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Education:

1965-1969 - B.A. The Johns Hopkins U. (Human Biology Major)
1968-1972 - M.D. The Johns Hopkins U. School of Medicine

Professional History:

1966-1967	Training in thin film microelectronics, Johns Hopkins Univ. Applied Physics Lab.
1967-1972	Research Assist. to Dr. William B. Marks, Dept of Biophysics, Johns Hopkins Univ.
1971	Guest Research Associate, Univ. of Utah Artificial Eye Project
1971-1972	Independent R&D of real-time scientific programming language for minicomputers
1972-1973	Internship, Department of Surgery, Univ. of Arizona
1973-1974	Research Associate, Lab. of Neural Control, IRP, NINCDS, NIH
1974-1979	Medical Officer, Lab. of Neural Control, IRP, NINCDS, NIH
1979-1986	Permanent Sr. Investigator, Lab. of Neural Control, IRP, NINCDS, NIH
1979-1981	Guest Researcher, Depts. Otolaryngology and Physiology, UCSF School of Medicine
1980-1981	Partner in Bak Electronics, Inc., responsible for product development, electrophysiological research instrumentation
1981-1990	President, Biomed Concepts, Inc., consulting and contracting for research and prototyping in biomedical engineering
1985-1987	Adjunct Associate Professor of Bioengineering, U. Utah
1986-1987	Chief, Neurokinesiology Section, Lab. of Neural Control, IRP, NINCDS, NIH (Sr. Surgeon, U.S. Public Health Service)
1987-1988	Special Expert, Lab. of Neural Control, IRP, NINCDS, NIH
1988-1991	Director of Special Projects, Biomedical Engineering Unit, and Professor of Physiology, Queen's University, Kingston, Ontario
1990-1999	Member, Medical Research Council Group in Sensory-Motor Neuroscience, Queen's University
1991-1999	Director of Bio-Medical Engineering Unit and Professor of Physiology, Queen's University
1994-1999	Chief Scientist (consulting), Advanced Bionics Corp., Sylmar, California
1999-present	Professor of Biomedical Engineering, University of Southern California, and Director of the Medical Device Development Facility, Alfred E. Mann Institute for Biomedical Engineering, USC
2003-present	Deputy Director, NSF Engineering Research Center on Biomimetic MicroElectronic Systems
2006-present	Professor of Neurology, University of Southern California

Awards and Honors:

Seeing Eye, Inc. Fellowship, 1969-72
Commendation Medal - U.S. Public Health Service
International Exchange Fellowship to Bulgaria - National Academy of Sciences
Queen's National Scholar - Queen's University
Fellow of the American Institute for Medical and Biological Engineering (AIMBE)
Medical Device & Diagnostic Industry Magazine's 100 Notable People in the Medical Device Industry

Research Interests:

Neuroprosthetics and neural control techniques
Sensorimotor control in mammals
Implantable medical devices

Research & Scholarly Activities:

Publications: 243

Electronic reprints available through http://www.usc.edu/dept/biomed/faculty/primary/gloeb.htm

Books: 1

Loeb, G.E. and Gans, C. *Electromyography for Experimentalists.* Univ. Chicago Press, 1986. (373 pp., 140 figs.)

Full-Length Reports in Refereed Journals: 107

Physiological Research: 61

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Duysens, J., Loeb, G.E. and Weston, B.J. Crossed flexor reflex responses and their reversal in freely walking cats. *Brain Res.* 197:538-542, 1980.

Hoffer, J.A., O'Donovan, M.J., Pratt, C.A. and Loeb, G.E. Discharge patterns in hindlimb motoneurons during normal cat locomotion. *Science* 213:466-468, 1981.

Loeb, G.E., White, M.W. and Merzenich, M.M. Spatial cross-correlation: A proposed mechanism for acoustic pitch perception. *Biol. Cybernetics* 47:149-163, 1983.

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Lan, N., Fornwalt, H. C., Mileusnic, M., Davoodi, R., Brown, I. E. and Loeb, G. E., Biomimetic Design of FES Control Systems. Proceedings of the 6th Annual Conference of the International Functional Electrical Stimulation Society, June 16-21, 2001, Cleveland, Ohio, pp. 303-305.

Fornwalt III, H. C., Davoodi, R., Lan, N., and Loeb, G. E., Kinematic Analysis of Reaching to Extract Command Signals for FES Control. Proceedings of the 6th Annual Conference of the International Functional Electrical Stimulation Society, June 16-21, 2001, Cleveland, Ohio, pp. 256-258.

Loeb, G.E. Asymmetries of cutaneous reflexes produced by neonatal tendon transfers in cat hindlimb. Gait & Posture 9:S4, 1999.

