRATIVE STAFF FOR CENTER FOR ADAPTIVE NEURAL SYSTEMS

- Nikki Thompson, Business Manager, Spring 2008-present
- Jeanine Elliott, Administrative Assistant, Feb '07-present
- Betsy Arnold, Program Coordinator, Jan'07- Sept'07
- Eona Lewis, BS, Program Coordinator, January '05 – Sep'06
- Melissa Magyar, BS, Administrative Assistant, Fall'04-Fall'05

Note: Administrative staff supervised in capacity of co-Director of the center

RESEARCH STAFF

- Alex, Iarkov, PhD, Research Scientist, Aug. '04 - present
- James V. Lynskey, PhD, PT, Asst. Research Scientist (part-time), July '06- present
- Seung-Jae Kim, PhD, Asst. Research Scientist, August '08- present
- Jeremy Burton, BS, Research Technician, June '08- present
- Diane Hagner, BS, Research Analyst, Senior, July '04- Mar'07
- Anil Thota, M.S., Laboratory Coordinator and Engineer, Apr. '04- October'05.
- Alana La Belle, M.S., Project Engineer, Oct '03 – July '04
- Elizabeth Ashton, B.S., Research Coordinator, July '03 – July '04
- Elizabeth A. Knapp, M.S., Principal Research Analyst, Feb.'01-Oct.'02
- Brian Thompson, M.S., Sr. Research Analyst, Oct.'99-Sept.'02
- John Alton, Research Tech, Mar' 02-July '02
- Fahad Fahoudi, Research Technician, Jan.'91-July '92.

POSTDOCTORAL SCHOLARS

- Sharmilla Venugopal, PhD Oct'08- present
- Joe Graham, PhD, June '08-present
- Seung-Jae Kim, PhD, Aug'06-Aug'08
- Current Status: Assistant research Scientist, Center fro Adaptive neural Systems, Arizona State University
- James Lynskey, PhD, PT, Dec.'04-June '06

Current Status: Assistant Professor - Physical Therapy, AZ School of Health Sciences, A.P. Still University, Joint Appointment as Research Scientist, Center for Adaptive Neural Systems, Arizona State University

Tsukasa Kanchiku, MD, PhD., Aug.'04- June '06

Current Status: Surgeon, Department of Orthopedic Surgery, Yamaguchi University, Yamaguchi, Japan
Kazuhiko Ichihara, MD, Ph.D., Feb.'03- July '04

Current Status: Chief Doctor - Orthopedic Surgery, Department of Orthopedic Surgery, Kyoritsu Hospital, Yamaguchi, Japan

Thomas D. Coates, Ph.D., Aug.'01- July '02

GRADUATE STUDENTS

ASU; ARIZONA STATE UNIVERSITY; HDBE: HARRINGTON DEPT. OF BIOENGINEERING; UKY: UNIVERSITY OF KENTUCKY; IGERT: INTERDISCIPLINARY GRADUATE EDUCATION, RESEARCH & TRAINING

Primary Dissertation/Thesis advisor for:

Active:

Mallika Fairchild nee Mukherjee, PhD program, Aug'04-present; expected graduation: Summer 2009.
HDBE, ASU

Dissertation title: *Neuromuscular Electrical Stimulation Therapy in a Rodent Model of Spinal Cord Injury*; Research Supported in part by: NIH:R01NS054282; SfAZ

Brian Hillen, PhD program, June 2005-present, expected graduation: Summer 2009; HDBE, ASU;
Supported by: NIH:R01NS054282

Sambhavi Subramanian, M.S.program, Oct'08-present. HDBE, ASU

Graduated:

Joe Graham, PhD, Aug'03-May'08 IGERT& HDBE, ASU

Dissertation title: *Modeling Motoneurons and the Effects of Spinal Cord Injury*

Research Supported by: NIH:R01NS054282

Current Status: Postdoctoral Fellow, ASU

Adam Bellinger, MS, Aug'03-Dec'05 HDBE, ASU

Thesis title: *The Effects of Therapeutic Neuromuscular Stimulation Following Incomplete Spinal Cord Injury.*; Research Supported in part by: NIH:R01HD40335

Current Status: Engineer, BioRec, Inc. Tempe, AZ

Ganapriya Venkatasubramanian, M.S. Aug'02-Aug'05, Degree: Aug'05. HDBE, ASU

Thesis title: *A Rodent Model for Locomotor Training after Spinal Cord Injury Using Functional Neuromuscular Stimulation.* Research Supported by: NIH:R01HD40335

Current Status: Research Associate, Sports Injury Prevention Center, Department of Kinesiology, University of Michigan, Ann Arbor, MI.

