Computer Science
Chair Candidate Seminar

Optimal Linear Precoding for Finite Alphabet Signaling in Wireless Systems and Networks
Dr. Chengshan Xiao, Missouri S&T

Finite alphabet signaling refers to commonly used discrete-constellation modulations in practical communication systems, such as PAM, PSK or QAM. In this talk, we will target at how to increase data rate or throughput via linear precoding in wireless systems and networks such as multiple-input multiple-output (MIMO) systems, multiple access channels, broadcast channels, wiretap channels, and cognitive radio networks. We will present backgrounds, theoretical results, hardware implementation, and experimental results for maximizing the mutual information-based achievable data rate or throughput. Our results demonstrate that precoding for finite alphabet signaling can be radically different from the precoding (or power allocation) for Gaussian signaling. Our examples show that the finite-alphabet signaling-based approach provides not only higher achievable data rate but also lower coded bit error rate than the approaches that design the precoder with Gaussian input assumption. Further research topics will be discussed in this talk as well.

Bio: Chengshan Xiao is an IEEE Fellow and Professor of Electrical and Computer Engineering at Missouri University of Science and Technology. He is currently a Program Director with the Division of Electrical, Communications and Cyber Systems at the National Science Foundation. His research interests include wireless communications, signal processing, and underwater acoustic communications. He is the holder of three U.S. patents. His algorithms were implemented in Nortel's base station radios after successful field trials and network integration.

Prof. Xiao has served as the Editor-in-Chief of IEEE Transactions on Wireless Communications, elected Board of Governor, Director of Conference Publications, Fellow Evaluation Committee, and Distinguished Lecturer of the IEEE Communications Society. He was the founding Chair of the IEEE Technical Committee on Wireless Communications, and the Technical Program Chair of the 2010 IEEE International Conference on Communications, Cape Town, South Africa. He received several distinguished awards including 2014 Humboldt Research Award, 2014 IEEE Communications Society Joseph LoCicero Award, and 2015 IEEE Wireless Communications Technical Committee Recognition Award.

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9:45 am Talk
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