Guest Lectures (previous 12 years only):

2nd World Congress of Biomechanics, Amsterdam, "Mammalian Muscle Dynamics: Separating the Contractile from the Elastic", 7/94.

Wright State University, Dayton, Ohio, "Skeletal Muscle: Control Engineering Dream", 7/94.

4th International Congress of Vertebrate Morphology, Chicago, "Muscles and Brains - Sifting for Clues to the Coevolution of an Optimized Partnership", 8/94.

Whitaker Foundation Biomedical Engineering Research Conference, Plenary Lecture: "Taking Control of Muscles and Limbs", 8/94.

Canadian Society of Biomechanics, Calgary, "The Relationship Between Reflexive and Intrinsic Control of Limb Trajectories", 8/94.

Neural Control of Movement, Key West, FL, "How Does the Brain Know What the Limbs Are Doing?", 4/95.

1995 Conference on Implantable Auditory Prostheses, Asilomar, California, "Reliability of Current Cochlear Implant Technology", 8/95.

IEEE-EMBS Workshop on Bioelectric Measurements, Montreal, Quebec, "A Brief Overview of Bioelectric Measurement", 9/95.

Workshop on Cochlear Implants in Children, Nottingham, England, "Speech Processing Strategies", 11/95.

Queen's University, Clinical Mechanics Group, Kingston, Ontario, "Toward Clinical Trials of MicroStimulator Technology", 12/95.

Queen's University, Psychology Dept., Kingston, Ontario, "Cochlear Prostheses - Speaking Directly to the Brain", 1/96.

Queen's University, Physiology Dept., Kingston, Ontario, "Grace Under Fire", 2/96.

Pediatric Use of Cochlear Implants, Miami, Florida, "Speech Processing Strategies for Children", 2/96.

International Neuromodulation Society, Orlando, Florida, "Micromodular implants for functional and therapeutic electrical stimulation", 3/96.

Brain Research Association, Newcastle upon Tyne, England, Plenary Lecture: "Grace Under Fire - The Real Goal of Motor Control", 3/96.

Biomechanics & Neural Control of Movement, Engineering Foundation Conference, Mt. Sterling, Ohio, "The Appropriate Use of Models", 6/96.

Alberta Motor Control XIX: Present Perspectives and Future Directions, "Proprioceptive Generalizations About the Limbs", 9/96.

University of Montreal, Ctr Recherche Sci. Neurologique, "Grace Under Fire - The Real Goal of Motor Control", 11/96.

Caltech, Pasadena, CA, "Grace Under Fire - The Real Goal of Motor Control", 11/96.

SCIB Symposium on Muscle Properties and Organismal Function: Shifting Paradigms, Albuquerque, NM, 12/96, invited summary.

University of Washington, Seattle, "Grace Under Fire - The Real Goal of Motor Control," 1/97.

University Southern California, Los Angeles, "Brain - Spinal Cord - Muscle: A Hierarchy of Sensorimotor Control," 1/98.

Queen's University, Kingston, ON, Neuroscience Seminar, "Owner's Workshop Manual for the Ear," 2/98.

Queen's University, Kingston, ON, Dept. of Mechanical Engineering, "Neural Prosthetic Interfaces Between Electornic Devices and the Nervous System," 2/98.

Arizona State University, Tempe, AZ, "Brain - Spinal Cord - Muscle: A Hierarchy of Sensorimotor Control," 3/98.

Neural Control of Movement, Satellite on Computational Modelling, Key West, Florida, "The Importance of Being Muscular," 4/98.

University of California at Los Angeles, CA, "Neural Prosthetic Interfaces Between Electronic Devices and the Nervous System," 7/98.

University of Southern California, Los Angeles, "Neural Prosthetic Interfaces Between Electronic Devices and the Nervous System," 9/98.

University of Arizona, Tucson, AZ, "What Might the Brain Know about Muscles, Limbs and Spinal Circuits:," 11/98.

Biomedical Engineering Society, Cleveland, OH, "Muscle as Motor," 10/98.

Institute of Movement Science, University College London, England, "How Might the Brain Represent Muscles, Limbs and Spinal Circuits?" 3/99.

Institute of Electronic Systems, Aalborg University, Aalborg, Denmark, "Bionic Neurons for Electrical Stimulation of Paralyzed Muscles: Technology and Biology," 3/99.

National Institute of Mental Health, Neural Prosthetics Conference, Washington, DC, "We Made the Deaf Hear. Now What?" 8/99.

IVth International Symposium on the Head/Neck System, Tokyo, "Is the Neck a Leg?", 8/99.

Engineering the Future of Medicine Symposium, A.E. Mann Institute for Biomedical Engineering, University of Southern California, "A Brief History of Neural Prosthetics," 2/2000.

