

Dynamic Scheduling and Trajectory Planning for Urban Intersections with Heterogeneous Autonomous Traffic

Tuesday, June 18, 2024 3:00 PM (20 minutes)

The anticipated launch of fully autonomous vehicles presents an opportunity to develop and implement novel traffic management systems, such as for urban intersections. Platoon-forming algorithms, in which vehicles are grouped together with short inter-vehicular distances just before arriving at an intersection at high speed, seem promising from a capacity-improving standpoint. In this work, we present a performance evaluation framework which not only captures the intersection access dynamics via a queueing model (or, more specifically, a polling model) with multiple customer types, but also explicitly accounts for the vehicle trajectory planning via a joint optimisation procedure. We further focus on deriving computationally fast and interpretable closed-form expressions for safe and efficient vehicle trajectories during the process of platoon formation, and show that these closed-form trajectories are equivalent to those obtained via the joint optimisation procedure. Additionally, we conduct a numerical study to obtain approximations for the capacity of an intersection under the platoon-forming framework.

Presenter: JOSHI, Purva (TU/e)

Session Classification: Poster session