Anil Thota, M.S. Aug.'00-Aug'02; Summer '03-April '04, Degree: May'04 Center for Biomedical Engineering, UKY

Thesis title: *Neuromechanical Control of Locomotion in the Intact and Incomplete Spinal Cord Injured Rat.* Supported by: Kentucky Spinal Cord and Head Injury Research Trust and NIH:R01HD40335

Current Status: Research Engineer, Cleveland Clinic Foundation & BME doctoral student, Case Western Reserve University, Cleveland, OH.

Sarvani Grandhe, M.S., 1997-2000, Degree: Spring 2000. Center for Biomedical Engineering, UKY

Thesis title: *Perturbation Analysis of the Locomotor System.*

Supported by: NIH-RR12588 and NSF (IBN-9601345) to R. Jung

Current Status: Engineer, Advanced Bionics, CA.

Dan Li, M.S., 1997-2000, Degree: Fall 2000. Center for Biomedical Engineering, UKY

Thesis title: *Time Varying Analysis of Rhythmic Locomotor Activity of the In-Vitro Neonatal Rat Spinal Cord*

Supported by: Kentucky Spinal Cord and Head Injury Research Trust (MAR-9606-K3) to R. Jung

Current Status: Research Engineer; Guidant Inc., Minneapolis, MN.

Heng Wang, M.S., 1998-2000, Degree: Fall 2000. Center for Biomedical Engineering, University of Kentucky

Thesis title: *Effects of Supraspino-Spinal Interactions on Variability in the Lamprey Locomotor Rhythm.*

Supported by: Grants from NSF (IBN-9601345) and The Whitaker Foundation to R. Jung

Current Status: Researcher, University of Michigan.

Jayaroop Guallapalli, M.S. program, September 2001-August 2004, Dept. of Electrical and Computer Engineering, UKY. (Dr. Peter Hardy took over as primary advisor in August 2002 when R. Jung moved to ASU)

Thesis title: *Monitoring Recovery from Spinal Cord Injury Using Magnetic Resonance Imaging.*

Research Supported by: Kentucky Science and Education Fund.

Research Rotation:

Tomoko Sengoku, Ph.D. program, July 1998-August 1998, Interdepartmental Neuroscience Program, University of Kentucky

Dissertation/Thesis Committee Member:

Active Doctoral committees (Bioengineering:4; Electrical Engineering:1; Mathematics:1)

Active Masters committees (Bioengineering: 2)

Graduated Doctoral committees (Bioengineering:3; Biology: 1)

Graduated Masters committees (Bioengineering:10; Electrical Engineering:1)

UNDERGRADUATE STUDENTS

Supported several undergraduate students from engineering and life sciences over the years; including honors theses and NSF summer REUs.

Arizona State University:

The Barrett Honors College: Thesis Research Advisor

Taryn Jensen, Fall 2002-Spring 2004

Thesis: Posture Control in Rats with Incomplete Spinal Cord Injury

Current Position: Engineer with Medtronics, Inc.

The Barrett Honors College; Second reader (2 students)

Bioengineering: Senior capstone design (7 students)

Bioengineering: Research rotations (7 students)

Biology/Psychology/School of Life Sciences (SOLS):

ASU/NASA Space Grant research internship (7 students)

SOLS undergraduate research internship (8 students)

Electrical Engineering Senior capstone design (4 students)

University of Kentucky:

NSF REU summer fellowships in mathematics (Out of state applicants; 5 students)

Howard Hughes Medical Institute Research Fellowship (1 student)

Biology: Research in Biology (2 Honors theses) (4 students)

Biosystems and Agriculture Engineering: Independent study (3 students)

Electrical Engineering; Independent study (5 students)

Mechanical Engineering; Independent study (2 students)

HIGH SCHOOL (3 students)

COURSES TAUGHT

(* indicates new course developed, # indicates new teaching material or topic developed)

Interdisciplinary (University of Arizona College of Medicine, Phoenix in partnership with Arizona State University Arizona State University)

- #Neural-Endocrine and Immune Systems (Spinal Neurotrauma: Regeneration, Repair & Recovery NEI: *Human Systems Neuroscience* (Fall 2007)
Team taught; One guest lecture; New teaching material; Medical School (first year)

Interdisciplinary (Arizona State University)

- #BME 598: *Human Systems Neuroscience* (Fall 2006; Spring 2008)
One guest lecture; New teaching material;
Graduate class in Neuroscience;

Bioengineering (Arizona State University)