Rehabilitation Medicine Rounds, Veterans Administration Hospital, Los Angeles, "BIONic Implants for Therapeutic Electrical Stimulation," 3/00.

Marquette University, Milwaukee, WI, "Bionic Man: Myth, Reality and Progress," 3/2000.

7th Joint Symposium on Neural Computation, Los Angeles, CA, Keynote speaker: "Dialogs with the Nervous System," 5/2000.

1st Annual International IEEE EMBS Special Topic Conference on Microtechnology in Medicine and Biology, Lyon, France, "Design and Fabrication of Hermetic Microelectronic Implants", 10/2000.

IEEE USC Student Chapter, Los Angeles, CA, "Electronic Interfaces with the Brain", 10/2000.

Symposium on Spinal Cord Function and Rehabilitation, sponsored by J. Physiol. In honor of Prof. Jankowska, New Orleans, LA, "Learning *From* the Spinal Cord", 11/2000.

NIPS*2000 Workshop on Algorithms, Technologies and Neural Representations for Neuroprosthetics and Neurorobotics, Breckenridge, CO, "Primitives or Primitive: Forgetting Knowledge about the Spinal Cord", 12/2000.

CI2001, Los Angeles, CA, "Managing Extreme Versatility – CLARION II Implant Architecture", March 3, 2001.

Neural Information and Coding Workshop 2001, Big Sky, Montana, "Useful Effects from Lousy Signals: How to Build a Clinically Successful Neural Prosthesis", March 20, 2001.

Hospital for Special Care, New Haven, CT, "BIONs – Injectable Electrical Stimulators for Paralyzed Muscles", June 13, 2001.

MIT Leg Lab, Cambridge, MA, "BIONic Implants for Distributed Neural Prosthetic Interfaces", June 20, 2001.

Neurosurgical Grand Rounds, Massachusetts General Hospital, Boston, MA, "Making the Deaf Hear, the Blind See and the Lame Walk", June 21, 2001.

VA/NIH Prosthetics Roundtable, Bethesda, MD, "BIONic Interfaces for Rehabilitation and Repair," June 25, 2001.

Jet Propulsion Lab, Pasadena, CA, "BIONic Implants for Distributed Neural Prosthetic Interfaces", June 28, 2001.

5th SIAM Conference on Control and its Applications, San Diego, CA, "Get Real: Biological and Neural Prosthetic Control of Muscles and Limbs", July 12, 2001.

International Symposium on Movement and Sensation, Cairns, Australia, principal speaker, "The Importance of Biomechanics," Sept. 6, 2001.

Long Beach VA Medical Center and UC Irvine, CA, "BION Injectable Muscle Stimulators: Current Clinical Trials and Potential Application to Sleep Apnea", Sept. 26, 2001.

Neural Prosthesis Workshop, NIH, Bethesda, MD, "Clinical Experience with Microstimulators," Oct. 19, 2001.

Cal Tech, Pasadena, CA, Sloan Seminar, "Making the Deaf Hear, the Blind See and the Lame Walk", Nov. 5, 2001.

Cal Tech, Visual Research Lab Seminar, "Command and Control: Does our reach exceed our grasp?", Nov. 5, 2001.

University of Minnesota, Minneapolis, MN, "Neural Prosthetic Interfaces Between Electronics and Neurons: Making the Deaf Hear, the Blind See and the Lame Walk", Nov. 26, 2001.

Industrial Technology Research Institute (ITRI), Taipei, Taiwan, "The Field of Neural Prosthetics" and "BION Technology and Biomimetic Control Strategies to Reanimate Paralyzed Limbs", Dec. 17, 2001.

USC School of Pharmacy Winter Retreat, Ojai, CA, "Embedded Electronics in our Bodies, our Homes and our Lives", Jan. 19, 2002.

UCLA Biomedical Engineering Student Association, Los Angeles, CA, "BIONic Reanimation of Paralyzed Muscles and Limbs", Mar. 8, 2002

Christopher Reeve Paralysis Foundation, Research Consortium Associates Meeting, Irvine, CA, "Learning From the Spinal Cord," May 18, 2002.

Association of Pacific Rim Universities, Los Angeles, CA, "AMI-USC: An Experiment in Biomedical Technology Transfer", May 30, 2002.

Llewellyn-Thomas Lecture, Institute of Biomaterials & Biomedical Engineering, Toronto, Canada, "Prosthetic Interfaces with the Nervous System", June 6, 2002.

USC School of Engineering, 2002 Technology Equity Conference, San Diego, CA, "Alfred Mann Institute for Biomedical Engineering – An Experiment in Technology Transfer" and "BION Implants to Reanimate Paralyzed Muscles", Sept. 24, 2002.

