Impact of Advanced Driver Assistance Systems on Pedestrian Safety in Europe in 2030

Antonio Fadel da Costa
VTT Technical Research Centre of Finland Ltd.

Abstract

The European Union (EU) has set the target to halve the number of road deaths and serious injuries from 2019 to 2030. Although traffic injuries and fatalities have been decreasing in the region, the safety situation of pedestrians has not improved at a similar rate as that of motor vehicle occupants. In July 2022, several Advanced Driver Assistance Systems (ADAS) have become mandatory for new passenger car models in the EU, under the General Safety Regulation 2019/2144. As traffic accidents involving passenger cars are the main safety issue for pedestrians, this study aimed to assess the impact of three mandatory ADAS on pedestrian safety in the EU 27 member states (EU-27) in 2030: Automatic Emergency Braking (AEB) with pedestrian detection, Intelligent Speed Assistance (ISA), and reversing detection with camera. The safety impact calculation was performed using 1) market penetration rate estimates rooted on literature and passenger car renewal statistics, 2) effect sizes of ADAS in reducing target pedestrian accidents with injuries, retrieved from a review of scientific papers on retrospective safety benefit assessments, and 3) the shares of pedestrian injury accidents targeted by each ADAS based on accident statistics.

The results indicate that AEB, ISA, and reverse cameras could, combined, reduce pedestrian injury accidents by approximately 12.7% in the EU-27 in 2030. AEB with pedestrian detection would account for an 11.1% pedestrian injury accident reduction, making it the most effective of all three mandatory ADAS investigated. Reverse cameras were estimated to reduce the number of pedestrian injury accidents by 1.2%. Finally, Advisory ISA was estimated to bring a 0.6% pedestrian injury accident reduction in the EU-27 in 2030. The combined impact result is lower than the sum of each ADAS' safety impacts, as accidents are targeted by more than one ADAS simultaneously.

The results of this study suggest that the three mandatory systems investigated are likely to contribute to reaching the EU road deaths and serious injuries reduction targets. However, ADAS deployment should be combined with other measures capable of producing an impact on any of the three dimensions of safety (accident risk, exposure, and consequence). As approximately 94% of injury and fatal pedestrian accidents involving passenger cars in the EU-27 in 2019 happened on urban roads, cities could invest in safety measures such as lowering speed limits, introducing traffic calming structures, and improving infrastructure design for vulnerable road users, in an effort to reduce pedestrian accidents.