Vehicle direction, not driver biometrics, best way to detect drowsiness

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Researcher Drew Morris demonstrates how a Clemson vehicle simulator is used to measure driver fatigue. Credit: Ashley Jones

Drowsy drivers take a heavy toll on the nation's highways. So finding a reliable way to test for fatigue to mitigate its potential damage could have a significant impact on highway safety.

U.S. statistics reveal drowsy drivers are five times more likely to be involved in an accident, or a near-crash incident, than alert drivers. Furthermore, drowsy or fatigued drivers are responsible for an estimated 56,000 crashes annually with more than 40,000 of them resulting in fatal and non-fatal injuries. Closer to home, there are more than 730 traffic accidents in South Carolina linked to drowsy or fatigued drivers.

Research recently completed at Clemson University sought to determine the most effective way to detect a driver's sleepiness. Many previous studies have focused on measuring psychophysiological metrics, including driver eye movements, muscle activity and changes in heart rate to determine alertness. The biometric measurements have been shown to be inaccurate at times and intrusive to a driver's actions.

Researchers at Clemson determined that a reliable, less intrusive way to detect fatigue or drowsiness in a driver is to monitor vehicle behavior rather than the biometrics of the person behind the wheel.

The Clemson study tested 20 volunteers whose attentiveness was measured in a vehicle simulator during a 26-hour stretch without sleep. The simulator tested volunteer drivers for about 20 minutes on a 15-mile course that included nine curves. Driving performance was measured for lateral lane position, lane heading and vehicle heading.

The Clemson University research, aimed at improving the detection of drowsy driving and finding solutions to mitigate it, was conducted by Drew Morris, a human factors psychology Ph.D. student; June Pilcher, alumni distinguished professor of psychology; and Fred Switzer, professor of psychology. The research was published in the journal *Accident Analysis & Prevention*.

"GPS capability is standard technology in many cars, so it's very easy to monitor every movement of a vehicle," said Pilcher.

"By employing more accurate GPS technology to pinpoint the vehicle's orientation on the road, the driver could be notified if their driving is getting dangerous. The vehicle may even present information like a video game, with a stream of driving statistics," added Morris.

The idea of utilizing GPS to detect a vehicle's deviations and signaling almost immediate warnings to drivers has real practical safety applications to the auto industry. Pilcher said it's a workable approach to detecting inattentiveness that goes beyond fatigue or drowsiness.

"This kind of technology may work the same way if the inattentiveness is caused by texting, picking up something off the vehicle's floor or any other distraction that can lead to a dangerous situation," Pilcher said.

One of the most dangerous aspects of drowsy or fatigued drivers is that although 37 percent of them admit to having fallen asleep behind the wheel, research shows drivers are very poor at gauging their sleepiness before being involved in an accident.

"Early detection of a vehicle's movement deviation is a step in the direction of preventing a tragedy. Though we can't say this type of detection will prevent an accident from occurring, it can provide a warning to a driver who may not believe danger is imminent," Pilcher said.

More information: www.sciencedirect.com/science/ … ii/S0001457515001360

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