Catholic University of America, Washington, DC, "We Made the Deaf Hear….Now What?", October 8, 2002.

University of Chicago, IL, "Reanimating Paralyzed Limbs – Coping with Spatially Distributed, Multimodal Systems", Oct. 23, 2002.

Society for Neuroscience Symposium on Computational Motor Control, Orlando, FL, "Model-Based Analysis of Sensorimotor Control Strategies", Nov. 2, 2002.

Neurology/Neurosurgery Grand Rounds, University of Southern California, "Strategies for Neuromuscular Stimulation", Feb. 25, 2003.

Strategic Partnering Opportunities Conference, Southern California Biomedical Council, “The BION Project”, March 12, 2003.
2003 Spinal Cord Conference and Training, Long Beach, CA, “BIONs – History and Potential”, June 5, 2003.
AARP Workshop, Los Angeles, CA, “The Emerging Reality of Neural Prosthetics”, June 16, 2003.
Biomedical Engineering Seminar, USC, Los Angeles, CA, “Modular Injectable Interfaces with the Body – A New Direction for Medical Devices & Diagnostics?”, Sept. 16, 2003.
2003 Science & Technology Series, Johns Hopkins U. Center for Talented Youth, “Neural Prosthetics – Making the Deaf Hear, the Blind See, and the Lame Walk”, Nov. 16, 2003.
Multidisciplinary Research Colloquium in Gerontology, USC, “Making the Deaf Hear, the Blind See and the Lame Walk”, Jan. 22, 2004.
Canadian Physiological Society, British Columbia, Canada, “Biomimetic Prosthetic Proprioception”, Jan. 28-Feb. 1, 2004.
Bionics and Prosthetics - 2003 Whitney Symposium, GE Global Research, Schenectady, NY, “BIONics”, Mar. 8-9, 2004.
Rehabilitation Institute of Chicago, IL, “Making the Deaf Hear, the Blind See and the Lame Walk”, Mar. 10, 2004.
Nano and Microtechnology Symposium, California Institute for Quantitative Biomedical Research, “BIONic Reanimation of Paralyzed Limbs”, April 17, 2004
BioNEMS Symposium, Los Angeles, CA, “Survival Strategies for Millimeter Scale Injectable Stimulators”, May 22, 2004.
2004 Spinal Cord Conference, Keynote Speaker for Ernest Bors Symposium, Long Beach, CA, “BIONic Therapy for Paralyzed Legs”, June 5, 2004.
University of California at Santa Cruz, "Making the Deaf Hear, the Blind See and the Lame Walk", June 8, 2004.
SoCalBio Medical Technology Showcase, Los Angeles, “Implantable Glucose Sensor”, June 16, 2004.
Dept. Aerospace & Mechanical Engineering, University of Southern California, “Neural Prosthetic Reanimation of Paralyzed Limbs,” Sept. 29, 2004.
Humanoids 2004, Santa Monica, CA, “Biomimetic Sensorimotor Control for Paralyzed Patients and Robots”, Nov. 12, 2004.
Brandeis University, Boston, MA, “Neural Prosthetic Reanimation of Paralyzed Limbs”, Nov. 22, 2004.
Cornell University, Ithaca, NY, “Neural Prosthetic Reanimation of Paralyzed Limbs”, Nov. 23, 2004.
Univ. of Indonesia, Jakarta, “Treatment of Hearing Loss: Technology Meets Economics”, Dec. 15, 2004
University of Southern California, Los Angeles, CA, “Design and Fabrication of Disposable, Percutaneous Chemical Sensors”, Jan. 31, 2005
SoCalBio Investor Conference, Los Angeles, CA, “The Sencil™: Indwelling Percutaneous Optical Fibers with Nanoengineered Chemical Sensors”, Mar. 23, 2005.
Biotechnology Club, University of Southern California, “The Development of Medical Devices: Research, Construction and Distribution”, Mar. 30, 2005.
2005 Design of Medical Devices Conference, University of Minnesota, Minneapolis, “Modular Injectable Interfaces with the Body”, April 13, 2005.
First International Conference on Neural Interface and Control, Wuhan, China, “FES and BION™ Development”, May 27, 2005.
Rutgers University, New Brunswick, NJ, “Biomimetic Reanimation of Paralyzed Limbs”, Nov. 21, 2005.
Sate of the Science Workshop on Functional Restoration for the Stroke Survivor, “Practice”, keynote speaker, La Jolla, CA, March 7, 2006.
University of California at Irvine Engineering Symposium on Prosperity thru Technology, May 15, 2006.
Second Computational Motor Control Workshop, Ben-Gurion University of the Negev, Beer-Sheva, Israel, “Biomimetic Integration of Sensorimotor Neural Prostheses”, June 7, 2006.
US-China Workshop on Neural Interface Technologies, Kunming, China, “Injectable Muscle Stimulators and Sensors for Motor Function,” July 9-11, 2006.
Neural Interfaces Workshop, National Institutes of Health, Bethesda, MD, “BIONic Neuromuscular Interfaces,” Aug. 21-23, 2006.
Johns Hopkins University Center for Hearing and Balance, Baltimore, MD, “Reanimating Limbs = Technology + Neurophysiology,” Aug. 23, 2006.
Alberta Motor Control, Kananaskis, Canada, “Mathematical Models of Proprioceptors,” “Prosthetic Proprioception,” Sept. 23-24, 2006

