PADERBORN UNIVERSITY
Jun.-Prof. Dr.-Ing. Christoph Sommer
Cooperative Mobile Systems – CCS Labs
CCS

Master's Thesis

Efficient Traffic Light Management for Platoons at Urban Intersections

A vehicle platoon is formed by a number of vehicles following each other with a close distance at highway speed. This approach also tackles safety and traffic congestion problems by cooperatively coordinating vehicles in an autonomous way. The traffic flow is optimized by using an advanced Adaptive Cruise Control (ACC), called Co-operative ACC (CACC), which drastically reduces inter-vehicle gaps. Platooning involves control theory, dynamics of vehicles, different aspects of communication and traffic engineering.
Recent research in platooning is usually focused on freeway scenarios and algorithms to build and manage platoons. We believe that using such algorithms in other scenarios is usually a problem, as there are other conditions than on federal highways.

Our research is focused on urban scenarios. Platooning in urban areas is much more dynamic and flexible compared to platooning on freeways since urban areas have varying speed limits, single carriageway, intersections, traffic lights and even more distinctive features. First research already shows the benefit for platooning at urban traffic lights with a static traffic light scheduling. We believe that the efficiency of urban platoons can be further increased when platoon members and the infrastructure cooperate, e.g. using adaptive traffic light control mechanisms.

Goals of the thesis

In this thesis, the student will perform a study investigating one algorithm for traffic light control and implement it using OMNeT++, Veins and SUMO. The protocol will be checked for a possible use in a platoon scenario at urban intersections. For this, different parameters to measure platoon properties will be used for the validation of the implemented approach.

Keywords

C++, Platooning, Network Simulation, Vehicular Networking

Contact:
Tobias Hardes <hardes@ccs-labs.org>
Website:
http://www.ccs-labs.org/cms/

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