

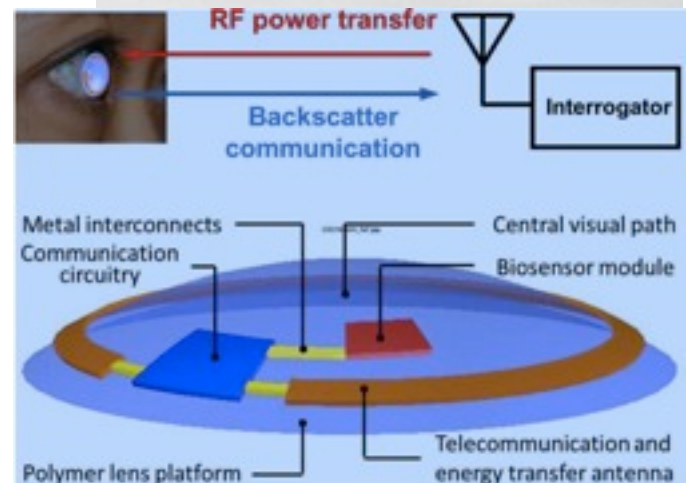
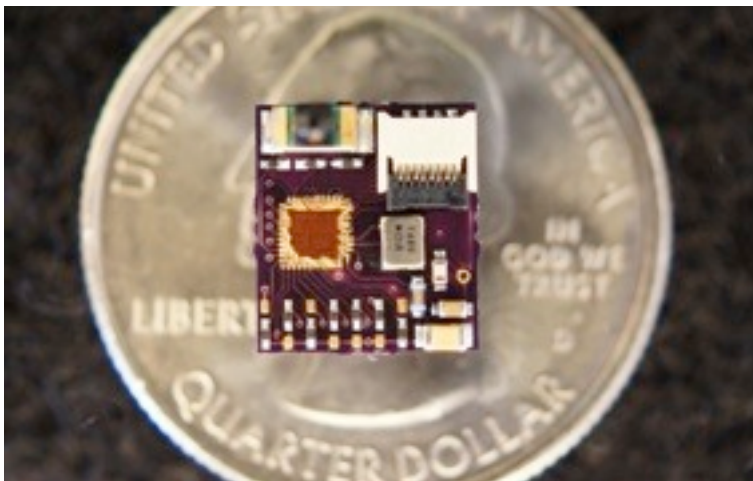
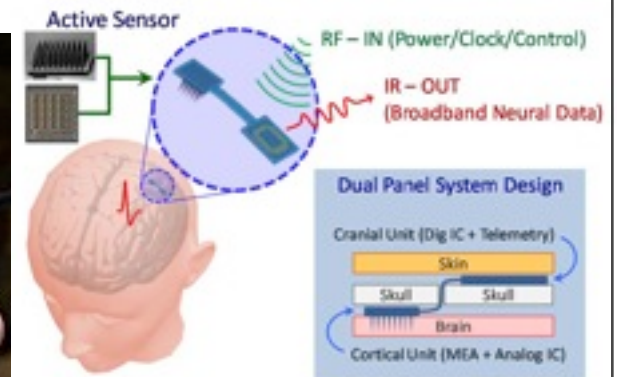
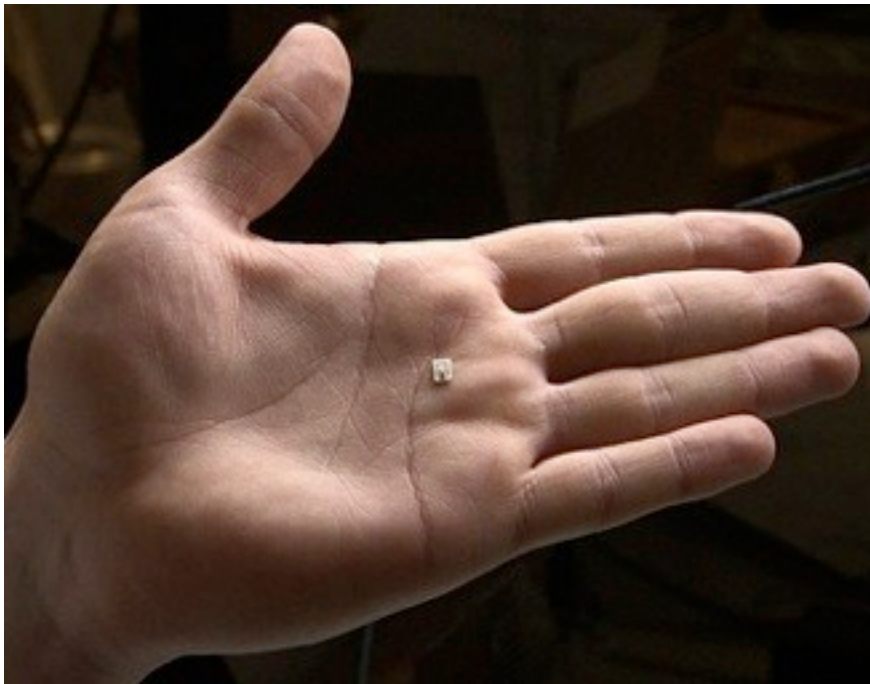


