

GPS, COMMUNICATION AND ENVIRONMENTAL SENSOR BASED COLLISION MITIGATION SYSTEM FOR TRUCKS

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ABSTRACT

In order to enable state of the art and future accident preventing systems (APS) to react appropriate in traffic situations, it is essential to monitor the driving environment. Therefore a new communication, GPS and environmental sensor based method for APS data acquisition was developed. This method uses GPS, vehicle related driving dynamics data, wireless car-2-car-communication (C2C) and combines them with on-board environmental sensor data (Camera and Lidar sensors).

First a Kalman-Filter based GPS-tracking was developed in order to increase the update rate of GPS. Therefore GPS- and vehicle dynamics data are fused in a dead reckoning system. Second, a Kalman-Filter based 3rd order lane model was implemented using Camera data from ego- and preceding vehicle - transmitted by C2C - for the determination of the relevant target. Beyond vehicle related data are transferred from the target vehicle to the ego-vehicle in order to improve the target selection. The potential of this method was demonstrated in a prototype collision mitigation (CM) system. The system was tested within driving experiments and subsequent simulations with the measured data.

With the new method the accuracy and scope of application of collision mitigation systems can be enhanced, so that the detection and identification of stationary vehicles, for example at the end of traffic jams, is improved. Furthermore a high reliability of the determination of the relevant target for APS can be reached.

As a matter of course the limitation of this approach is the dependency of the system performance (as in all C2C and environmental sensor based systems) on the equipment rate. On the other hand it can be expected that equipment rates will increase in future.