MT-ITS 2019

Abstract

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http://www.mt-its2019.pk.edu.pl/

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IMPORTANT DATES

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Topics

- ITS-oriented traffic planning, operations and management
- Demand modelling and travel behaviour under ITS
- Model calibration, simulation and tools for ITS
- Case studies and assessment of ITS applications
- Future mobility data collection for passenger and freight
- Real-time traffic control, management and short-term predictions
- ITS, multimodal transportation and freight systems
- ITS and big data
- Plug-in Electric Vehicles and impacts on mobility
- Vehicle-to-X: Vehicle (V2V), Infrastructure (V2I) and Grids (V2G)
- Current Issues in Transportation Energy and Climate Change
- Automated and intelligent Vehicles
- Communication in ITS
- Infrastructure design, safety and ITS
- Rail Operations and Management
- ITS and Smart Cities
- Electromobility

Title

Enhanced Traffic Management Procedures in Transition Areas

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Content (500 words)

In light of the increasing trend towards vehicle connectivity and automation, there will be areas and situations on the roads where high automation can be granted, and others where it is not allowed or not possible. These are termed ‘Transition Areas’. Without proper traffic management, such areas may lead to vehicles issuing take-over requests (TORs), which in turn can trigger transitions of control (ToCs), or even minimum-risk manoeuvres (MRMs). In this respect, the TransAID Horizon 2020 project develops and demonstrates traffic management procedures and protocols to enable smooth coexistence of automated, connected, and conventional vehicles, with the goal of avoiding ToCs and MRMs, or at least postponing/accommodating them.

In first instance, we provide an outline of the state-of-the-art of traffic management, putting the focus first on general approaches, including coordinated network-wide traffic management, using KPIs, layered architectures spanning the range from top-down regulation over self-organisation to full bottom-up regulation, and Traffic Management-as-a-Service. Next, we look at the trend towards more cooperative systems which is well-suited for enhanced traffic management, making the systems smarter by targeting (cooperative/connected) vehicles individually. Moreover, we look at the expected impacts that machine learning techniques and artificial intelligence in general would have on traffic management.

In itself, all these solutions are very fine and usable. However, there are no (readily available) integrated traffic management experiments or setups, taking higher degrees of vehicle automation into account. Nor do they allow the interplay between all the various solutions to lead to a better system performance. This is where TransAID makes the difference by creating a traffic management framework. Fleet managers of connected and/or autonomous vehicles (CAVs), as well as road authorities, both operate backend centres to manage their fleets and traffic networks, respectively. To effectively and systematically manage transition areas on a large scale and for multiple AV fleets and multiple road authorities, TransAID positions itself as an intermediary service provider, acting as a trusted (and possibly mandated) third party. It will then represent the single-point-of-contact for road authorities and traffic participants (or indirectly, via their OEMs).

Within TransAID we defined five different use cases where disruptions of traffic flow are expected to be most severe as a result of transition between automation levels. In addition, all use cases are elaborated with general descriptions, timelines, road networks, and requirements on the vehicle capabilities, vehicle numbers, and traffic compositions. The use cases themselves are focused on providing path advice around obstacles (blocked lanes), providing speeds and headway/lane advice to accommodate merging strategies at on-ramps, enabling traffic separation at the latter in order to smoothly join (C)AVs and conventional vehicles, managing MRMs by guiding vehicles to safe spots, and scheduled distribution of ToCs/MRMs.

For each of these use cases, we explain when, where, and how traffic management measures should be applied. The measures are implemented in the iTETRIS simulation platform (using SUMO as a microscopic representation of traffic flows and NS-3 to achieve realistic communication capabilities and collective sensing). They are calibrated and validated using predefined sets of KPIs/metrics.

Comments / Remarks

N/A