National Center for Sustainable Transportation

Project Information Form

Dissertation Title	Critical Infrastructure Systems: Distributed Decision Processes over Network and Uncertainties
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Funding Source(s) and Amounts Provided (by each agency or organization)	National Center for Sustainable Transportation
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Brief Description of Research Project	Critical infrastructure systems (CISs) provide the essential services that are vital for a nation's economy, security, and health, but the analysis of CISs are challenged due to their inherent complexity. This dissertation focuses primarily on the system analysis of critical infrastructure systems, with a particular interest to address the modeling and computational challenges brought by uncertainties, interdependencies and distributed decision making of various components and stakeholders involved in CISs, so that a secure, reliable, efficient and resilient system can be further pursued. Through two examples, the first one is on electric vehicle charging infrastructure planning in a competitive market, and the second one is on power generators planning in a restructured electricity market, we illustrate how our general modeling framework, N-SMOPEC, can be adapted to formulate the specific problems in transportation and energy system. Each example is solved by decomposition-based approach with convergence properties developed based on recent theoretical advances of variational convergence. Median size numerical experiments are implemented to study the performance of proposed method and draw practical insights. In addition, we have shown some knowledge from different domains, such as microeconomics, energy and transportation, can be shared to facilitate the formulation and solution process of seemingly unrelated problems of each other, which could possibly foster

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	the communication between different fields and open up new research opportunities from both theoretical and practical perspectives.
Describe Implementation of Research Outcomes (or why not implemented) (Attach Any Photos)	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links • Reports • Project website	http://ncst.ucdavis.edu/dissertation/incorporating-strategic-business-behaviors-in-electric-vehicles-charging-infrastructure-system-modeling/