Transportation Seminar Series

Friday, September 4, 2009
4 - 5 p.m. in 212 O'Brien

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Tools for Operational Planning (TOPL):

Modeling, Simulation and Analysis of Freeway Traffic Corridors

Abstract: Vehicular traffic congestion remains one of the major world-wide sources of productivity and efficiency loss, wasteful energy consumption, and avoidable air pollution. For example it is estimated that in 2007, congestion caused urban Americans to travel an additional 4.2 billion hours and to purchase an extra 2.9 billion gallons of fuel. In this talk I will describe a set of modeling and simulation Tools for Operational Planning (TOPL) developed to provide quick and quantitative assessments of the benefits that Transportation Management Center (TMC) control policies can provide on freeway corridors, in order to decrease congestion. A freeway corridor typically comprises a 40 kilometer freeway segment on a highly populated urban area, together with its adjoining major urban streets or arterials. The movement of vehicles in a corridor is regulated by programmable field control elements including arterial intersection signals, ramp-metering signals, and message signs that announce emergency conditions, set speed limits and tolls, and provide driver information. Traffic data is primarily collected through inductive loop detectors buried roughly every kilometer along the freeways' pavement, as well as detectors located in some of the major corridor arterials. TOPL contains a self-calibrated Cell Transmission Model (CTM) traffic macroscopic simulator. This simulator relies on a well-accepted theoretical model of traffic flow; it is parsimonious and does not require parameters that cannot be estimated from traffic data; and has been tested for reliability on several freeways. Moreover, it is fast, running several hundred times faster than real time, which can be used with real-time measurements and statistically predicted short term future traffic demands to keep track of the current freeway traffic state, as well as make short-term predictions. I will also review the qualitative behavior of a single freeway based on the Asymmetric CTM. These properties will be further explored in the formulation of traffic responsive and coordinated ramp-metering policies, model calibration and missing on-ramp imputation techniques, and congestion and state estimation techniques.

Bio: Roberto Horowitz a Ph.D. degree in 1983 in mechanical engineering from the University of California at Berkeley. In 1982 he joined the Department of Mechanical Engineering at the University of California at Berkeley, where he is currently a Professor and holds the James Fife Endowed Chair. His current research interests include: Micro-mechatronics, control of computer disk file systems, robotics, mechatronics of smart exercise machines and paper handling devices, and Intelligent Vehicle and Highway Systems (IVHS).

Please join us for a TRANSOC-sponsored cookie hour in the ITS library at 3:30 p.m.