ACM MedCOMM

Workshop on Medical Communication Systems

August 13, 2012, Helsinki, Finland

<http://spqr.cs.umass.edu/events/2012-medcomm/>



Welcome to ACM MedCOMM 2012!

It is my great pleasure to welcome you to the ACM Workshop on Medical Communication Systems. There is an increasing trend toward the convergence of wireless communication, Internet connectivity, and medicine. MedCOMM aims to introduce SIGCOMM researchers to the challenging open problems in medical communication systems and to spark ideas for research in wireless communication, software radios, and networking.

The program includes eight invited talks and two workshop papers. Our distinguished speakers are leaders in their respective fields ranging from electromagnetic interference to biomedical engineering. Again, welcome!

In vivo, in vitro, in infilo, in viscera secura
—Kevin Fu, MedCOMM Program Chair



CONFERENCE ORGANIZERS

PROGRAM CHAIR

Kevin Fu (*University of Massachusetts Amherst / University of Michigan, USA*)

PROGRAM COMMITTEE

Srdjan Capkun (*ETH Zürich, Switzerland*)

Nicolas Christin (*Carnegie Mellon University, USA*)

Prabal Dutta (*University of Michigan, USA*)

Nick Feamster (*University of Maryland, USA*)

Shyamnath Gollakota (*Massachusetts Institute of Technology, USA*)

Matt Reynolds (*Duke University, USA*)

Joshua Smith (*University of Washington, USA*)

Jacob Sorber (*Dartmouth College, USA*)

John Stankovic (*University of Virginia, USA*)

Desney Tan (*Microsoft Research, USA*)

Keith Winstein (*Massachusetts Institute of Technology, USA*)



Thank you to our sponsor!
U.S. National Science Foundation

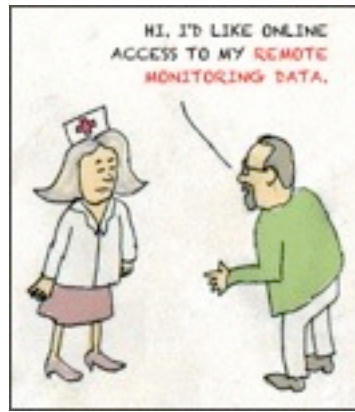
WORKSHOP COORDINATORS

Wendy Cooper (*University of Massachusetts Amherst, USA*)

Andres Molina-Markham (*University of Massachusetts Amherst, USA*)

Ben Ransford (*University of Massachusetts Amherst, USA*)

