Testing and Evaluation of Freeway Wrong-Way Driving Detection Systems

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Current Situation
Crashes caused by drivers driving the wrong way on off-ramps or freeways are relatively rare, but they are much more likely than other types of crashes to result in fatalities. The Florida Department of Transportation has sponsored a series of projects focused on this problem, beginning with projects that documented where and how wrong-way driving is likely to occur through identifying interventions that can prevent wrong-way driving.

Research Objectives
University of South Florida researchers evaluated commercially available video-based systems for their ability to detect vehicles driving the wrong way on freeways.

Project Activities
Video-based detection systems from three companies were tested: Telegra Inc., MetroTech Net Inc., and Citilog Inc. The systems were installed at three northbound locations and three southbound ones on a segment of I-275 in Tampa. Because wrong-way

A video-based detection system must correctly detect the presence of a vehicle and its direction of travel..

driving is rare and not likely to provide sufficient data for the project, the researchers developed an innovative approach. For the first testing location, they set up the systems to detect true wrong-way traffic. At the second, they set up the system to treat all traffic as wrong-way traffic. At the remaining four locations, they set up the systems to treat the inner lane of opposing traffic as wrong-way traffic. For the first location, data were collected 24 hours each day and, for the second location, data were collected from 3-4 am. For the remaining four locations, data were collected from midnight to 5 am, but two locations had nighttime lighting conditions. This plan allowed for a more robust test of the detection systems.

Performance of the systems was measured in two ways. First, researchers wanted to answer the question "If the detector sees a vehicle, was there really a vehicle there?" Second, they wanted to answer the question "Did the detector see all the vehicles it could have?" In terms of the first question, detectors did well, meaning that they rarely claimed to have seen a vehicle when the video showed there was no vehicle. But for the second question, the detectors performed very differently, meaning that one detector was very good at seeing all the vehicles that passed it, one was mediocre, and one missed the great majority of vehicles on the road. The same system had the highest rating in both areas.

Project Benefits
This project highlighted the potentially great differences among video-based WWD detection systems. It provided a robust methodology for testing them and guidance for selection.

For more information, please see www.fdot.gov/research/.