Simon Fraser University, Vancouver, Canada, "Reanimating Limb = Technology + Neurophysiology," Sept. 25, 2006.

Global Digital Healthcare, Cambridge Healthtech Institute, Baltimore, MD, "Neural Prostheses: Crossing the Last Meter in Personal Telecommunications," Oct. 10-11, 2006.

Taipei, Dec. 2006

35th Annual Conference of Indian Association for Physical Medicine and Rehabilitation, Patna, India, "BION Injectable Neuromuscular Stimulators: Technology and Clinical Applications," Jan. 20, 2007.

IEEE International Solid-State Circuits Conference, San Francisco, CA, "BIONic Neuromuscular Interfaces," Feb. 13, 2007.

4th World Congress of the International Society of Physical and Rehabilitation Medicine, Seoul, Korea, "The Many Interfaces Required for Functional Reanimation of Limbs," June 12, 2007.

Neurorehabilitation Grand Rounds, Rancho Los Amigos National Rehabilitation Center, Downey, CA, "BIONic Interfaces for Neuromuscular rehabilitation," Oct. 25, 2007.

Administrative

Professional Memberships:

American Institute for Medical and Biological Engineering (AIMBE)
Institute of Electrical and Electronics Engineers (IEEE)

Society for Neuroscience
Biomedical Engineering Society (BMES)
International Functional Electrical Stimulation Society (IFESS)
Phi Beta Kappa

Advisory Posts (previous ten years only):

Chairman, MRC Grants Committee for Biomedical Engineering (1989-92)

MRC Grants Committee for Biomedical Engineering (1988-89)

Theme Coordinator, Neuroscience Network of Centres of Excellence (1993-97)

Editorial Boards: Associate Editor, *IEEE Trans. Neural Systems and Rehabilitation Engineering* (2002-4); *J. Neurophysiol.* (1987-90); *Exercise & Sports Science Reviews* (1985-1995); *Exp. Brain. Res.* (1992-present); Honorary Editorial Board of *Applied Bionics and Biomechanics*, (2003-present), Editorial Advisory Panel, *Expert Review of Medical Devices* (2004-present); Advisory Board, *IEEE Transactions on Neural Systems & Rehabilitation Engineering* (2005-present)

Frequent Referee: *J. Neuroscience, J. Neurophysiology, Exp. Brain Res., J. Physiol., J. Morph., IEEE-BME, IEEE-TNRE, J. Neurosci. Methods, Med. & Biol. Engng. & Comput., J. Biomech., Brain & Behavioral Sciences, Ann. Biomed.Engng., Muscle & Nerve*

Ad hoc Study Section member: US NIH, US NSF, MRC Canada, NSERC Canada, Muscular Dystrophy Association Canada, Rick Hansen Fund

Academic Committees (USC only)

1999-present: Steering Committee, Institute for Health in an Aging Population

2000-2: Appointment, Promotion and Tenure Committee for the School of Engineering, representing Dept. of Biomedical Engineering

2000-3: Research Committee of the Academic Senate; chair 2001-3

2001-2: Research Committee for the School of Engineering

2001-2: Board of Advisors, Technology Commercialization Alliance

2001-3: Board of Advisors, National Network for Technology Education and Commercialization (NSF funded)

2002-3: MS Program Review Committee, School of Engineering

2002- : University Committee on Academic Review

2002: Internal Review Committee, Dept. of Electrical Engineering

2003-4: Provost's Strategic Planning Committee

2004- : Faculty Advisory Committee to the Distance Education Network

2004: Task Force on Restructuring of the Independent Health Professions

2004- : USC Health Faculty Collaborative

2004-5: Committee on Nanotechnology, Viterbi School of Engineering

2005- : University Research Committee for the Academic Senate

Scientific Meeting Organization:

Track Chair, Neural Prosthetics and Rehabilitation, IEEE-EMBS, Shanghai, 9/2005.

