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Education

Rice University	Electrical and Computer Engineering	PhD	1996
Rice University	Electrical and Computer Engineering	MSEE	1994
Georgia Institute of Technology	Electrical Engineering	BEE	1991

Employment

Georgia Institute of Technology, Atlanta, Georgia, USA
Academic Positions: *Professor* (with tenure, 2010-present), *Associate Professor* (with tenure, 2004-2010) and *Assistant Professor* (1999-2004), School of Electrical and Computer Engineering.
Administrative Positions: *Associate Dean for Research and Innovation*, College of Engineering (2016-present), *Co-Director*, Center for Neural Engineering (2014-2016), *Executive Committee*, Emory Neuromodulation Technology Innovation Center (2013-present), *Faculty Director of Grand Challenges Living Learning Community* (2012-2015). *Faculty Director of Graduate Studies* (2009-11). *Director,* Interdisciplinary Bioengineering Graduate Program (2005-8). *Associate Director* (2004-9) and *Director* (2010-12), NSF IGERT Program in Hybrid Neural Microsystems.

US Dept of State, Washington, DC, USA. *Jefferson Science Fellow and Senior Bioengineer* (2008-2009), serving as a science advisor to the US Department of State on foreign policy issues in the areas of biosecurity, biosafety, and biological weapons nonproliferation.

National Institutes of Health, Bethesda, Maryland, USA. Postdoctoral Fellow (1998-1999), Laboratory for Neural Control, NINDS, Postdoctoral Fellow (1996-1998), Mathematical Research Branch, NIDDK

Research

While I am electrical engineer by degree, my graduate and postdoctoral training have been under the mentorship of collaborative pairs of neuroscientists and quantitative scientists (engineers and mathematicians). **My recent focus has been techniques and applications to modulate peripheral nerve activity.** However, my research career has integrated electrophysiology and computational approaches, with a particular past focus on studying mechanisms of synchrony and pattern generation in neural circuitsa and the development and analysis of computational models of brainstem networks underlying respiratory rhythm generation. **In parallel with this research, my lab has been developing open-source software for integrating real-time computing with electrophysiology experiments.** We have significant expertise in not just developing real-time software for electrophysiology, but studying the accuracy and limitations of using such techniques. Our past and present research has been supported by government funding agencies (NIH, NSF, DARPA), foundations (James S. McDonnell Foundation) and corporations (GlaxoSmithKline, Proctor and Gamble, Axion Biosystems). Texas Instruments has generously provided equipment donations. I have been PI or co-PI on about $25M in sponsored research and graduate training funds.

Publications are available at https://scholar.google.com/citations?user=_DT8jHD7dGYJ.

Mentorship

I have graduated 12 PhD students and 10 MS students in programs In Bioengineering, Biomedical Engineering, Electrical and Computer Engineering, Computer Science, and Physics. I have mentored over 100 undergraduate researchers and received Georgia Tech's **Outstanding Senior Faculty Undergraduate Research Mentor Award** in 2016.

Education Activities

I have routinely taught courses on bioelectricity, quantitative neuroscience, and undergraduate core EE topics, as well as Problem-Based Learning to Biomedical Engineering freshmen. I taught a recent course to introduce microcontrollers to Biomedical Engineering Students. I also developed a program called *Exploring Grand Challenges,* a problem-based learning course for freshmen of all majors who work on teams to identify a "grand challenge" problem to tackle.

Professional Service

I have been very active in the IEEE Engineering in Medicine and Biology Society, serving as an AdCom (Board of Directors) representative (2005-09), Vice President for Finance (2011-14), and Vice President for Publications (2017-19). I have also served on the Board of Directors for the Organization for Computational Neuroscience (2012-14). I have served on about 30 federal grant review panels (NIH and NSF) on topics of neuroscience, neural engineering, physiology, graduate training, and undergraduate training.

Honors

2018	IEEE EMBS Distinguished Lecturer
2016	Georgia Tech Outstanding Senior Faculty Undergraduate Research Mentor Award
2013	Visiting Fellow, Mathematical Biology Institute, Ohio State University
2011	Fellow, American Association for the Advancement of Science (AAAS)
2008	Jefferson Science Fellow, US Department of State and US National Academies
2008	Fellow, American Institute for Medical and Biological Engineering
2004	NSF CAREER Award
2003	Senior Member, IEEE
2001	James S. McDonell Foundation 21st Century Scientist Award
1998	Visiting Fellow, Institute for Mathematics and its Applications, Univ. of Minnesota
1995	Rice University Graduate Student Association Service Award
1992	Whitaker Foundation Graduate Fellowship in Biomedical Engineering
1989	Georgia Tech Research Institute Outstanding Undergraduate Student Employee

Community

I am President and a Founding Member of Decatur Makers, a local "maker space" in Decatur, Georgia USA. I believe strongly in the power of "learning by doing" and hands on learning. My experiences at Decatur Makers have informed my classroom teaching at the university as well. http://www.decatur-makers.org

Distinguished Lecturer Topics

I have proposed the following topics, but am also willing to talk about general careers and trends in biomedical engineering education. More information is on the Distinguished Lecturers website.

1. The promises and risks of bioelectric medicine. Bioelectric medicine is a relatively new field whose goal is to utilize neural stimulation to control visceral organs. The role of the autonomic nervous system in modulating organ function is not well understood, and exploiting the nerve-organ connection as an alternative means of treating disease. In this talk I will highlight the opportunities and knowledge gaps in this field, and the critical role of an understanding of physiology and autonomic control in making progress. I will conclude with examples of how my own lab became involved in this field, motivated by a search for applications of our research on methods to reversible block nerve conduction.

2. Challenges and applications using kHz stimulation frequencies to block nerve conduction. The use of frequencies from 5-70 kHz to block peripheral and autonomic nerve conduction has gained increased attention in recent years. In this talk I will review recent work from our lab over the past decade focusing on understanding what types of nerves are blocked at these frequencies and how to block them more effectively via better electrode designs. I will conclude with two recent or ongoing examples from our lab: the neuromodulation of inflammatory responses and the potential to modulate glu-cose metabolism. Optionally, I may also discuss the back story of how my lab came to pursue this line of research, as it highlights the importance of comparative animal modes and the role of serendipity in laboratory research.

3. Learning by doing: the role of the maker movement and problem-based learning in transforming biomedical engineering education. Young engineering graduates are often criticized for 1) not sufficiently connecting theory to practice, or 2) assuming that design parameters are provided, as op-posed to discovered or determined by engaging intimately with. Customer or problem. In this talk I will discuss my experience with both university and community-based efforts to address these concerns, including maker-spaces, problem-based and hands-on learning, courses that identify “problems that matter”, and fostering student entrepreneurship. This talk will focus on initiatives developed by my col-leagues and me at both Georgia Tech and the metro-Atlanta area.

4. Real-Time Software and Quantitative Neuroscience. For over 20 years my lab and I have beendeveloping real-time software for novel electrophysiology experiments. In this talk I will talk about the experimental paradigms that have been created by integrating modeling with experiment in real time, and more recent opportunities posed by advances in low-cost computers and the rise of high-density multichannel recording techniques.