

# Lane departure warning systems help drowsy drivers avoid crashes

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Four driver warning systems that may help those who fall asleep at the wheel were recently tested and evaluated by human factors/ergonomics (HF/E) researchers at Ford Motor Company.

Called Lane Departure Warnings (LDW), these systems are designed to help reduce car crashes by alerting drowsy drivers that the vehicle has wandered out of the lane. The researchers will present their results on Thursday, October 19, 2006, during the HFES 50th Annual Meeting at the Hilton San Francisco Hotel, which takes place October 16–20.

National Highway Transportation Safety Administration data from 2002 indicate that about 1500 fatalities have occurred in recent years from about 100,000 crashes in which driver drowsiness was a factor. Effective LDW systems can reduce that number. The question is, what makes an effective LDW?

The warning systems tested rely on the detection of the vehicle's position in relation to the road lane markings with the help of a small camera mounted on the vehicle. In the study, if a driver departed out of a lane, one or a combination of the four warning systems would activate: steering wheel torque that communicated to the driver the appropriate steering wheel angle needed to return to the lane, a rumble strip sound recording, steering wheel vibration, or a row of flashing red LEDs on top of the instrument panel.

Participants used Ford's VIRtual Test Track Experiment, a hydraulically

powered moving-base simulator, to "drive" a 2000 Volvo S80. They had not slept for 23 hours, and their drowsiness was assessed by, among other things, a physiological measure of eye closure. Participants drove for three hours, during which they experienced both forced and driver-initiated lane departures.

All four warning systems cut drivers' reaction time almost in half. The steering wheel vibration warning in combination with the steering wheel torque proved to be the most effective. When drivers noticed one of the warning systems, they provided feedback about whether it was helpful, intuitive, and acceptable.

As a result of this study, the HF/E researchers have gained knowledge of how to design an effective LDW system in the effort to prevent car crashes and fatalities caused by drowsy drivers.

Source: Human Factors and Ergonomics Society

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