Organizer, Symposium Series "Engineering the Future of Medicine", A.E. Mann Institute:

- "Can we make the blind see?" Feb., 19, 2000
- "Putting the brain in command" July 8, 2000
- "Breaching barriers to drug entry" Mar. 31, 2001
- "Electric power in vivo" Feb. 28, 2004

Program Committee, 1st Annual International IEEE EMBS Special Topic Conference on Microtechnology in Medicine and Biology, Lyon, France, 10/2000.

Meeting Organizer, "Musculoskeletal Modeling Workshop", sponsored by A.E. Mann Institute for Biomedical Engineering, Morro Bay, CA, 8/2000

Meeting Organizer, "Putting the Brain in Control" Engineering the Future of Medicine Series, A.E. Mann Institute for Biomedical Engineering, Los Angeles, CA, 7/2000.

Session Organizer, NCM2000 Satellite on Computational Models, Key West, FL, 4/2000.

Meeting Organizer, "Can We Make the Blind See?" Engineering the Future of Medicine Series, A.E. Mann Institute for Biomedical Engineering, Los Angeles, CA, 2/2000.

Organizing Committee, Conference for Research in Action and Perception, Kingston, ON, 6/98.

Program Committee, Neural Prostheses - Motor Systems V Conference, Burnaby, BC, 8/97.

Focus Group Leader, 1997 Conference on Implantable Auditory Prostheses, Pacific Grove, Ca, 8/97.

Scientific Panel Organizer, Neural Control of Movement Meeting, Cancun, Mexico, 4/97.

Program Committee, Engineering Foundation Conference on Biomechanics & Neural Control of Movement IX, Deer Creek, Ohio, 6/96.

Panel Organizer, "Linking Neural Control to Movement: Insights from Biomechanics," Neural Control of Movement, Marco Island, Florida, 4/93.

Scientific Committee, North Sea Conference - Biomedical Engineering 90, Antwerp, Belgium.

Cochairman, Engineering Foundation Conference on Biomechanics & Control, Henniker, NH, 7/87.

Panel Organizer, "Neural Prosthetic Electrode Arrays: The Perennial Promise of Microelectronics," Materials Research Society, 12/85.

Panel Organizer, 16th Annual Neural Prosthesis Workshop, NINCDS, 11/85.

Steering Committee, Engineering Foundation Conference on Neural Prostheses, Henniker, NH, 8/85.

Steering Committee, Engineering Foundation Conference on Biomechanics & Neural Control of Movement, Henniker, NH, 7/85.

Workshop Organizer, Winter Conference on Brain Research, 1/85.

Track Chairman, Neural Engineering Committee, Biomedical Engineering Society, 1/07

Teaching

Program Development: Founding Director, USC Master of Science in Medical Device and Diagnostic Engineering

Post-doctoral Fellowship Supervision:

J. Duysens (1977-78), Fogarty International Fellowship
C.A. Pratt (1979-80), PHS NRSA
S.J. Duenas (1984-86), Fogarty International Fellowship
S. Spector (1984-86), PHS NRSA
J. Blaszczyk (1985-1987), Fogarty International Fellowship
C.J. Heckman (1986-1988), PHS NRSA
J. Weytjens (1986-1988), Fulbright Scholar
R.P. Young (1990-1992), NIH Grant
H. Ruddy (1991-1993), Network of Centres of Excellence/NIH Program-Project Grant
Wan Jiang (1997-98), MRC Grant
R. Davoodi (1999-2001), AMI-USC
A. Inmann (2002-2003), AMI-USC
N. Rodriguez (2005-2007), AMI-USC
V.J. Santos (2007-), AMI-USC

Ph.D. Thesis Adviser:

A.J. Rindos (1988), Dept. Elect. Engineering, Univ. Maryland
C.M. Chanaud (1988), Dept. Zoology, Univ. Maryland
S.H. Scott (1993), Dept. Physiology, Queen's Univ.
T. Cameron (1996), Dept. Physiology, Queen's Univ.
I.E. Brown (1998), Dept. Physiology, Queen's Univ.
A.C. Dupont (2001), Dept. Physiology, Queen's Univ.
M. P. Mileusnic (in progress), Dept. of Biomedical Engineering, USC
H. M. Kaplan (in progress), Dept. of Biomedical Engineering, USC
W. Tan (2006), Dept. of Biomedical Engineering, USC
W.H. Tran (in progress), Dept. of Biomedical Engineering, USC
D. Popovic (in progress), Dept. of Biomedical Engineering, USC
J. Y. Hwang (in progress), Dept. of Biomedical Engineering, USC
K.C. Liao (2006) Dept. of Biomedical Engineering, USC
G. Raphael (in progress), Dept. of Biomedical Engineering, USC
M. Hauschild (in progress), Dept. of Biomedical Engineering, USC
R. Kaliki (in progress), Dept. of Biomedical Engineering, USC

