Behavior-Consistent Information-Based Route Guidance: Integrating Network Interactions and Traveler Response

Thursday, April 26, 2007
4:00 – 5:00 pm
Refreshments available at 3:30 pm

Location:
The Transportation Center
Chambers Hall, Lower Level Conference Center
600 Foster, Evanston

Abstract: Deployment effectiveness of information-based network control strategies in congested vehicular traffic networks entails the robust modeling of traffic flow dynamics and driver behavior. Existing approaches, addressed under the broad label of dynamic traffic assignment (DTA), primarily focus on robustly capturing traffic flow dynamics. However, their driver behavioral assumptions can be restrictive for real-time deployment. This motivates the development of a route guidance paradigm that integrates information-based network control strategies and realistic driver behavior representation. We propose a fuzzy control based methodology in which the controller seeks behavior consistency by solving a fixed-point problem that estimates drivers' likely reactions to the controller-proposed information strategies while determining them. Network-level experiments are performed to evaluate the effectiveness of the proposed methodology. The results suggest the importance of using a behavior-consistent approach to determine the information-based network control strategies. That is, the effects of driver response behavior to information provision may require more meaningful strategies than those provided under the traditional dynamic traffic assignment models to reliably estimate or control system performance. Information strategies that are not behavior-consistent can potentially deteriorate system performance.

BIO: Dr. Srinivas Peeta is a Professor of Civil Engineering and the Director of the NEXTRANS Center (USDOT’s Region V Regional University Transportation Center) at Purdue University. He also chairs Purdue’s System of Systems Signature Area. He received his M.S. from Caltech in 1989 and Ph.D. from the University of Texas at Austin in 1994. His current research interests are in the dynamics of traffic networks under information provision (network interactions and driver behavior), interdependent infrastructure systems, collaborative logistics, stochastic signal control, and integrated disaster planning and response. He is a member of the Editorial Advisory Board of the journals Transportation Research, Part B and the Intelligent Transportation Systems Journal. He is also an Associate Editor of the Journal Networks and Spatial Economics. Dr. Peeta chairs the Committee on Transportation Network Modeling of the Transportation Research Board (TRB) of the National Academies. He was also appointed by the TRB as a member of the Section on Travel Analysis Methods. He serves as a member of TRB’s Committee on Travel Behavior and Values. He also chairs the TRB sub-committee on Route Choice and Spatial-Temporal Behavior.

Dr. Peeta has authored more than 110 technical publications, and has presented papers/talks/lectures at more than 160 invited and/or international conferences/symposiums in several countries. Dr. Peeta’s research received international recognition through three best dissertation/thesis awards of his students for work in three different topics in the transportation arena. His students received the 2002 Pikarsky Award for the Best Ph.D. Dissertation in Science and Technology, and the 2003 Pikarsky Award for the Best M.S. Thesis in Science and Technology, from the Council of University Transportation Centers (CUTC). Another student received the 2002 Eric Pas Award for the Best Ph.D. Dissertation in Travel Behavior Research from the International Association for Travel Behavior Research (IATBR).