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Title: Control with Limited and Unreliable Communications

Biography

Lihua Xie received his B.E. and M.E. degrees in electrical engineering from Nanjing University of Science and Technology in 1983 and 1986, respectively, and Ph.D. degree in electrical engineering from the University of Newcastle, Australia, in 1992. He was with the Department of Automatic Control, Nanjing University of Science and Technology from 1986 to 1989. Since 1992, he has been with the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, where he is currently a professor and the Director of the Centre for Intelligent Machines. He is also a Changjiang visiting Professor with South China University of Technology. His current research interests include robust control and estimation, networked control, sensor networks, time delay systems, and control of disk drive systems.

Dr Xie is a Fellow of IEEE. He has authored/co-authored 4 books including *Optimal and Robust Estimation* (CRC Press, 2007) and *Modeling and Control of Vibration in Mechanical Systems* (CRC Press, 2010), 2 patents and many journal articles. He received several awards for his research including the Best Paper Award at the 7th Asian Control Conference in 2009, the Best Paper award at the 6th Int. Conf. on Information, Communications and Signal Processing in 2007, and the Best Theoretical Paper Award at the 6th World Congress on Intelligent Control and Automation in 2006. He is an editor of IET Book Series on Control and has served on the editorial boards of a number of journals including *IEEE Transactions on Automatic Control*, *Automatica*, *IEEE Transactions on Control Systems Technology*, and *IEEE Transactions on Circuit and Systems-II*.

Abstract

Information exchanges over networked entities are governed by network topology and channel characteristics such as channel capacity, data rate, communication delays, and packet losses. One of the main challenges in networked control systems is the analysis and synthesis of control systems over unreliable and limited capacity/rate feedback channels. In this talk, we shall discuss issues such as network topology, minimal channel capacity and minimal data rate for stabilization and the design of coding and control schemes to better utilize available communication resources for stability and control performance.