

学术报告会

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SINR-based DoS Attack on Remote State Estimation: A Game-theoretic Approach

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Abstract:

We consider remote state estimation of cyber-physical systems under signal-to-interference-plus-noise ratio (SINR)-based denial-of-service (DoS) attacks. A sensor sends its local estimate to a remote estimator through a wireless network that may suffer interference from an attacker. Both the sensor and the attacker have energy constraints and they need to consider how much transmission power to use and how much interference power to attack. We propose a Markov game framework to model this interactive decision-making process based on the current state and information collected from previous time steps. To solve the associated optimality (Bellman) equations, a modified Nash Q-learning algorithm is applied to obtain the optimal solutions. Numerical examples and simulations are provided to demonstrate our results. (If time allows, we will also discuss another form of CPS attack, namely, sensor data integrity attack and will present a novel optimal linear attack strategy).

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 networked control systems, wireless sensor networks, event-based state estimation and sensor scheduling, and smart energy systems. He has been serving as a subject editor for International Journal of Robust and Nonlinear Control from 2015. 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.