Florida Department of Transportation Research

Evaluation of Camera-Based Systems to Reduce Transit Bus Side Collisions — Phase 2
BDK85 977-35

In a previous project for the Florida Department of Transportation (FDOT project BDK85 977-08), University of Florida researchers demonstrated the effectiveness of side-view cameras in giving bus operators a clear view of the right and left sides of the bus, eliminating large blind spots. The Florida Crash Analysis Reporting System (CARS) shows that about 2500 bus-at-fault collisions occur each year in the state, and almost half of these occur in the right and left bus blind spots. In this project, the researchers took the next step of developing and field-testing a functional hybrid camera-mirror system and recommending specifications for such systems, with the goal of facilitating their widespread use.

In the previous project, operators answered a key question for development of the system: they preferred a hybrid mirror-camera system over cameras alone. Also in the previous project, the camera systems used were aftermarket products with a wide-angle view of up to 100 degrees. Operators found that this angle covered too wide an area, and with the fish-eye distortion, the scene was difficult to interpret. Therefore, after testing, the researchers selected for this project a 65-degree angle for the developed system, which gave excellent coverage and a flatter, more easily interpretable scene.

The initial system was tested in a controlled driving test on a closed course with 29 drivers. The drivers used the system to drive the bus and identify objects placed around the bus. Effectiveness of the mirrors-only system was compared with the hybrid system in these trials. Statistical analysis showed that with the camera system, drivers had a 96-98 percent correct identification of the location of the object compared to 70-78 percent with the mirrors only. Also surprisingly, drivers identified objects more quickly using the camera system, even though the camera monitors added two additional search locations than were present with the traditional mirrors-only. Feedback showed that the majority of drivers agreed that the system can eliminate blind zones, and thus help drivers reduce side collisions by providing better side views.

Monitors for left and right side view cameras were placed next to the steering wheel at 10 and 4 o'clock.

Driver recommendations were taken into account when finalizing the system to be used for a longer field deployment on actual transit routes. With systems deployed for a longer period, drivers gave positive feedback and thought it helped them cover the blind zones, potentially reducing side collisions. Both the driving test and field deployment helped identify major factors to aid in the development of specifications for such systems.

Using the results from the literature review, the controlled test, and the field deployment, recommended specifications were compiled for general requirements, cameras, monitors, and system configuration. These recommendations will help practitioners, industry professionals, and operating managers when choosing such systems for their fleets, preventing side collisions and reducing injury, property damage, and civic liability.

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For more information, visit http://www.dot.state.fl.us/research-center