Provably-Correct and Comfortable Adaptive Cruise Control

Reference No: B80008

CHALLENGE

In the past years enormous progress in Advanced Driver Assistance Systems (ADAS) has been made. One future goal is the use of such systems for autonomous driving. But even today, they can contribute to increase the driving safety for non-autonomous vehicles. Adaptive Cruise Control (ACC) is one of the most common ADAS comfort features of road vehicles. Despite the large market penetration of this technology current ACC systems are not safe in all driving conditions and require supervision by a human driver.[1] In general, current systems are quite reliable concerning preceding vehicles. However, as soon as a car cuts in the reaction of the system becomes incorrect i.e. uncomfortable or even unsafe.

INNOVATION

The invention provides a system explicitly designed to handle such situations. It can be implemented into existing ACC systems by supervising them and intervening in case of a crucial safety event: When there is no preceding vehicle within the sensor range, the standard cruise controller is engaged. Otherwise, all relevant surrounding vehicles are selected and a safe acceleration value with respect to each one of them is computed. The safe acceleration with respect to each vehicle is realized by a safety-keeping controller. When a vehicle cuts in, the safety recapturing controller is activated for this vehicle. In case of an unavoidable collision an emergency breaking is initiated to mitigate the consequences of the accident. If on the other hand a collision can be avoided, the current safety problem is solved by breaking within given acceleration values. Comfortable manoeuvres can be obtained by using appropriate breaking profiles.[1]

COMMERCIAL OPPORTUNITIES

The advantage of the technology compared to other systems is the fact that also those vehicles are considered that are not located directly in front of the own car. Thus, the system can react to manoeuvres of other vehicles, like cutting in, in a safe and comfortable way.

DEVELOPMENT STATUS

The invention has been successfully tested on a driving simulator.

REFERENCES:

1 M. Althoff, S. Maierhofer and C. Pek, „Provably-Correct and Comfortable Adaptive Cruise Control," in IEEE Transactions on Intelligent Vehicles, doi: 10.1109/TIV.2020.2991953.

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