Connected Vehicle Traveler Alert System

Project Location:
Minneapolis, MN

Start – Finish Date:
February 2020 – December 2023

Project Status:
Complete

Project Partners:
Iteris

MnDOT Project Cost:
$367,000

Projects with Similar Characteristics:
N/A

Project Description:

The Connected Vehicle Traveler Alert System project was implemented to increase traveler awareness and subsequently increase safety of the traveling public by notifying them of upcoming maintenance vehicles or snowplows that may not have been in the line of sight. This was tested by sending maintenance vehicle location data gathered by an automatic vehicle location (AVL) system to a MnDOT server where the data was sent to:

- The Transportation Management Center (TMC) which allowed for the display of a dynamic message sign (DMS) message to the traveling public that a maintenance vehicle was ahead.
- An application running on a smart phone / mobile device of drivers who were approaching the maintenance vehicle at a specified distance.

Project Objective:

The objective for the Connected Vehicle Traveler Alert System project was to develop and demonstrate a service to maximize the safety of roadway workers and traveling public by making motorists aware of snowplows and maintenance vehicles operating on the road ahead of the traveling public.
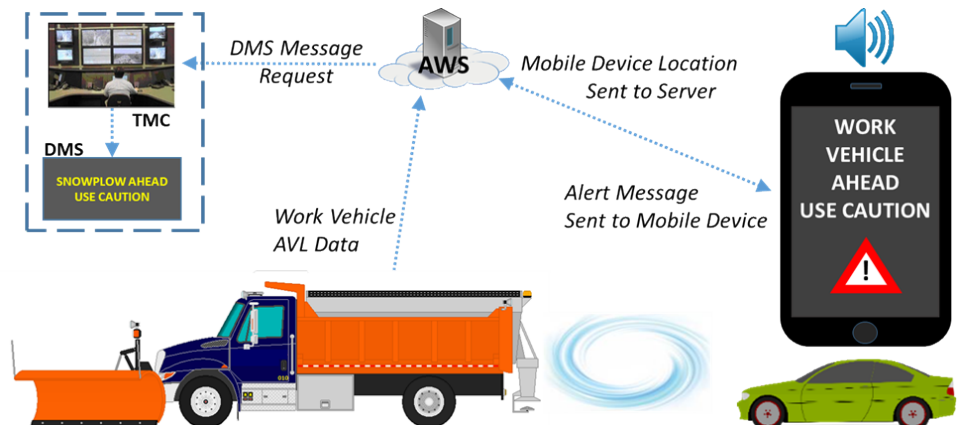

Figure 1: Traveler Alert System Concept

Project Accomplishments:

The main project accomplishment was successfully displaying alerts on dynamic message signs (DMS) of upcoming maintenance vehicles, demonstrating potential connected vehicle applications without using roadside infrastructure.

Key Findings:

DMS Alerts

The DMS alerts functioned as anticipated. In December of 2022, the DMS provided over 61,000 alerts for maintenance and plowing notifications. None of the 61,000 alerts required operator intervention to initiate the alert.

Application Alerts

The results of the mobile device application alert testing were limited. Limitations with available participants, limited cell phone battery life, and data privacy concerns resulted in a limited application assessment with inconclusive results before this part of the demonstration was terminated.

Connected Vehicle Technology

Through this project, MnDOT demonstrated connected vehicle technology by utilizing existing infrastructure to allow communications between the maintenance vehicles and the DMS without operator intervention. The effectiveness of communicating directly into other vehicles was not determined.

Lessons Learned:

- The close proximity of maintenance vehicles in MnDOT maintenance yards presented some issues during testing with false vicinity alerts.
- Involving maintenance staff in the beta testing process allowed the project team to identify more issues with mobile application reporting which could be addressed, tested, and resolved.
- Some other issues that were resolved involved smartphone battery drain and communications load.
- User testing identified many issues that were able to be resolved including false alerts. After false alerts were dramatically reduced, user confidence increased.
- Developing agency processor solutions based on individually developed or third-party provided applications will face adoption and integration challenges.

Potential Next Steps for MnDOT:

- Assess the expanded pilot testing of the DMS alerts to determine the value of the traveler alert system to MnDOT and its road users.
- Conduct analysis of effectiveness of expanding pilot testing by communicating solely through the MnDOT ATMS system, compared to using 5.9 GHz direct communications.
- Consider plans to integrate into an overall winter maintenance program.