



Illinois Center for Wireless Systems

ICWS Seminar Series



Wireless Power and Information Transmission - where Maxwell meets Moore and Shannon

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Abstract: An increasingly important problem in biomedicine and biomimetics is the contactless monitoring of physiological processes. Both power and information are transferred wirelessly to the implanted stimulators and sensors, and the sensors in turn transmit measurements to external monitors. In the past 50 years, analyses, circuit design techniques, and prototype implementation of the wireless link for medical implants were developed at frequencies below 10 MHz. A critical obstacle is the unwieldy size of antennas at the implant due to the long wavelength at these frequencies. In this talk, I will show, both theoretically and experimentally, that the optimal frequency is about 2 orders of magnitude higher than the conventional wisdom. As a result, the antenna at the implant can be reduced by 100 times for a given efficiency, or the efficiency can be improved by 30 dB for a given antenna dimension. The dramatic miniaturization of the implant antenna enables the realization of fully integrated wireless interface for medical implants and potentially opens up new classes of wireless applications for medical devices. I will describe a prototype implementation in CMOS that realizes the above theoretical results.

Biography: Ada Poon received the B.Eng and M.Phil. degrees in Electrical and Electronic Engineering from the University of Hong Kong in 1996 and 1997 respectively, and received the M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences from the University of California at Berkeley in 1999 and 2004 respectively. From 2003 to 2004, she worked at Intel Corporation as a senior research scientist. In 2005, she joined her advisor's startup company, SiBeam Inc., designing Gigabit wireless transceivers leveraging 60 GHz CMOS and MIMO antenna systems. Later in 2005, she joined the faculty of the Department of Electrical and Computer Engineering in the University of Illinois at Urbana-Champaign. Her research interests are wireless communications, information theory, electromagnetic theory, and integrated circuits.

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