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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

Research Results

TMS Innovative Product Proof of Concept (POC) Support

Evaluating and comparing crosswalk detectors for pedestrian walk time extension from three vendors: ACD, MS-Sedco and iComs

Advanced Research

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Project Title:
ITS Field Device Research

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WHAT WAS THE NEED?

Pre-set pedestrian phase passage, i.e., "don't walk," intervals do not always give vulnerable road users, especially elders and individuals with disabilities, enough time to traverse crosswalks at signalized intersections on state highways. To address this problem, Caltrans is looking to improve traffic signal operations for pedestrians using new detection technology in urban areas. Research was needed to help realize Caltrans' vision of improving urban communities and, specifically, to evaluate the feasibility of applying pedestrian crosswalk detectors to existing traffic signal infrastructure so walk times can be extended accordingly.

WHAT WAS OUR GOAL?

The objective of this research was to procure and evaluate pedestrian crosswalk detectors from three different vendors and determine which one is best suited to allow Caltrans' traffic signals to extend the passage, i.e., the "don't walk," interval for a pedestrian phase when pedestrians are still detected in the crosswalk at the end of the corresponding vehicle phase.

WHAT DID WE DO?

A task order was established under the master contract with the Advanced Highway Maintenance and Construction Technology (AHMCT) center at UC Davis to procure and evaluate pedestrian crosswalk detectors from three different vendors. The researchers procured and evaluated the following three crosswalk detectors: AGD 326, MS Sedco SmartWalk XM, and iComs TMA-011 LV. They followed the detectors' manuals to ensure that testing was carried out fairly. The sensors were set up on the same apparatus

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with similar testing procedures, which allowed for a reasonable comparison between all detectors. The researchers mounted each detector on a rigid structure built into the bed of a pickup truck that kept its position stable in the wind and situated it ten feet above the ground. Building the test apparatus into the truck bed also helped with transporting test equipment. Each detector was tested separately to ensure they did not interfere with each other.

To identify the detection range of each detector, the researchers spray-painted a grid on the AHMCT test track to simulate the detection area of a crosswalk. Each square on the grid measured 2x2 meters. The grid had 3 columns and 16 rows of squares, making the outer dimensions of the grid 6 meters wide and 32 meters long. A researcher would then walk along the edges of each square. A camera mounted next to the detector would record the researcher's path along the grid as well as when the researcher was detected as measured by an LED wired the detector's output relay and visible within the camera frame. The researchers watched the resulting videos to analyze detector behavior. Each detector was tested five times to ensure the accuracy of the evaluation. In this way, the detection range of each detector could be measured and compared. The researchers also recorded qualitative comparisons based on observations about the different features and relative ease of setup of each detector.

WHAT WAS THE OUTCOME?

The researchers at AHMCT concluded that the AGD 326 detector would be best overall candidate for Caltrans' purposes. The AGD 326 has the most user-friendly interface, which makes the setting adjustment process straightforward. The AGD 326 sensor is the only candidate that allows flexibility in adjusting the detection zone parameters to match the crosswalk dimensions. It is the only sensor that has both sound and LED detection indicator. The AGD 326 also presents a visual demonstration in its manual where the user can check the integrity of the sensor detection parameters. These unique features were found to be more valuable when compared to the features of the MS Sedco SmartWalk XM and iComs TMA-011 LV detectors.

WHAT IS THE BENEFIT?

This research will help to increase the safety of vulnerable road users on state highways, especially pedestrians in urban areas, by allowing Caltrans to configure its traffic signals to extend the passage, i.e., the "don't walk," interval for a pedestrian phase when pedestrians are still detected in the crosswalk at the end of the corresponding vehicle phase.

IMAGES

Image 1: AGD 326 pedestrian in crosswalk detector

Image 2:MS Sedco SmartWalk XM pedestrian in crosswalk detector

Image 3: iComs TMA-011 LV pedestrian in crosswalk detector

Image 4: Mounting, setup and transport apparatus for detector testing

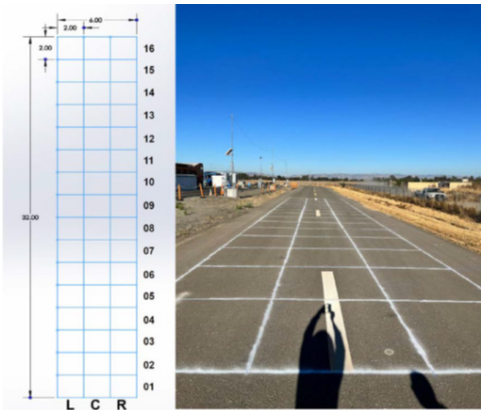

Image 5: Crosswalk simulation grid for detection range testing

Image 6: Video monitoring of pedestrian position and detector output