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Innovation Corner

Navigating Smart Roads: Safeguarding Vulnerable Road Users Through Technology

by Jon Strauss

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V2X technologies will connect drivers and infrastructure across the roadscape.

The number of roadway-related deaths and injuries among vulnerable road users is unacceptable. In 2021, there was a 12.5% increase in fatalities among people walking- the highest recorded in decades. The Federal Highway Administration is working toward zero deaths through the application of the Safe System Approach.

The U.S. Department of Transportation's National Roadway Safety Strategy specifies that zero is the only acceptable number of deaths and serious injuries on our roadways. USDOT is committed to taking substantial, comprehensive action to achieve this goal. USDOT and FHWA encourage roadway owners and operators to use data-driven approaches to identify and address safety challenges affecting vulnerable road users (https://highways.dot.gov/safety/hsip/vru-safety-assessment-guidance).

The Bipartisan Infrastructure Law (BIL) provides unprecedented funding to address roadway safety issues, including issues specific to vulnerable road users.

Existing and evolving technology provides opportunities for addressing the crisis of vulnerable road user deaths. Transportation agencies such as the Tampa Hillsborough Expressway Authority (THEA) worked with USDOT at a connected vehicle (CV) pilot site to address road user safety.

THEA's Executive Director, Greg Slater, comments: "...as part of the THEA CV Pilot, we deployed a pedestrian collision warning application that we are now using to tackle an issue where drivers exiting an expressway into a dense urban area, need to slow down as they enter a completely new system."

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The pilot program's success is measured by averted potential crashes and collisions and the number of advisories issued to the CV system.

The application uses cameras to detect pedestrian movements while they are in the crosswalks and sends a message to vehicles capable of receiving the message in the vicinity. Those vehicles then provide the driver with an alert that a vulnerable road user is in the crosswalk ahead.

FHWA funded the CV pilot program to test the ability of CV technology to prevent traffic crashes. The pilot program's success is measured by averted potential crashes and collisions and the number of advisories issued to the CV system.

CV technology, also known as Vehicle-to-everything (V2X) technology enables the rapid transmission of situational information providing safety warnings of imminent collisions. The communication of situational information takes place between equipped motor vehicles, pedestrians, cyclists, and non-motorized travelers. For example, V2X technology—like units carried by cyclists, scooters, and pedestrians—sends signals to corresponding equipment in vehicles, which then alerts drivers through visual and auditory cues to the presence of vulnerable road users.

Slater noted that this technology "… can provide auto and vulnerable road users with valuable information when making decisions while navigating busy roadways and intersections."

THEA continues to test V2X and other technologies in a controlled real-world environment on the authority's reversible lanes. To have real-world benefits, V2X capabilities need widespread application of interoperable technology on vehicles, devices carried by vulnerable road users, and infrastructure. Field applications such as the ones tested by THEA indicate the promise of this technology to save lives in all conditions, especially instances of low visibility like nighttime or weather-related scenarios.

FHWA's Every Day Counts 7 Nighttime Visibility for Safety initiative focuses on the broad application of visibility treatments to protect vulnerable road users. Low visibility conditions make intersections hot spots for crashes.

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New technologies support the safety of all road users.

FHWA's analysis of Lighting for Pedestrian Safety concludes that 90 percent of traffic fatalities happen in four types of places: intersections, pedestrian roadway crossings, curves, and ramps, and 76 percent of pedestrian fatalities occur at night. Improving visibility for pedestrians at these location types can help transportation agencies curb preventable crashes, injuries, and deaths.

The integration of new technology into the current infrastructure, along with partnerships with agencies and businesses, could lower the risk of crashes involving vulnerable road users and vehicles in low-visibility situations. Infrastructure owners and operators are testing new technology and interactions between road users. These tests are happening at pilot sites across the Nation. They require cooperation from partners, such as the Federal Government, State and local governments, stakeholder agencies, and numerous interested parties, including the auto industry, advocacy groups, higher learning institutions, and the public. Partnerships enable the testing of technologies such as V2X.

As vehicles become more connected, so will vulnerable road users with personal alert systems such as V2X technologies, facilitating awareness between users and vehicles. This advancement enhances visibility and prompts behavioral changes, reducing the risk of crashes. From smart infrastructure to wearable devices, partnerships, and testing solutions, embracing these innovations and collaborations will propel our Nation to safer and more accessible roads for everyone regardless of their mode of transport.

Jon Strauss is a communications specialist and project manager contractor with FHWA.

For More Information

https://www.transportation.gov/nrss/usdot-national-roadway-safety-strategy

https://theacvpilot.com

https://www.fhwa.dot.gov/innovation/everydaycounts/edc_7/nighttime_visibility.cfm

https://safety.fhwa.dot.gov/roadway_dept/night_visib/docs/Lighting_for_Pedestrian_Safety_2pager.pdf

https://www.transportation.gov/NRSS/SafetyProblem

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