



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Wireless Information and Power Transfer: A Unified Study
by
Professor Rui Zhang
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Date : 5 April, 2013 (Friday)
Time : 4:00pm – 5:30pm
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

Energy-constrained wireless networks such as sensor networks are typically powered by batteries that have limited operation time. Although replacing or recharging the batteries can prolong the lifetime of the network to a certain extent, it incurs high costs and is inconvenient, hazardous (say, in toxic environments), or even impossible (e.g., for sensors embedded in building structures or inside human bodies). A more economic, convenient, safer, as well as greener alternative solution is thus to harvest energy from the environment, which virtually provides perpetual energy supplies to wireless devices. In addition to other commonly used energy sources such as solar and wind, ambient radio-frequency (RF) signals can be a viable new source for energy scavenging. Since RF signals can be utilized for information transmission at the same time, a unified study on simultaneous wireless information and power transfer (SWIPT) has recently drawn growing attention. In this talk, we will first provide a survey on the history of wireless power transfer and its state-of-the-art applications and enabling technologies including magnetic induction, magnetic resonance, and EM radiation. Next, we will focus on the RF signal (EM radiation) enabled wireless power transfer, and introduce the new challenges in designing wireless powered communication networks. We will characterize the fundamental rate-energy tradeoffs in SWIPT systems and present some novel solutions to practically achieve/approach such fundamental limits.

Biography

Rui Zhang received the B.Eng. (First-Class Hons.) and M.Eng. degrees from the National University of Singapore in 2000 and 2001, respectively, and the Ph.D. degree from the Stanford University, Stanford, CA USA, in 2007, all in electrical engineering.

Since 2007, he has worked with the Institute for Infocomm Research, A*STAR, Singapore, where he is now a Senior Scientist. Since 2010, he has joined the Department of Electrical and Computer Engineering at the National University of Singapore as an Assistant Professor. He has authored/coauthored over 140 internationally refereed journal and conference papers in the field of wireless communications. His current research interests include multiuser MIMO, cognitive radio, cooperative communication, green communication, wireless networks powered by energy harvesting and wireless power transfer, smart grid, and optimization theory.

Dr. Zhang was the co-recipient of the Best Paper Award from the IEEE PIMRC in 2005. He was the recipient of the 6th IEEE ComSoc Asia-Pacific Best Young Researcher Award in 2010, and the Young Investigator Award of the National University of Singapore in 2011. He is now an elected member of IEEE Signal Processing Society SPCOM & SAM Technical Committees, and an editor for the IEEE Transactions on Wireless Communications.

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