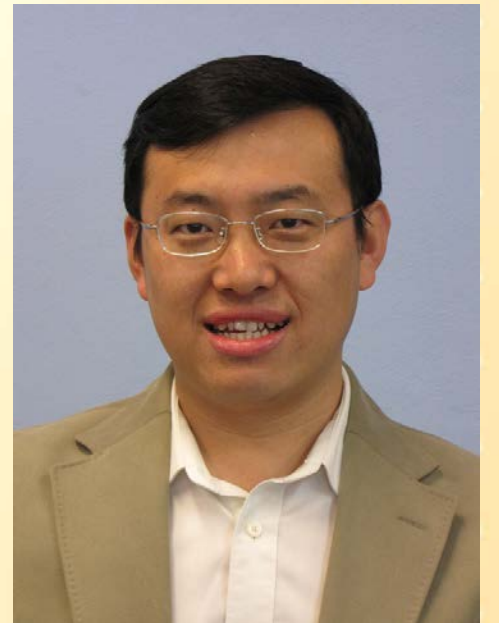


# Energy Harvesting Communications with Limited Feedback

by

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**Time:** 3 p.m. – 4 p.m.

**Venue:** SHIAE Conference Room

7/F, William M.W. Mong Engineering Building, CUHK

### Abstract

In energy harvesting wireless communications, full channel state information at transmitter is generally needed to determine transmission power policy. In this work, we propose online discrete rate and power adaption policies for an energy harvesting communication over Rayleigh fading channels. The receiver periodically sends 1-bit feedback by comparing the channel power gain with a predetermined threshold. The transmitter correspondingly adjusts QAM level and transmission power based on the 1-bit feedback and the available battery energy. To determine the optimal channel threshold, adaptive M-QAM level and corresponding power allocation, we formulate a constrained optimization problem to maximize the throughput within a finite horizon. We show that this problem follows a Markov decision process and can be solved via backward induction method. We further propose an efficient but suboptimal discrete rate and power policy that uses the best effort M-QAM adaption and the channel threshold determined by maximizing the average rate over channel fading and EH processes. Our results show that the performance loss is negligible for the simple M-QAM adaption of the suboptimal policy that is attributed to the optimal choice of channel threshold.

### Biography of the Speaker

**Wei Zhang** (S'01-M'06-SM'11-F'15) received the Ph.D. degree in Electronic Engineering from the Chinese University of Hong Kong in 2005. He was Research Fellow at the Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology in 2006-2007. In 2008, he joined the School of Electrical Engineering and Telecommunications, The University of New South Wales, Sydney, Australia, where he is currently Associate Professor. His current research interests include cognitive radio, energy harvesting communications, MIMO, and multiuser information theory. He received the best paper award at the 50th IEEE Global Communications Conference (GLOBECOM), Washington DC in 2007 and the IEEE Communications Society Asia-Pacific Outstanding Young Researcher Award in 2009. He is an Editor of IEEE Transactions on Wireless Communications and an Editor of IEEE Journal on Selected Areas in Communications (Cognitive Radio Series). He served as a TPC Co-Chair of Communications Theory Symposium of IEEE ICC 2011, TPC Co-Chair of Wireless Communications Symposium of IEEE ICC 2013, and TPC Chair of Cognitive Radio Symposium of the IEEE GlobalSIP 2014. He was elevated to IEEE Fellow in November 2014 for his contributions to cognitive radio communications. He was elected as Secretary of IEEE Wireless Communications Technical Committee in December 2014.

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ALL ARE WELCOME

\* Light refreshment will be served at 2:30 p.m. before the lecture \*