UCF | Electrical and Computer Engineering

ECE Seminar Series

Reach Set-based Attack Resilient State Estimation

FRIDAY, MARCH 15, 2019

11:00 AM—12 PM HEC 356

Abstract

This talk deals with the problem of secure state estimation in an adversarial environment with the presence of bounded noises.

The problem is given as min-max optimization, that is, the system operator seeks an optimal estimate which minimizes the worst-case estimation error due to the manipulation by the attacker.

To derive the optimal estimate, taking the reach set of the system into account, we first show that the feasible set of the state can be represented as a union of polytopes, and the optimal estimate is given as the Chebyshev center of the union.

Then, for calculating the optimal state estimate, we provide a convex optimization problem that utilizes the vertices of the union.

On the proposed estimator, the estimation error is bounded even if the adversary corrupts any subset of sensors.

Numerical comparisons and examples finally illustrate the effectiveness of the proposed estimators.

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Biography

Toru Namerikawa received the B.E., M.E and Ph.D of Engineering degrees in Electrical and Computer Engineering from Kanazawa University, Japan, in 1991, 1993 and 1997, respectively.

He is currently a Professor at Department of System Design Engineering, Keio University, Yokohama, Japan.

He held visiting positions at Swiss Federal Institute of Technology in Zurich in 1998, University of California, Santa Barbara in 2001, University of Stuttgart in 2008 and Lund University in 2010.

He received 2014 Pioneer Technology Award from SICE Control Division and 2017 Outstanding Paper Award from SICE.

His main research interests are robust control, distributed and cooperative control and their application to mechatronic systems and power network systems and smart cities.