

JOINT TRANSPORTATION RESEARCH PROGRAM

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Evaluating the Impact of Vehicle Digital Communication Alerts on Vehicles

Introduction

Traditional methods for communicating the presence of maintenance activities and work zones has been accomplished with a variety of fixed signs. Short-duration or mobile maintenance activities are often the most challenging situations for managing risks and communicating to the motorists. The increase of in-vehicle connectivity on our roads, either directly integrated into the vehicle or via an application running on a mobile phone, provides an opportunity to further communicate with motorists about the presence of emergency vehicles, maintenance activities or work zones. In-vehicle digital communication alerts have been identified as a way to improve communication with drivers of modern vehicles, and a critical first step in this communication is

to leverage the extensive telematics currently deployed on the Indiana Department of Transportation vehicles. The objective of this study was to conduct trial deployments on a variety of INDOT vehicle; evaluate the impact of in-vehicle digital communication alerts and begin a dialog with private sector partners about what information INDOT can share that will create a safer roadway for all motorists, INDOT workers, and INDOT partners.

Findings

The design of connected vehicles will likely change considerably over the next few years as market forces determine what type of information is integrated directly into the vehicle and what information is integrated via cell phones. This report identifies several examples where



Queue truck used to alert drivers.



Hoosier helper with an integrated sign (i).

in-vehicle notifications alerting drivers to the presence of service and contractor vehicles were acknowledged by the drivers. Hard braking data is being used to determine if these alerts have a meaningful impact on safety. Early results indicate a substantial reduction in hard braking events (from 29 to 3) between conditions when queue trucks are not used versus when they are used. A larger data set is currently being collected with Hoosier Helpers to isolate the impact of the in-vehicle alerts.

- Waze users are already actively using and acknowledging alerts triggered by public safety vehicles. The alert acknowledgments provide good evidence of the alert impact, but we will need to work collectively with the navigation and automotive OEMs to ensure that we are not introducing distractions that negatively impact safety.
- The significant reduction in hard braking events associated with queue trucks equipped with HAAS Alerts on I-65 was observed and compared to cases with no queue trucks or HAAS Alerts. Although it is not clear how much of this reduction is due to the visibility of the truck compared to the HAAS Alert, the reduction of hard braking (and hence crash risk) has been well received. Similar results have also been observed on Interstate I-69.

Implementation

Over the course of this study, the research team performed a pilot deployment of the HAAS Alert devices on various Indiana Department of Transportation (INDOT) vehicles across the state. In total, HAAS devices were installed on eight different vehicles from May 14 through August 31, 2020. Three of the eight vehicles operated in the Indianapolis area, two in Gary, one in Plymouth, one in West Lafayette and one on a research development

vehicle that was active across the state. Data is currently being sent to local servers from HAAS servers using API connections for different vehicles across five different organizations that are operating queue trucks, Hoosier Helper, and/or Crew Cabs. Telematics records are ingested every 2 seconds with information on the location and timestamp for a moving vehicle, whereas alerts are triggered when the strobe lights are turned on. Over 4.3 million records and more than 18 thousand alerts were ingested for 34 different vehicles as of June 23, 2021. Qualitative results observed from multiple case studies are promising, but there is a need for a much larger sample size to draw a valid statistical conclusion.

As of June 28, 2021, telematics from 15 Hoosier Helpers have been integrated into the HAAS Alert system and approximately 20 Hoosier Helpers will serve as a control group (without HAAS integration). Over the next year, the hard-braking events associated with the Hoosier Helpers will be evaluated and a technical report summarizing the marginal impact will be provided in 2022.

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