5th International Symposium on Resilient Control Systems

The major purpose of this symposium is to extend and endorse particular concepts that will generate novel research and codify resilience in next generation control system designs.

Special/Invite Session Announcement and Call for Papers

Session S/I-03:

Tutorial on Static and Dynamic Game Theory for Resilient Control Systems

Session Abstract:

In many critical infrastructures, the growing complexity of interconnected systems requires a new set of tools for analysis and design. Security and resilience are important system attributes of these systems, which are often subject to exogenous disturbances and exposed to unexpected adversarial attacks or events. Game theory is a versatile quantitative tool and has been commonly used to model different types of interactions among players or subsystems at multiple layers of the system. In this tutorial, we introduce game theoretic methods and discuss their application to resilient control systems. In the first part of the tutorial, we present static one-shot games and their basic solution concepts such as Nash equilibrium and Stackelberg equilibrium. In the second part, we introduce games that can capture system dynamics either in extensive forms or by differential equations and through stochastic dynamics. We draw examples from power systems and smart grids to illustrate various applications of game theory.

Topics:

- Static Games and Applications: Matrix Games, Learning in Games, Stackelberg Games, Games-in-Games, and Computational Methods
- Dynamic Games and Applications: Extensive Games, Differential Games, Stochastic Games, Large Population Games, Multi-Layer and Multi-Resolution Games
- Game Theoretic Methods for Resilient Control Systems

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