Adv Automob Eng 2015, 4:1
http://dx.doi.org/10.4172/2167-7670.C1.003

Active safety features in radar ECU and dual security layer concept

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Autonomous car driving, v2v and v2x communications are the future trends in automobiles. So Radars, Lidars, Sonars, Cameras and various communication devices will drive our vehicle in nearby future. These devices will be of assistance in lane change, traffic assist, overtaking, pedestrian detection, autonomous parking, assistance to keep safe distance and adaptive cruise control. So the position of these sensors in the vehicle is very important. Software used in these sensor ECUs should take care of all the safety features. Since these physical sensors detects the targets and provide warning based on their lobe angle, the alignment of the sensors in the vehicle is very important to provide correct warning to driver. These alignments have to be verified in factory and servicing stations. The alignment algorithm used in the sensor ECUs will continuously check the alignment while running the vehicle (auto alignment checking). Alignment algorithms have to take care of some safety features which are very important for passenger safety. Even a small change in alignment angle beyond the tolerance level will give wrong information to driver. Due to the wrong alignment (or wrong alignment angle input) sensors will not be able to detect targets properly. Hence, software will not be able to provide desired results. This paper describes different safety features that need to be implemented in these sensor ECUs. It also describes different problems of the current softwares used in radar ECUs and also proposes different methods/approaches to solve these problems. The paper also proposes the concept of dual security service layer in sensor ECUs.

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Simulation of aerodynamic behavior of a super utility vehicle

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The main objective of the study is to reduce the aerodynamic drag and increase the stability of the car on the road for a three dimensional full-sized Super Utility Vehicle (SUV) using Computational Fluid Dynamics (CFD). The study calculates the pressure and the streamline of velocity around the car. The SUV baseline model in the simulation is Mercedes-Benz GL class model 2013. Modifications and aerodynamic add-on devices are used to improve the aerodynamic Behaviour of the complex SUV model. There are many modern aerodynamic add-on devices which are used in this research, such as many types of the spoiler, ventilation duct, mud flaps, vortex generator, ditch at the roof and diffuser. New design of devices is used to improve the aerodynamic performance of the SUV model. All of these tools are used individually or in combination. The improvement of aerodynamics should not mainly affect the vehicles capacity and comfort. This study has dealt with three boundary conditions for the velocity of the car, one with airflow of 28 m/s (100.8 km/h), 34 m/s (122.4 km/h) and 40 m/s (144 km/h). At 28 m/s an aerodynamic drag reduction of up to 25.64% compared with the baseline is achieved for Mercedes Benz GL class, model 2013 with all modifications and add-on devices. It is clear that the use of ventilation duct has a significant effect in reducing aerodynamic drag.

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