Master's Thesis

Investigating the use of Visible Light Communications for Platooning

Cooperative Adaptive Cruise Control (CACC), oftentimes referred to as *Platooning*, has been extensively investigated in the context of vehicular networking applications.

Platooning is one of the most promising safety applications for the next generation of transportation systems. It is an interdisciplinary approach combining techniques from control theory, traffic engineering and wireless communications. For the most part, WLAN-based communication technologies like IEEE 802.11p/DSRC have been considered as the primary communication technology to realize Platooning. As a results, most of the corresponding protocols are designed according to the characteristics of those technologies.

However, recently Visible Light Communication (VLC) has emerged as a candidate access technology for vehicular networking. As such, it can also be used for Platooning. VLC has a distinct set of properties which differ from RF communications. Some of these properties, e.g., the intrinsic security due to the confined nature of the light, and the small collision domain owing to the directionality of VLC, can be highly beneficial to Platooning. Moreover, the VLC channel can be used complementary to the RF channel, potentially improving reliability and latency, without any side effects.

However, the study of VLC's utilization in the context of Platooning is limited only to a set of sporadic works. Hence, in the scope of this thesis we are interested in investigating the suitability of VLC for Platooning. In doing so, we want to address questions specific to Platooning, like for example:

- What are the implications in terms metrics such as beaconing rate, minimum inter-vehicle distance, acceleration, etc., when using VLC for Platooning?
- How does VLC affect the reliability and latency of Platooning?
- Can VLC be used for communication with the head of the platoon, or only for communication between platoon members?

Requirements

The candidate is expected to have a good understanding of vehicular networking technologies and protocols. And knowledge about network simulation. Proficiency in Linux, C++, R, and version control (git & SVN) are a plus.

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