Compressive Feedback Control: Theory and Applications

Ning Xi
Emerging Technologies Institute
The University of Hong Kong

Abstract

The compressive feedback means the sensory information in the feedback of a control system is compressed or obtained from compressive sensing. Compressive sensing is a newly developed sensing method in which the key information can be obtained based on limited sampling. The compressive feedback method can significantly reduce sensing time. Therefore, high performance real time control can be achieved even for the systems with slow sensory feedbacks. The key question is how to use such compressive information to control a real-time system. In this talk, following a brief introduction of compressive sensing, the theoretical foundation as well as implementation methods for modeling, analysis and design of compressive feedback control systems will be presented. Applications, including robot control and high precision nano motion control, will be discussed. The experimental testing results will also be presented.

Ning Xi received his D.Sc. degree in Systems Science and Mathematics from Washington University in St. Louis, Missouri, USA in December 1993. He is the Chair Professor of Robotics and Automation in the Faculty of Engineering and the Director of the Emerging Technologies Institute at the University of Hong Kong. Before he joined the University of Hong Kong in 2016, he was a University Distinguished Professor, the John D. Ryder Professor of Electrical and Computer Engineering and the Director of Robotics and Automation Laboratory at Michigan State University. Dr. Xi received the Best Paper Award in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) in August, 1995, and the Best Paper Award in the 1998 Japan-USA Symposium on Flexible Automation. Dr. Xi was awarded the first Early Academic Career Award by the IEEE Robotics and Automation Society in May, 1999. He also received The Best Paper Award of IEEE Transactions on Automation Science and Engineering in 2007. Dr. Xi was awarded SPIE Nano Engineering Award in 2007. In addition, he is a recipient of US National Science Foundation CAREER Award. Dr. Xi is a fellow of IEEE.