



Florida Department of Transportation Research

Evaluation of Camera-Based Systems to Reduce Transit Bus Side Collisions

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The Florida Crash Analysis Reporting System (CARS) reveals that there are about 2500 bus-at-fault collisions each year in the state. Studies indicate that almost half of these collisions occur on the right or left side of the bus, coinciding with major blind spots for bus operators. Reducing these collisions is of vital interest for public safety and transit agency liability.

In a series of four tasks, researchers from the University of South Florida examined the effectiveness of camera systems which provide bus operators with a view of the sides of the bus which is enhanced when compared to standard mirrors.

First, researchers compared systems that give bus operators information about the vehicle's environment. These systems were based on mirrors, sensors, and cameras, which provide information in the form of images or audible signals. Mirrors are commonplace, and drivers are adapted to them, but they do not give a view of all areas around the bus, and sometimes, mirrors intended to enhance one view can block another. Sensors are a vital tool used by the driver but do not provide a visual image. Cameras combined with sensors are expensive, but can provide a comprehensive view of the bus environment.

Next, researchers thoroughly examined how camera-based systems reduced side blind zones for common types of transit buses. Vehicle types included ultra-low floor buses, high floor buses, and cutaway buses. For each type, the limits of visibility using mirrors only were measured all around the bus. The vehicles were then equipped with cameras, and visibility was again measured. Both plain and wide-angle lenses were used. An important aspect of using vision aids is the ability to judge distances correctly, and static tests of driver perception of distances were conducted, with positive results.

Dynamic tests were conducted on a measured

Project Manager: Erin Schepers, FDOT Transit Office
Principal Investigator: Pei-Sung Lin, University of South Florida
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The view of a car approaching the bus from the right rear is more complete in a sideview camera monitor than in the sideview mirror.

test course. Experienced drivers were asked to perform specific maneuvers on the course. Drivers responded to surveys that evaluated their viewpoint and experience with mirrors and camera-based systems, both before and after the driving test. Timing of maneuvers and video output was recorded electronically.

Sideview cameras had numerous benefits compared to mirrors. For example, mirrors were obscured by bad weather due to wetting of both mirror and window surfaces; whereas the camera monitor is inside the bus. Mirrors must be adjusted for each driver to achieve the optimum views, while the camera provides the same optimum view to all drivers. The camera system also improved night views, and drivers indicated in surveys that they liked this feature.