ACM MedCOMM Agenda



9:00 - 9:15

Introduction - Kevin Fu, Program Chair

9:15 - 10:00

Opening keynote address
Hugo Campos
"Open access to my heart's data"

10:00 - 10:30

Prof. Arto Nurmikko, Brown University, Engineering and Physics
"Wireless Neural Interfaces"

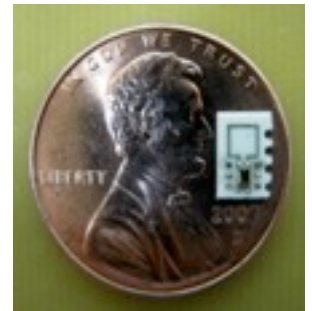
10:30 - 11:00

Coffee break (no implantable delivery available)

11:00 - 12:30

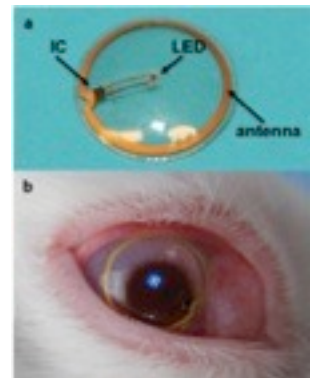
Wireless medical devices: implanted and worn
Prof. Ada Poon, Stanford University, Electrical Engineering
"Emerging wireless applications in biomedicine"

Abstract: In recent years, we have become fascinated by the idea of tiny surgical robots that can be introduced into a blood vessel, travel through the patient's body, exchange information with an external controller for detailed diagnosis, and perform local interventions. They might even be permanently resident in the body for continuous monitoring. Such robots exist only in the realm of science fiction today. Their realization faces major obstacles, including power sources, and the control and monitoring of these untethered robots. In this talk, we will address these obstacles through fundamental understanding of wireless power transfer and communication schemes, as well as devising new sensing and propulsion functionalities to these robots.



Prof. Brian Otis, University of Washington, Electrical Engineering
"Electronics on contact lenses and low power sensor interfaces/wireless for peer-to-peer medical communication"

Stewart J. Thomas, Jordan S. Besnoff, Matthew S. Reynolds,
Duke University
"Modulated backscatter for ultra-low power uplinks from wearable and implantable devices" (paper)



12:30 - 14:00

Lunch

14:00 - 15:00

Medical device communication: sensors, security

Robert Farra, President & COO - MicroCHIPS
"Microchip based sensors and drug delivery systems"

Denis Foo Kune, Yongdae Kim, Univ. of Minnesota; Krishna Venkatasubramanian, Insup Lee, Univ. of Pennsylvania; Eugene Vasserman, Kansas State Univ.

"Towards a safe integrated clinical environment: A communication security perspective" (paper)



15:00 - 15:30

Social engineering event...

15:30 - 16:00

Coffee break (still no implantable delivery available, depending on next session)

16:00 - 17:00

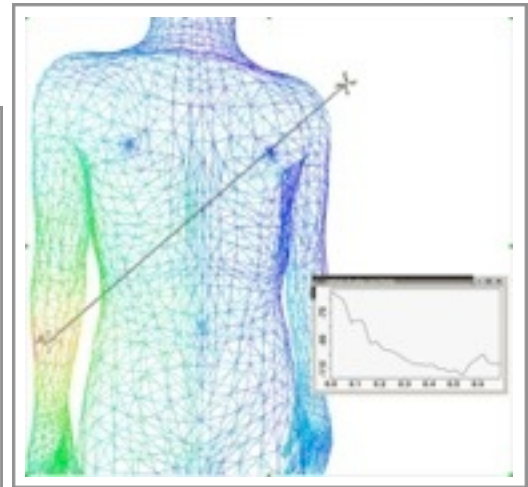
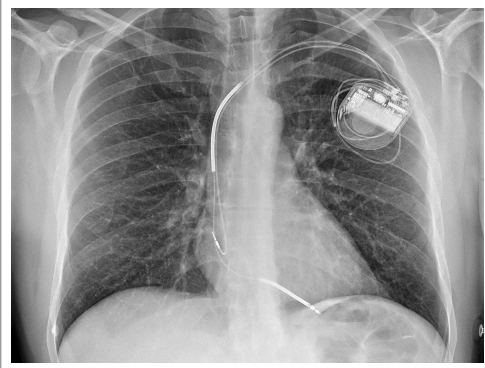
Medical communication: radio interference and propagation

