

Feeling the Road: Tactile Warning Systems for Drivers

February 27, 2011

Robert Gray

How is it even possible to text behind the wheel? But people do, adding one more activity to the growing list of driver distractions, along with shaving, reading the newspaper, putting on makeup, eating, watching movies (yes, even in the front seat), using the GPS, and of course, talking on the cell phone. Then of course there's also driving under the influence, whether it's alcohol, drugs, fatigue, or anger; cognitive decline; or some other temporary or permanent impairment that reduces response time.

"Approximately 40,000 people are killed in driving accidents per year in the United States," said Arizona State University's Robert Gray in his talk at the APS 21st Annual Convention. "And in over 85 percent of those accidents, the primary cause is cited as driver error," he added.

In the search for solutions to this widespread public safety problem, researchers are working to develop warning systems using auditory, tactile, and visual stimuli. However, there are many issues to consider when designing driving indicators. When and how should warnings be triggered? What sensory modality should be used? Will this effort realistically decrease driving accidents? According to Gray, research shows that visual warnings of possible collisions were no better than no warning at all, but auditory signals were much better and tactile signals better still. In addition, his studies have shown that in some instances (like when you signal at the last second) warnings providing escape directions to avoid a possible collision worked best while in other cases (when you signal well before the collision would occur) warnings that show the driver where the obstacle is located work best. A simple vibration of the steering wheel or voice informing a driver to turn left to avoid the pedestrian crossing the street in a blind spot was enough to decrease collision rates in these studies.

Gray recognizes that not all accidents are avoidable. We make errors and getting rid of every distraction is impossible. According to Gray, we must address not just the driver, but the entire structure of driving. "The problem is not the driver, but the roadway/vehicle/driver system," he said.