ABSTRACT

In the current state-of-the-practice, operational data from traffic signal systems are neither stored nor analyzed, and adjustments of traffic signal parameters are mostly based on the data manually collected in an ad hoc manner. The lack of detailed traffic signal data has hindered traffic engineers' ability to manage arterial traffic flow efficiently and more importantly our understanding of the distinctive nature of arterial traffic flow. In this talk, we will present a new data-driven paradigm for arterial traffic flow monitoring, modeling, and control. We will discuss how high-resolution traffic signal data is collected and analyzed based on the SMART Signal (Systematic Monitoring of Arterial Road Traffic Signals) system developed at the University of Minnesota. We will examine in detail how high-resolution data can be utilized to evaluate traffic signal performance, to optimize traffic signal parameters, and to improve the modeling of arterial traffic flow. We believe that the proposed data-driven paradigm has laid the groundwork for better traffic models and control strategies and opens up entirely new opportunities for managing traffic on congested roads.

Biosketch:
Dr. Henry Liu is currently an associate professor of Civil Engineering at the University of Minnesota -- Twin Cities. Before joining UMN, he was an assistant professor at Utah State University and a post-doctoral researcher at the University of California, Berkeley. He received his Ph.D. degree in Civil and Environmental Engineering from the University of Wisconsin at Madison in 2000 and his B.E. degree in Automotive Engineering from Tsinghua University in 1993. Dr. Liu’s research interests are in the areas of traffic network monitoring, modeling, and control, which includes traffic flow modeling and simulation, traffic signal operations, traffic management under network disruptions, and equilibrium traffic assignment. On these topics, he has published more than 50 articles in peer-reviewed journals. Dr. Liu is currently the overview paper editor of Transportation Research Part C. He is also on the editorial board of Journal of Intelligent Transportation Systems, IET Intelligent Transportation Systems Journal, and Network and Spatial Economics.