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

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Abstract:

In this talk, we consider remote state estimation of cyber-physical systems (CPS) 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. We first study an associated two-player game when multiple power levels are available. Then we build a Markov game framework to model the 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.

Biography:

Yuzhe Li received the B.S. degree in Mechanics from Peking University, China in 2011 and the Ph.D. degree in Electronic and Computer Engineering from the Hong Kong University of Science and Technology, Hong Kong in 2015. Between June 2013 and August 2013, he was a visiting scholar in the University of Newcastle, Australia. He is currently a Postdoctoral Fellow at the Department of Electrical and Computer Engineering, University of Alberta, Canada. His current research interests include cyber-physical system security, sensor power control and networked state estimation.