

Research Report Summary



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Assessing the Impact of Smartphone Usage While Driving in Work Zones

How GPS distraction impact drivers driving by TTC devices on a highway.

The increase of smartphone usage by drivers is particularly concerning in work zones during operations and maintenance (O/M) activities. Crashes occur more frequently in work zones due to the number of objects in proximity to traffic, requiring drivers' attention [1]. A total of 781 fatalities occurred in highway work zones in 2016 in the United States, and 143 of those were workers [2]. A web-based survey was developed and distributed online

to local drivers. The purpose of the survey was to identify the perceptions and attitudes of Puerto Rican drivers about the level of distraction caused by performing different activities while driving, such as using smartphones, GPS navigation systems, or social media (See Figure 1). Drivers' performance on highway work zone conditions with and without the influence of a GPS smartphone application was evaluated.

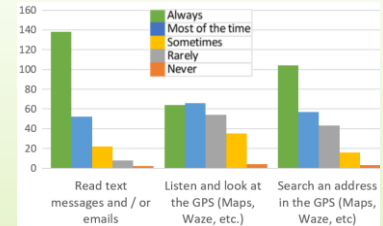


Figure 1. How distracting are the following actions in a moving vehicle?

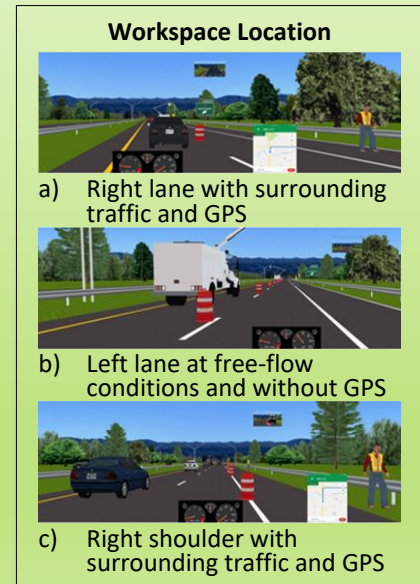
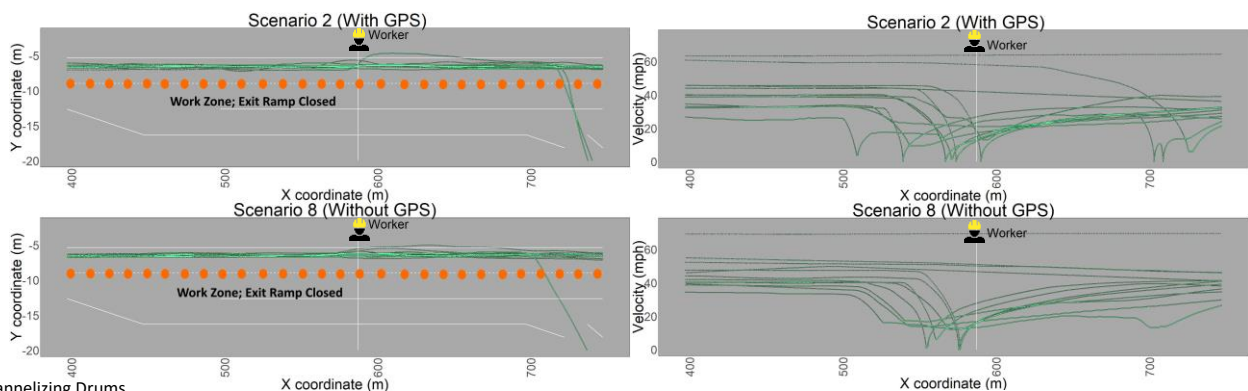


Figure 2. Sample roadway and work zone conditions.



● -Channelizing Drums
 Worker- Worker encroached the road.

Figure 3. Position and speed graphs in scenarios with right lane closed.

Driving simulation scenarios to investigate drivers' errors and speeding while using their smartphones through work zones were generated. Twelve scenarios were evaluated considering three major factors: with and without

“The effect of drivers' using smartphone GPS navigation systems, including the tradeoff between increased attention levels and distractions, which may cause drivers to encroach on workzones, can be effectively evaluated using driving simulators; thus improving worker and driver safety.”

GPS, with and without traffic, and three different work zones: closure of right lane, left lane, or shoulder (see Figure 2). Drivers' behavior in the work zone scenarios with the right lane closed (scenario 2 with active GPS and 8 without GPS) and a distracted worker that left the work zone and encroached the driving lane are presented in Figure 3.

Conclusions associated with the subjects exposed to a driving distraction while traversing a highway work zone (audible GPS instructions), showed that there was no significant difference in mean speed with respect to drivers without GPS. In terms of speed variability, there is less dispersion on subjects with GPS as compared with those driving without GPS. The subjects that encroached the workspace in scenarios 1 and 2 (active GPS) were 16.7%, while 8.3% of the subjects did so in scenarios 7 and 8 (without GPS).

Outcomes

Driving simulation is an effective tool for addressing the tradeoff of emerging technologies exposed to a built transportation infrastructure and to enhance safety for road users and workers. Amendments are needed to the FHWA MUTCD typical applications associated with Temporary Traffic Control in work zones in order to strengthen the use of protection barriers in work zones where exits are closed. This new policy would provide workers positive protection from a potential driver's decision to encroach on the workspace due to GPS instruction.

Local transportation authorities should coordinate with GPS companies to provide adequate signage and warnings as well as improve visual and voice messages to inform users of current road conditions during O/M activities.

Impacts

Driving simulation applications in work zones have the potential to reduce serious and fatal crashes involving drivers, workers and associated traffic delays. This research study contributes to the state of the art in safety and simulation, specifically addressing the effect of smart usage and transportation network companies and its effects in contributing to driving distractions in work zones. It is expected that by providing the updated information of the road conditions via GPS and by implementing different protection barriers in work zones near exits, 16% of the drivers will be prevented from encroaching the workspace. Therefore, the potential effects include reducing crashes in work zones and increasing workers' safety.

References

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