

Transportation Seminar

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17:00h, B1-005 class in North Campus UPC (Barcelona**Tech**)



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Cooperative vehicles for highway traffic flow management: analytical and simulation studies

Summary:

In dense traffic networks emerging technologies such as cooperative vehicle systems have the potential to partially remove congested and hazardous situations. As the reality of a mixed traffic made of cooperative vehicles aided or controlled by automated systems and of vehicles operated by drivers adopting their own specific behavior is approaching, prospective studies are required to understand and evaluate to what extent cooperative vehicles can help increase traffic flow efficiency and safety.

In this research the focus is put on highway traffic. It is assumed that cooperative vehicles are equipped with in-vehicle sensors that detect immediate surroundings, and are able to share the received and analysed information with other cooperative vehicles through communication channels.

Results of the research work are three-fold. First, the information flux is integrated in microscopic traffic flow models, and deterministic stability analyses of these defined cooperative models are performed to determine the conditions for perturbations in traffic to grow or decay in time. Secondly, a methodology is formulated to reproduce realistic traffic, accounting for the variability of drivers' behavior, from real world noisy data. Finally, a multi-agent modelling framework with physical, communication and trust layers is designed to deal in real time with sensors faults and data uncertainties, while providing innovative adaptive control algorithms.

Bio:

Julien Monteil received the M.Sc. Degree from the National Graduate School of Civil and Environmental Engineering (ENTPE), Lyon, France, and the Ph.D. degree in Applied Mathematics from University of Lyon, Lyon, France.

He is currently with Trinity College Dublin, Dublin, Ireland, as a research fellow, and he was with the Transportation Services Quality Authority (AQST), Ministry of Transport, Paris, France, as a data analyst. He was previously with the California Center for Innovative Transportation, University of California, Berkeley, USA, and with the Advanced Mobility Research Center, the University of Tokyo, Tokyo, Japan, as a visiting researcher. His interests lie in the use of technology, data, modelling and simulation for transportation systems applications.

He was awarded the 2014 Abertis national research Prize in France and the 2014 Abertis international research Prize for his PhD thesis.