

ITS SEMINAR

INSTANTANEOUS INFORMATION PROPAGATION IN A TRAFFIC STREAM THROUGH INTER-VEHICLE COMMUNICATION

Co-sponsored by the
Department of Planning, Policy and Design and the
Program in Transportation Science

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12:00 noon - 1:30 p.m.**

Room 408, Multipurpose Academic & Administration Building

Advances in wireless technologies have stimulated interest in the use of inter-vehicle communication as the foundation of decentralized advanced transportation information systems. In this seminar, I discuss the reliability of inter-vehicle communication in a traffic stream, dependent on the distribution of equipped vehicles. Assuming that information propagation is instantaneous compared to vehicle movements, I measure reliability as the probability of success that information will travel beyond a specified location. I present stochastic models for both uniform and general traffic streams. In the models, I divide the traffic stream into a series of cells based on the transmission range, clarify the structure of possible most-forward-within-range communication chains, regressively compute the probabilities for information to travel to and beyond a vehicle at a certain hop, and determine the lower bound of the absolute success rate for information to travel beyond a point. Based on the models, I examine the performance of information propagation for different penetration rates, transmission ranges and traffic scenarios that include gaps and shock waves. I conclude by discussing implications and extensions of this effort.

Wen-Long Jin is a postdoctoral researcher at the Institute of Transportation Studies at UCI. His research interests include vehicular traffic models and intelligent transportation systems. With a multi-disciplinary background in operations research and applied mathematics, he has studied second-order traffic models, kinematic wave theories for multi-commodity simulation and advanced transportation information systems based on inter-vehicle communications. He has published widely on these topics in the international literature. Dr. Jin holds M.S. and Ph.D. degrees in applied mathematics from UC Davis.