

学术报告会

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A Secure Cross-Layer Design for Remote Estimation under DoS Attacks

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Abstract:

We consider security issues of a cyber physical system (CPS) under denial-of-service (DoS) attacks. The measurements of multiple sensors are transmitted to a remote estimator over a multi-channel network, which may be congested by an intelligent attacker. Aiming at improving the estimation accuracy, we first propose a novel aggregation scheme for the estimator to produce accurate state estimates, from which we obtain a closed-form expression of the expected estimation error covariance. We further develop a sensor-attacker game to design the cooperative and defensive channel selection strategy, which avoids the sensors being attacked in an energy-efficient way. Numerical examples are provided to illustrate the developed results.

Biography:

Ling Shi received the B.S. degree in electrical and electronic engineering from Hong Kong University of Science and Technology, Kowloon, Hong Kong, in 2002 and the Ph.D. degree in Control and Dynamical Systems from California Institute of Technology, Pasadena, CA, USA, in 2008. He is currently an associate professor at the Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology. His research interests include cyber-physical systems security, networked control systems, sensor scheduling, and event-based state estimation. He has been serving as a subject editor for International Journal of Robust and Nonlinear Control from March 2015 and an associate editor for IEEE Transactions on Control of Network Systems from July 2016. He also served as an associate editor for a special issue on Secure Control of Cyber Physical Systems in the IEEE Transactions on Control of Network Systems in 2015-2016.