EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Leveraging Analytics to Monitor and Manage Transportation Infrastructure

Abstract: We discuss the development and field application of a statistical process control framework to support health-monitoring and management of transportation infrastructure. The work is motivated by advances in sensing, communications, and power harvesting technologies that allow for continuous, long-term, simultaneous collection of various response measurements, as well as the factors that contribute to their deterioration. The framework consists of two parts: The first, estimation of statistical models, i.e., Box-Jenkins ARIMA-GARCH and structural time series models, to explain, predict, and control for common-cause variation, i.e., changes, including serial dependence that can be attributed to usual operating conditions. In the second part of the framework, we detect and interpret possible special-cause events by using univariate and multivariate control charts to monitor the innovation and auxiliary residual series from the aforementioned models. We illustrate the proposed framework with analysis of strain, displacement, traffic, and weather data from the monitoring system on an in-service highway bridge in Hurley, Wisconsin (Wisconsin Structure B-26-7).

Dr. Pablo L. Durango-Cohen
Associate Professor
Department of Civil and Environmental Engineering
Northwestern University

SPEAKER BIO – Pablo L. Durango-Cohen is an Associate Professor in the Transportation Systems Analysis and Planning Program at Northwestern University. He completed his BS in Industrial and Systems Engineering at the University of Southern California, and then his Ph.D. in Industrial Engineering and Operations Research at the University of California, Berkeley. His research activities involve developing and analyzing optimization and econometric models to support monitoring, management and operation of transportation systems. He has also published in transportation economics and policy, as well as in environmental design and life-cycle assessment of transportation systems. Among others, his research has been recognized with a Faculty Early CAREER Development Award from the National Science Foundation in 2006, and with a Young Author Prize at the 2007 World Congress on Transport Research. Among Prof. Durango-Cohen's professional activities, he serves as Associate Editor for the ASCE Journal of Infrastructure Systems, and has served as proposal and project reviewer for a number of federal and state agencies, as well as universities. Notably, he served on a recent Transportation Research Board panel to review the Federal Transit Administration's Transit Economic Requirements Model (TERM).

USC Viterbi
School of Engineering
Daniel J. Epstein Department of Industrial and Systems Engineering

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3:30 PM – 4:50 PM
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