

Transportation Center Seminar.....

Uncertainty in Hazardous Materials Transportation

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4:00 - 5:00 pm

Location:
Transportation Center
Chambers Hall
600 Foster, Evanston
Lower level

Abstract:

This talk addresses various types of uncertainty in hazardous materials (hazmat) transportation. First, we discuss advanced routing methods to mitigate the uncertain risk of hazmat accidents and to avoid catastrophic consequences. In particular, value-at-risk (VaR) and conditional value-at-risk (CVaR) concepts are applied to truck transportation of hazmat. VaR and CVaR offer more flexible and computable schemes. Second, we discuss data uncertainty in measuring the risk of transporting hazmat. The two important data types in hazmat transportation are accident probabilities and accident consequences, both of which are subject to many ambiguous factors. In addition, historical data are usually insufficient to construct probability distributions of accident probabilities and consequences. This motivates a new robust optimization approach to consider the robust shortest path and the Worst-case CVaR (WCVaR). Third, we discuss uncertainty in the behavior of hazmat truck drivers. In the current literature, most, if not all, hazmat network design problems assume drivers' perfectly rational route decision making; that is, drivers will always choose the very shortest path available. However, recent research indicates that drivers often are not perfectly rational. Rather, drivers are usually boundedly rational such that they choose routes whose length is comparable with the shortest path length within a certain threshold. We discuss a generalized mathematical framework to address various boundedly rational behaviors of drivers in the context of hazmat transportation network design.

Bio:

Changhyun Kwon is currently an Assistant Professor in Industrial & Systems Engineering at the University at Buffalo, the State University of New York. His research interests include transportation systems analysis and service operations problems. His research has been supported by various organizations including the National Science Foundation, the U.S. Department of Transportation, and Canadian Embassy. He received a PhD in Industrial Engineering in 2008 and an M.S. in Industrial Engineering and Operations Research in 2005, both from the Pennsylvania State University. He also received a B.S. in Mechanical Engineering from KAIST in 2000. He received an NSF CAREER award in 2014.