Don Witters, FDA CDRH

"Wireless medical device systems: considerations for safety and effectiveness"

Dr. Kamran Sayrafian, NIST ITL

"RF propagation in Body Area Networks (BANs)"



Speaker Biographies



Keynote: Hugo Campos, Implantable Cardioverter Defibrillator (ICD) patient

"Open access to my heart's data"

Hugo Campos is a passionate advocate for the rights of patients to access their data and become empowered participants in their own health care. Mr. Campos spent over 15 years in advertising and 4 years in patient advocacy. His \$30,000 implantable cardiac defibrillator continually collects information about his body, yet he has no access to these valuable data. He is on a mission to change that.



Invited Talk: Prof. Arto Nurmikko, Brown University, Engineering and Physics

"Wireless neural interfaces"

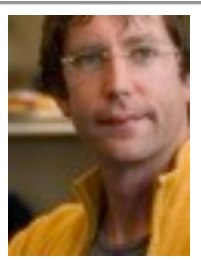
Arto V. Nurmikko, a native of Finland, is a L. Herbert Ballou University Professor of Engineering and Physics at Brown. He received his degrees from University of California, Berkeley, and did postdoctoral work at the Hebrew University (Jerusalem) and MIT. Co-director of the Center for Biomedical Engineering at Brown, Prof. Nurmikko conducts research in neuroengineering, photonics, microelectronics, nanosciences, and the translation of device research to new technologies in physical and life science applications. His current interests are focused on device science especially for implantable neural interfaces. Prof. Nurmikko has published in several fields (over 300 journal articles), led many multi-institutional research teams, advised federal funding agencies, and lectured worldwide. Prof. Nurmikko is a Fellow of the American Physical Society, of the Institute of Electrical and Electronics Engineers, and of the Optical Society of America. He received a Guggenheim Fellowship, and was elected to the American Academy of Arts and Sciences.



Invited Talk: Prof. Ada Poon, Stanford University, Electrical Engineering

"Emerging wireless applications in biomedicine"

Ada Poon received her B.Eng degree from the EEE department at the University of Hong Kong and her Ph.D. degree from the EECS department at UC Berkeley. Her dissertation attempted to connect information theory with electromagnetic theory so as to better understand the fundamental limit of wireless channels. Upon graduation, she spent one year at Intel as a senior research scientist building reconfigurable baseband processors for flexible radios. Afterwards, she joined her advisor's startup company, SiBeam Inc., architecting Gigabit wireless transceivers leveraging 60 GHz CMOS and MIMO antenna systems. After two years in industry, she returned to academia and joined the faculty of the ECE department at the University of Illinois, Urbana-Champaign. Since then, she has changed her research direction from wireless communication to biomedical systems. In 2008, she moved back to California and joined the faculty of the Department of Electrical Engineering at Stanford University.

**Invited Talk: Prof. Brian Otis, University of Washington, Electrical Engineering**

"Electronics on contact lenses and low power sensor interfaces/wireless for peer-to-peer medical communication"

Brian Otis joined the University of Washington Department of Electrical Engineering in 2005. His M.S. and Ph.D. were completed at U.C. Berkeley at the Berkeley Wireless Research Center with Prof. Jan Rabaey. He has worked previously at the University of Washington Kelly Tremblay Brain and Behavior Laboratory, the U.C. Berkeley Ralph Freeman Neuroscience Lab, Intel Corporation, Agilent Laboratories, and Google Inc.

