Critical Infrastructure Systems

Chair: Jagdish Chandra

Critical infrastructures such as transportation systems, communication networks, and electric power grids provide rich examples of hybrid systems. These systems contain interactive sub-systems of continuous-time dynamics, discrete-time events, continuous-time controllers, and discrete-time event controllers. Such systems are characterized by complex nonlinear behavior, and experience uncertainty both in their internal description and in external disturbances/environments. The design, analysis and survivability of such infrastructures present many analytical and computational challenges.

We have accepted three papers for this Minitrack. The first paper deals with targeting behavior of vehicles in a battlefield. Many approaches, including fuzzy set theory, has been employed for such target analysis. This paper introduces a model to illustrate how to apply a fuzzy relational equation algorithm to threat analysis in the context of combat simulation.

Critical infrastructure systems are complex networked systems that rely on distributed data processing hardware and software to accomplish coordination and interfacing among its sub-systems. The second paper describes an approach for modeling and analyzing the temporal failure and degradation behavior of critical infrastructure systems using novel temporal database management systems.

Finally, the third paper deals with a novel concept of a transportation system. It deals with the development of a railroad concept that optimizes various attributes including efficiency of traffic flow.

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