

PROJECT SUMMARY

CAREER: Mining Archived Intelligent Transportation Systems Data: A Validation Framework For Improved Performance Assessment And Modeling

The performance of our transportation infrastructure critically affects our nation's economy, security, environment and quality of life. Intelligent transportation systems (ITS) are one means for improving the efficiency, safety and sustainability of our transportation system. Over the past decade, we have deployed traffic surveillance and management systems including infrastructure-based point detectors, video and communications systems. These investments have not included systematic archiving or mining of the remotely sensed data that continuously stream into traffic management centers. In fact, some agencies discard these rich resources. There is still untapped potential to exploit these data for accurate assessment of system operation by developing and testing performance measures. This can also lead to a better understanding of fundamental traffic flow phenomena, leading to improved traffic flow modeling. This is necessary for forecasting the future system state so true control measures can be applied and evaluated.

The mission of this career proposal is to develop and evaluate methods to archive, mine and analyze real-time ITS data, using infrastructure-based sensors, video and dynamic floating probes. Using these resources, we will develop improved techniques to monitor and evaluate the transportation system, and expand our understanding of basic traffic flow principles underlying models of traffic flow. In turn, we will enhance these tools with a greater understanding of model uncertainty propagation. Specific research activities will include:

- Partnership with the Oregon Department of Transportation (ODOT), the City of Portland and TriMet (transit agency) for development and evaluation of a data archive and interface.
- Implementation and testing of an interactive performance measurement platform.
- Systematic empirical assessment of freeway bottleneck behavior.
- Development, calibration and validation of improved traffic flow models and model components and analysis of uncertainty propagation in these models.

This research agenda will provide guidance and tools for enhancing existing courses, developing new courses and course modules to support the education and training of new and current members of the transportation workforce, both practitioners and researchers. Specific educational activities will include:

- Enhancement of required and elective undergraduate courses using a variety of teaching and learning styles, incorporating information technology and projects using real transportation data.
- Development of new graduate courses focused on the use of real transportation data for generating system performance metrics and mathematical models of traffic flow.
- Involvement of undergraduates in multidisciplinary research teams.
- Development of an undergraduate Civil Engineering Profession seminar and campus-wide seminar series to attract and retain students from diverse backgrounds with diverse learning styles.

The research and education activities will support and enhance the proposed outreach activities, aimed toward increasing enrollment, quality and diversity in the transportation program, and attracting diverse young people to science and engineering. Outreach activities will include:

- Summer month-long Transportation Academy for underrepresented high school students.
- Partnership with the Oregon Museum of Science and Industry (OMSI) including construction of a bilingual transportation data exhibit in the new Technology Hall.
- Outreach to attract more Portland/Oregon high school students to science and engineering.
- An External Advisory Committee consisting of public agency, industry and community members.

The results of these integrated activities will play a pivotal role in improving our capabilities for monitoring, modeling and evaluating our transportation system.