- #BME 419: *Biocontrols* (3 credits; Fall 2007; 2008)
Seniors in bioengineering
- *BME 598: *Computational Neuroscience* (4 credits Spring 2008)
Team taught (one of three instructors responsible for approx. 1/3 of the classes)
Graduate bioengineering students in Neural Engineering Track
- #BME 598: *Scientific Communication* (Fall 2007; 2008)
Team-taught (responsible for one lecture); Graduate students in bioengineering
- #BME 100: *Introduction to Bioengineering* (Fall 2006; 2007; Spring 2008).
Two guest lectures each semester (*Computational Neuroscience for Bioengineers*)
Undergraduate freshman class (90-100 students) in engineering
- *BME 598P: *Neurotrauma: Repair, Regeneration and Functional Recovery* (3 credits; Spring 2004, 2005, 2006)
Graduate students in engineering, mathematics & life sciences;
- *BME 598L: *Computational Neuroscience* (3 credits; Fall 2003; Spring 2007)
Graduate students in engineering, mathematics & life sciences;
- #BME 413/423: *Bioinstrumentation I* (3 credits; Fall 2004, 2005)
Seniors in bioengineering; (~70 students)
- #BME 413/423: *Bioinstrumentation Lab* (1 credit; Fall 2004)
Seniors in bioengineering; (~70 students)
- #BME 513/523: *Bioinstrumentation I/Bioinstrumentation Lab* (3/1 credit; Fall 2004)
Graduate students in bioengineering;
- BME 591A: *Neural Engineering/ Molecular & Cell Tissues Seminar Series* (Co-in charge with JJ. Abbas)
(1 credit; Fall 2002, 2003, 2004; Spring 2003, 2004)
Arranged for weekly seminar speaker. Speakers from in-state and out-of-state.
- #BME591: *IGERT Neural and Musculoskeletal Form and Function* (4 credits; Spring 2005)
Team Taught; Graduate students in Engineering, Life Science and Anthropology
- BME 417: *BME Capstone Design I and II* (Fall 2003 – Spring 2005; Fall 2007-present)
Individual and Group Student Projects; Seniors in Bioengineering
- #ECE 100: *Introduction to Engineering Design* (Spring 2004)
One lecture; Freshmen in Engineering

Electrical Engineering (Arizona State University)

- EEE 489A: Senior Design (2 credits; Spring 2004)
Individual Student Projects; Seniors in Electrical Engineering
- EEE 488A: Senior Design (2 credits; Fall 2003)
Individual Student Projects; Seniors in Electrical Engineering

Biomedical Engineering (University of Kentucky)

- *BME 579: *Neural Engineering-Merging engineering with neuroscience* (3 credits; Spring 2001, 2002)
New course developed and formally approved, cross-listed as EE 579, initially taught as EE 599 as described below; Seniors in engineering and beginning graduate students;
- *BME 781-05: *Special Topics (Computational Neuroscience)* (3 credits; Spring 1998, 1999; Fall 2000, 2001.
New course developed; Graduate students in engineering;

*BME 481G: *Special Topics (Data Acquisition and Control for Neurophysiology)* (3 credits; Fall 1997, 1999, 2000, 2001, 2002). Seniors in engineering;

#BME 501: *Foundations in Biomedical Engineering* (3 credits; Fall 1999, 2001)
Team Taught; New teaching material; Graduate/undergraduate engineering;

BME 615: *Biomedical Signal Processing I* (Spring 1997)

Substitute guest lecturer; Graduate students in engineering;

Electrical Engineering (University of Kentucky)

#EE 499: *EE Design*, juniors and seniors in electrical engineering (3 credits; Spring 2000)

*EE 579: *Neural Engineering-Merging Engineering with Neuroscience* (3 credits; Spring 2001, 2002)

New course developed and formally approved, cross-listed as BME579; Seniors in engineering and beginning graduate students.

EE 599: *Neural Engineering* (3 credits; Spring 2001, 2002.)

Precursor to EE579/BME 579 described above

#EE 595: *Independent Problems* (3 credits; Spring 2000, Fall 2000).

Undergraduates in electrical engineering;

Physiology (University of Kentucky)

#PGY 609: *Advanced Respiration (Central Chemoreceptors)* Spring 1996, 1998.

Team Taught; Graduate students in Life Sciences;

Biology (University of Kentucky)

#BIO 395: *Research in Biology* (Spring 1996, 1998, 2000, Fall 1995, 1996, 1999, 2000).

New topic every section; Seniors in Biology/Biophysics;

Mathematics (University of Kentucky)

#MA 773: *Special Problems in Analysis: Bifurcation and Chaos*. Spring 1997.

Two guest lecturers; Graduate class in Mathematics;

Other (University of Kentucky)

Member of Interdepartmental Neuroscience Program at University of Kentucky

Summer Lectures for NSF-REU in Math and Engineering students.

Offered Research Experience for Undergraduates in Bioengineering; Biology; Biosystems and Agriculture Engineering; Computer Science; Electrical Engineering; Mathematics; Mechanical Engineering.