Smart Snelling

Project Location:

Snelling Avenue and
County Road B2

Ramsey County, MN

Start – Finish Date:

Fall 2019 – Fall 2021

Project Status:

Complete

Project Partners:

Traffic Control Corporation
Ideate Consulting PLLC
AI Applied Information
Ramsey County

MnDOT Project Cost:

$312,800

Projects with Similar Characteristics:

Centralized SPaT and MAP
Data Sharing (2020)

Project Description:

The Smart Snelling project was comprised of two main components:

- Testing a third-party application to provide users signal phasing and timing (SPaT) information.
- Testing snowplow signal priority.

MnDOT and Ramsey County installed connected vehicle technology equipment at 16 intersections owned by MnDOT and Ramsey County. The project tested the equipment's ability to provide snowplow signal priority by communicating with the onboard unit on the plow truck. The project also tested the "TravelSafely" mobile phone application's capabilities to provide real-time information accurately and effectively about signal phasing and timing to inform travelers of phase changes, red-light running, and presence of pedestrians/cyclists.

Project Objective:

- Validating the technology's functionality.
- Identifying opportunities and challenges with deploying CV technology.
- Gauging user understanding, expectations, and acceptance of CV technology.

Figure 1: TravelSafely application in-use

Project Accomplishments:

- Continued security and networking protocols essential to CV deployments.
- Gained an understanding of user knowledge and expectations.
- Gained an understanding of deployment testing requirements.
- Recognized business operating unit and institutional improvements.
- Gained a better understanding regarding technology readiness.

Key Findings:

User Outreach

The outreach portion of this project was impacted by COVID-19, and the original plan was reduced to a small-scale effort focused on MnDOT employees. Sixteen respondents provided the following feedback:

- 50% of users thought "TravelSafely" was useful.
- 57% of users thought it was safe to use an app for transportation.

Due to the small sample size, the project could not draw accurate conclusions regarding public opinion of CV technology through smartphone applications.

CV Technology

User testing identified several areas of improvement such as the application needing up-to-date traffic signal operations and for user devices needing to be able to provide accurate GPS information. Also, the vulnerable road user detection capabilities were not tested due to staffing constraints and initial driving tests. Overall, the system benefits were limited due to the application only receiving data from the traffic signals and other users.

Snowplow Signal Priority

After set-up and troubleshooting, the snowplow signal priority functioned as expected with priority requests being granted within the allowed time periods. Snowplow drivers provided positive feedback for the system.

Lessons Learned:

- Extensive testing should be a requirement for all CV technology prior to deployment, even if the technology is "off-the-shelf".
- Messaging of system functionality is critical for new technology.
- Snowplow signal priority was liked by users and had potential beneficial use.
- All ITS projects using new technologies should follow the systems engineering process.
- Conducting systems engineering on all new ITS, CAV, and technology projects is always valuable and often times critical to the success of a project.

Potential Next Steps for MnDOT:

- Adopt the systems engineering process on all future ITS technology projects, even if the project is only in the research and demonstration phase.
- All pilot deployments of technology should have a defined, written communications plan.
- Develop a larger scale snowplow pilot project with a systems engineering analysis conducted, performance measures identified, and alignment with stakeholder's needs and desired outcomes.
- Explore future internal build-out of SPaT data sharing rather than rely on individual applications with a limited focus and specific business case.
- Study the impacts of providing SPaT information to human drivers to understand positive and/or negative impacts affecting driver behavior and safety for all roadway users.

Date Updated: 2024-11-20