

Improving Rear Visibility with Video Technology

Abstract

Video camera technology is being used to provide blind spot detection for drivers when reversing or turning right. NHTSA has issued a final rule requiring rear visibility technology in all new light-duty vehicles by 2018.

Résumé

La technologie des caméras de recul a pour but la détection d'angles morts pour les conducteurs en marche arrière ou en tournant à droite. La NHTSA a publié une disposition exigeant la technologie de visibilité arrière dans tous les véhicules à poids léger dès 2018.

Reversing motor vehicles has always been difficult due to the driver's position towards the front of the vehicle, and the structural components that obscure rearward visibility. Vehicle design trends have resulted in reduced visibility - vehicles are larger, they have smaller rear windows, and larger roof pillars. In the past, rear view and side mirror systems have been utilized to provide assistance to drivers undertaking such manoeuvres. Nevertheless, the field of view provided has often been limited. Fatal and serious injury collisions have resulted to non-occupants in reversing incidents, and these have particularly involved children and the elderly.

In the United States, the National Highway Traffic Safety Administration (NHTSA) estimates that children under 5 years old account for 31% of back-over fatalities each year, and adults 70 years of age and older account for 26% of such incidents. The equivalent Canadian statistics are not so clear as many of these crashes occur "off road" (e.g. in private driveways) and are not necessarily recorded in police reports. However, some multi-year data from Transport Canada's National Collision Database (NCDB), suggest that 8% of on-road fatalities to pedestrians and cyclists resulting from impacts with reversing vehicles may involve children under 4 years of age, with adults aged 70 and above accounting for almost 55% of such crashes.

However, reversing is not the only vehicle manoeuvre involving vision restrictions that can result in collisions with pedestrians and cyclists. Another key issue involves right turns, especially for larger vehicles, such as heavy trucks and buses. Structural components, such as the vehicle's hood and the roof pillars, can limit the driver's view. Even side mirrors, that may help with blind spots to the rear, can create blind spots ahead of the vehicle. All of these factors may result in drivers being unable to see non-occupants in the path of travel.

The recent rapid advances in electronic technology, and in particular those related to digital imaging systems, may well provide a viable solution to such problems. Video cameras have been miniaturized, and their sensor systems refined in terms of their field of view and light-gathering ability. In particular, the cost of video cameras has been reduced considerably, and they are now being widely adapted for in-vehicle applications.



Backup camera view



Right-side mirror camera view

Rear-view cameras and in-dash display screens are being installed in many new vehicle models. These provide a broad view to the rear of the vehicle, with software often being used to overlay a grid on the image, indicating distances to objects to the rear of the vehicle.

Similar camera systems may be embedded in a vehicle's side mirrors. These systems provide additional coverage of blind spots and may be activated automatically, by use of the turn signals, or under the manual control of the driver.

As with all safety systems, there are some limitations inherent in the use of video cameras. Their lenses can get dirty and, in rainy conditions, water droplets on the camera lens may distort the image. Glare from sunlight, and low-light conditions (e.g. when backing into an enclosed garage), can also reduce the clarity of the displayed image.

Even with video technology, drivers need to be vigilant. The systems generally display warnings that driver should check the space around their vehicle before moving. It is also essential to properly adjust rear view and side mirrors, to use them, and to do shoulder checks if there are remaining blind spots.

However, despite such caveats, the potential for camera systems to reduce back-over collisions has been recognized by NHTSA. The agency has recently promulgated a final rule requiring the provision of rear visibility technology in all new light-duty vehicles by 2018. Given the highly integrated nature of the North American vehicle fleets, it is anticipated that similar regulations will be adopted by Transport Canada.

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