M.Sc. Thesis Adviser:

A.J. Rindos (1982), Dept. Zoology, Univ. Maryland
C. Engstrom (1990), Dept. of Anatomy, Queen's Univ.
I.E. Brown (1995), Dept. Physiology, Queen's Univ.
E. Cheng (1999), Dept. Physiology, Queen's Univ.
J. Singh (2002), Dept. of Biomedical Engineering, USC
D. M. Kleiman (2003), Dept. of Biomedical Engineering, USC
M. Rodriguez (2005), Dept. of Biomedical Engineering, USC
H.C. Fornwalt (in progress), Dept. of Biomedical Engineering, USC
N. Sachs (in progress), Dept. of Biomedical Engineering, USC

Thesis Committees:

Javier Jo, Ph.D., Dept. of Biomedical Engineering, USC
Deniz Baskent, Ph.D., Dept. of Biomedical Engineering, USC

Juji Harimoto, Ph.D. (in progress), Dept. of Biomedical Engineering, USC
Chunhong Zhou, Ph.D. (in progress), Dept. of Biomedical Engineering, USC
Eric Ortega, Ph.D. (in progress), Dept. of Biomedical Engineering, USC
Joe Fu-Jiou Lo, Ph.D. (in progress), Dept. of Biomedical Engineering, USC
J Henry Lin (2007), Dept. of Pathology, USC
N. Sachs (2007), Dept. of Biomedical Engineering, USC
J. Y. Hwang (in progress), Dept. of Biomedical Engineering, USC
T. Li (in progress), Dept. of Biomedical Engineering, USC
C. Zhou (in progress), Dept. of Biomedical Engineering, USC
W.H. Tran (in progress), Dept. of Biomedical Engineering, USC
Dan Song (in progress), Dept. of Biomedical Engineering, USC
Alan Horsager (in progress), Dept. of Biomedical Engineering, USC

Course Organizer:

Physiological Instrumentation, PHGY 484/884, Queen's Univ.
Applied Electrophysiology, seminar and laboratory, BME620, USC
Development of Regulated Medical Products, BME416, USC (with F.J.Richmond)

Special Course Faculty:

Cold Spring Harbor Course on Computational Neurobiology, 1985, 1986, and 1988.
Queen's University, PHGY 801 - Beyond Academia: Using Biomedical Science in Business and Government, 1996 - present.
Advanced Bionics Corp., Continuing Education in Medical Devices, 1994 - 1999.
USC School of Pharmacy Short Course, Clearing Roadblocks in the New-Product Path, 2000.
UCLA Dept. of Biomedical Engineering, BME260 Neuroengineering, guest lecturer 2000-2002

Research Funding

Contract Administration:

Project Officer, #N01-NS-7-2366, Stanford Univ., Development of a Multichannel Electrode for an Auditory Prosthesis, 1976-79.

Project Officer, #N01-NS-7-2364, University of California at San Francisco, Development of a Multichannel Electrode for an Auditory Prosthesis, 1976-79

Project Officer, #N01-NS-3-2348, Univ. of Maryland, Kinesiological Modeling of the Cat Hindlimb, 1982-1986 and #N01-NS-6-Z300, 1986-89.

Principal Investigator, NIH Contracts #N01-NS-9-2327, #N01-NS-2-2322, #N01-NS-5-2325 to A.E. Mann Foundation, Micro-stimulator for Functional Neuromuscular Stimulation, 1989-98.

Recent and Current Research Funding:

National Academies Keck Futures Initiative (2007)

DARPA – Revolutionizing Prosthetics, contract to Johns Hopkins University Applied Physics Laboratory – subcontract P.I. (2006-2010)

National Science Foundation – Biomimetic Microelectronic Systems Engineering Research Center – Deputy Director (2003-2008)

National Institutes of Health – Bioengineering Research Partnership - P.I. (2002-2007)

National Institutes of Health - Program Project Grant - Project P.I.

National Institutes of Health - R01 Individual Research Grant - P.I. (2000-2003)

National Institutes of Health - Neural Prosthesis Contract - co-P.I.

National Institutes of Health - Small Business Innovative Research Grants – subcontractor

Whitaker Foundation – Special Opportunity Grant – co-P.I. (2000-2003)

Medical Research Council of Canada - Group Grant - Project P.I.

Medical Research Council of Canada - Individual Grant - P.I.

Canadian Networks of Centres of Excellence - Neuroscience Network - Theme Coordinator

Ontario Rehabilitation Technology Consortium - Project co-P.I.

Muscular Dystrophy Association of Canada - P.I.
Advanced Bionics Corporation - Research Contract - P.I.