**Prof. Matthew Reynolds, Duke University, Electrical and Computer Engineering**

"Modulated backscatter for ultra-low power uplinks from wearable and implantable devices"

Matt Reynolds is the Nortel Networks Assistant Professor of Electrical and Computer Engineering at Duke University. He received S.B., M.Eng., and Ph.D. degrees from MIT, and was a Motorola Fellow at the MIT Media Lab. Matt co-founded the RFID systems firm ThingMagic Inc. in 2000 and served as Chief Technology Officer until 2007. He joined the Duke faculty in January 2008. Matt is also co-founder of the energy conservation firm Zensi, acquired by Belkin Inc. in 2010. He is a Senior Member of the IEEE and has received 4 Best Paper awards as well as 10 issued and over 20 pending patents.

**Invited Talk: Robert Farra, MicroCHIPS, Inc.**

"Microchip based sensors and drug delivery systems"

Robert Farra, President & COO of MicroCHIPS, has more than two decades of leadership experience successfully developing complex electro-mechanical and fluidic-based medical devices and combination products. His development experience spans concept generation through all stages of development and commercialization, as well as managing intellectual property. Based on proprietary microreservoir technology first developed at the Massachusetts Institute of Technology, MicroCHIPS' platform incorporates long-term implant technologies and wireless communications.

**Denis Foo Kune, University of Minnesota**

"Towards a safe integrated clinical environment: A communication security perspective"

Denis Foo Kune is a PhD candidate at the University of Minnesota where he is focusing on defending against vulnerabilities in the wireless medium. His work includes short-range electromagnetic compatibility and cellular networks. He has over a decade of experience in the industry, mostly at the Honeywell Labs where he worked on improving wireless protocols, industrial networks, and represented Honeywell on technical standard committees. Denis has an M.S. in Computer Science from the University of Minnesota and a B.A. in Computer Science from Macalester College. He will be joining the SPQR lab as a postdoctoral research associate at the University of Massachusetts Amherst.

**Invited Talk: Don Witters, U.S. FDA, Center for Devices and Radiological Health (CDRH)**

"Wireless medical device systems: considerations for safety and effectiveness"

Don Witters is a Regulatory Review Scientist at the Office of Science and Engineering Laboratories, Center for Devices and Radiological Health, U.S. Food and Drug Administration. He has over 30 years experience in the areas of microwave calibration, electromagnetic compatibility (EMC) of medical devices and medical device wireless technology. He has performed laboratory research, presented talks and published papers, and helped write national and international standards dealing with EMC of active medical devices such as implantable cardiac pacemakers with RF wireless sources such as cellular telephones and metal detectors. Mr. Witters is the primary author of the draft FDA guidance for RF wireless medical devices and chairs the CDRH EMC and wireless work group.

**Invited Talk: Dr. Kamran Sayrafian, NIST ITL**

"RF propagation in Body Area Networks (BANs)"

Dr. Kamran Sayrafian is a program lead at the Information Technology Laboratory of the National Institute of Standards and Technology. He leads several strategic projects that are focused on Pervasive healthcare technologies. Dr. Sayrafian was an active contributor to the IEEE802.15.6 international standardization on medical body area networks. Prior to joining NIST, he was the cofounder of Zagros Networks, Inc. a fabless semiconductor company where he served as President & senior member of the architecture team. His research interests include medical body area networks, and mobile health technologies. He has published over 50 conference and journal papers, and book chapters in these areas. He was the recipient of the IEEE PIMRC 2009 & SENSORCOMM 2011 best paper awards. Dr. Sayrafian holds Ph.D., M.S. and B.S. degrees in Electrical & Computer Engineering from University of Maryland, Villanova University and Sharif University of Technology, respectively. He is a senior member of IEEE and an adjunct faculty of the University of Maryland.