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Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods

Presentation Topic

Mathematical models of car-following, lane changing, and gap acceptance are mostly descriptive in nature and lack decision-making or error tolerance. Including additional driver-related information with respect to behavior and cognitive characteristics (brain activity, eye-tracking, changes in heart rate, questionnaires) would account for these lacking parameters and incorporate a human aspect. Car-following, particularly in relation to the intelligent driver model (IDM), is the primary component of this research. The major objectives of this research were to investigate how psychophysiological constructs can be modeled to replicate car-following behavior, and to correlate subjective measures of behavior with actual car-following behavior. To accomplish the objectives a framework was theorized that incorporates biobehavioral parameters to predict changes in driving behavior performance. To calibrate the framework, a multitude of data were collected through an extended driving simulator experiment with ninety participants and six strategic driving scenarios. A biobehavioral extension to the IDM was developed and calibrated using the data obtained from the participants. The developed model was validated and was found to be more efficient in predicting car-following speeds and trajectories when compared to the traditional IDM.

About the Speakers



Dr. Alexandra Kondyli is an Associate Professor of Transportation Engineering in Civil, Environmental and Architectural Engineering at the University of Kansas. Dr. Kondyli's research interests include traffic operations and management, highway capacity, ITS, microsimulation, driver behavior, and traffic flow theory. She has worked on research projects funded by Kansas DOT, Florida DOT, FHWA, USDOT, and by the National Cooperative Highway Research Program (NCHRP). Dr. Kondyli received her Graduate Diploma in Rural and Surveying Engineering from National Technical University of Athens, Greece, in June 2003. She received her M.S. degree in 2005 and her Ph.D. degree in 2009 in Civil Engineering from University of Florida, Gainesville, Florida.



Dr. Vishal Kummetha is a postdoctoral research scholar at the University of South Florida – Center for Urban Transportation Research (CUTR). He earned his PhD and MS in Civil Engineering from the University of Kansas in 2020 and 2017, and BSc in Civil Engineering from the University of Cape Town in 2014. His research areas of interest include connected mobility, human factors and driving simulators, traffic modeling, human-machine interfaces and automation, car-following dynamics, big data, and roadway safety. He has worked on several Kansas DOT, FHWA, and USDOT funded projects. He also serves as a reviewer for the Accident, Analysis & Prevention journal.

Join us via livestream:

September 14, 2020**4:00 PM Central Time (US and Canada)**

Register in advance for this meeting:

<https://unl.zoom.us/meeting/register/tJcvcuCvpz8oHN36KzdzqfrR2bD2EcDBw-bLJA>

After registering, you will receive a confirmation email containing information about joining the meeting.

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