Consulting (partial listing)

Bioness Inc., Valencia, CA (2006-)

Advanced Neuromodulation Systems, Plano, Texas (2001-)

A.E. Mann Foundation, Sylmar, California (1987-1999)

Advanced Bionics Corp., Sylmar, California (1993-1999)

PI Medical, Portland, Oregon (1992-1996)

Advanced Surface Technology, Billerica, Massachusetts (1991-1993)

Biophor Corp., Billerica, Massachusetts (1991-1992)

Jet Process Corp., New Haven, Connecticut (1991-1992)

Abiomed Inc., Danvers, Massachusetts (1989-1990)

Ionic Atlanta, Atlanta, Georgia (1988-1990)

Trovan Ltd., Luxembourg (1988-1992)

Mentor Technologies, Inc., Rockville, Maryland (1987-1990)

Taymar Inc., Westminster, Colorado (1987-1988)

Travenol Laboratories, Deerfield, Illinois (1986-1987)

BTS, Inc., Greenbelt, Maryland (1985-1986)

Identification Devices, Inc., Boulder, Colorado (1985-1986)

Collier's Encyclopedia, Macmillan Publishers, New York (1986)

Intermedics, Freeport, Texas (1985-1986)

Gentronix, Inc., Rockville, Maryland (1984-1986)

Storz Instrument Company, St. Louis, Missouri (1983-1985)

University of California, Dept. of Urology, San Francisco, California (1984-1986)

Micro-Probe, Inc., Clarksburg, Maryland (1984-1987)

Biostim, Inc., Princeton, New Jersey (1983-1985)

Parco Scientific Company, Vienna, Ohio (1981-1983)

Bak Electronics, Inc., Rockville, Maryland (1979-1984)

AUTOBIOGRAPHICAL SKETCH

I received both my bachelors and medical degrees at The Johns Hopkins University through their accelerated/combined program 1965-1972. While an undergraduate and medical student, I worked on several projects involving microelectronic fabrication of electrode arrays for neurophysiological research and neural prosthetics, including service as principal investigator on a biomaterials development contract from NIH to Johns Hopkins and as a guest researcher at the University of Utah Artificial Eye Project. I trained for one year as a resident in the Department of Surgery, University of Arizona, and I am a licensed physician in the State of California.

From 1973 to 1987, I was a medical officer in the USPHS in the Laboratory of Neural Control, National Institute of Neurological and Communicative Disorders and Stroke, National Institutes of Health, Bethesda, Maryland. In 1983, I received the Commendation Medal of the U.S. Public Health Service. I was responsible for planning and conducting a wide range of studies concerning the sensorimotor control of locomotion, electrophysiological studies of peripheral nerve conduction, and development of novel research techniques for neurokinesiological studies. In particular, my research group developed a variety of implantable electrodes and transducers that permit detailed study of single neuron and whole muscle activity during natural behavior in intact animals. I directed a collaborative project with the University of Maryland to develop a comprehensive musculoskeletal model of the cat hindlimb.

In addition to pursuing basic research, I have been involved in a variety of biomedical engineering projects in various capacities, including a guest appointment at University of California at San Francisco, adjunct associate professor at University of Utah, and president of Biomed Concepts, Inc., a consulting and prototype development business. During the period 1979-1981, I commuted regularly to UCSF, where I was responsible for recruiting and leading the engineering team that developed the forerunner of the CLARION™ cochlear implant, which now provides functional speech perception for thousands of profoundly deaf patients. From 1988-1998 I led an inter-institutional team (Queen's University, Mann Foundation, and Illinois Institute of Technology) that developed a new class of implantable electronic devices (BION™) for a wide range of applications involving therapeutic and functional electrical stimulation of weak and paralyzed muscles. From 1994-1999 I was Chief Scientist for Advanced Bionics Corp. (Sylmar, California), working on commercialization and further development of the CLARION™ and BION™ systems.

I have authored or coauthored over 200 publications (excluding abstracts), including a book on electromyography, 61 full-length physiological research reports in refereed journals, 43 full-length biomedical engineering papers in refereed journals, and 42 issued patents. I have served on the editorial boards of four journals and regularly referee for several others, as well as having served as Chairman of the MRC Grants Committee for Biomedical Engineering (1989-1992).

My long term career goal continues to be the development of clinical neural prostheses as a way both to utilize and to extend our rapidly growing understanding of nervous system function. My training and research have been directed to obtaining working expertise in the various fields of basic research, clinical medicine, applied engineering and industrial relations that must be brought together for such "high-tech" endeavors to succeed. At USC, my research provides the experience and opportunities to train the next generation of researchers and engineers on the development of medical devices and diagnostics.