DRISI
Caltrans Division of Research, Innovation and System Information

Research Notes

TMS Innovative Product Proof of Concept (POC) Support

Evaluating the performance of new-to-market vehicle, bicycle and pedestrian detection and tracking systems through closed-course testing

Advanced Research

NOVEMBER 2022

Project Title:
ITS Field Device Research

Task Number: 4049

Start Date: January 1, 2022

Completion Date: September 30, 2023

Task Manager:
John Slonaker
Sr. Transportation Electrical Engineer (Specialist)
john.slonaker@dot.ca.gov

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) needs a comprehensive mechanism to support Intelligent Transportation Systems (ITS) or Transportation Management System (TMS) equipment evaluation and expedited field testing. This includes functions such as vehicle detection, incident detection, and pedestrian and bicycle monitoring. Given the short development cycles in the ITS industry, new and innovative ITS devices are continually arriving on the market and providing an opportunity to achieve efficiencies and increased functionality for supporting Caltrans' business needs. The project delivery cycle can take several years, and the districts are not always able to respond quickly to changing technology. They typically do not have the program staffing available and funding in place to adequately research and evaluate various aspects of new ITS products.

WHAT ARE WE DOING?

This task provides capacity for the add-hac evaluation of new ITS and TMS devices. As new products are sought out by, or brought to the attention of, district staff, research and evaluation plans will be generated. This includes purchasing or borrowing ITS equipment for installation in a state highway facility or laboratory test environment. The equipment will be evaluated to ensure that it meets current business needs.

New or innovative ITS/TMS products will be proposed by Headquarters (HQ) or district personnel for evaluation. The researchers will purchase, install, test, and evaluate the new product or system. This may consist of a temporary pilot installation on a state highway facility where district staff can evaluate and provide feedback. However, the laboratory facilities at the university might prove more suitable for some test procedures. The researchers will analyze the test results and report on their evaluation and implementation considerations. This is intended to provide expertise and support to HQ and

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system

the districts to make better decisions on the applicability of new ITS products.

The researchers will evaluate each system to ensure that it meets Caltrans' business needs as determined by Caltrans panel members. Evaluation will be based on quantitative field test data, qualitative analysis, and follow-up surveys and/or interviews with Caltrans personnel to obtain their view on the suitability and performance of the system. the researchers will deliver a report summarizing the results of the individual evaluations and implementation considerations. They will also present the project results to Caltrans in a workshop forum.

WHAT IS OUR GOAL?

The anticipated outcome of this research is the evaluation of new ITS products to ensure that they meet Caltrans' current business needs. Working with HQ Traffic Operations and the districts, a task-based research project will be developed for the intake, analysis and best practices for the use of new ITS equipment. As new products are sought out by, or brought to the attention of, district staff, a research and evaluation plan will be generated. This includes purchasing ITS equipment for installation in a real-world test environment.

WHAT IS THE BENEFIT?

The benefit of this task is the development of a comprehensive mechanism to support Intelligent Transportation Systems (ITS) or Transportation Management System (TMS) equipment evaluation and expedited field testing. This will provide a means for more timely, responsive, and focused evaluation of emerging products, which will allow Caltrans to more efficiently deploy promising systems. This will support Caltrans' goals of safety, efficiency, and mobility.

WHAT IS THE PROGRESS TO DATE?

The Researchers have completed testing of the first set of ITS products: pedestrian detectors for crosswalk phase extension from three different vendors. The Project Manager (PM) had received an evaluation request from Caltrans' District 7 and formed a panel that met with the researchers to discuss the scope of work. Once the panel had decided which specific products to test, the researchers procured the following devices:

Manufacturer	Model Number	Function
AGD	326	FMCW Radar-based pedestrian detector
MS Sedco	Smartwalk XM	Doppler Radar-based pedestrian detector
iComs	TMA-011 LV	Microwave Radar-based pedestrian detector

The researchers tested each detector separately. They mounted them on a rigid structure built into the bed of a pickup truck to achieve a ten-foot mounting height, keep the detectors from moving in the wind and provide a convenient mechanism for transporting test equipment to the test track.

To identify detection range, the researchers spray-painted a grid on the test track. They walked along the lines of the grid and noted where they were and weren't detected. They repeated this procedure five times for each detector to reliably determine the detection zones for each device.

The researchers recently submitted a draft report to the PM detailing their findings, explaining how to set up each detector and ranking them according to how well they performed.

IMAGES

Image 1: Detector mounting apparatus.

Image 2: Detection range measurement grid

Image 3: AGD 326 pedestrian detector as mounted for testing

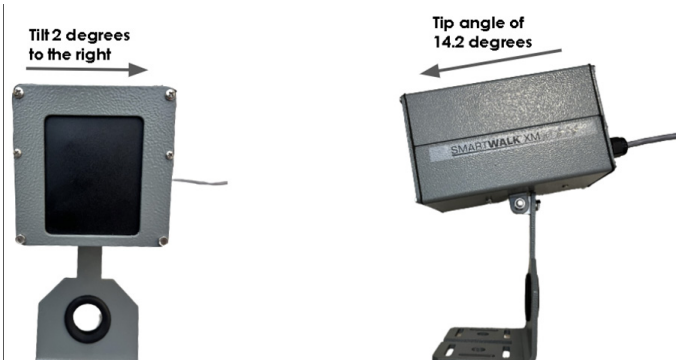

Image 4: MS Sedco Smartwalk XM pedestrian detector as mounted for testing

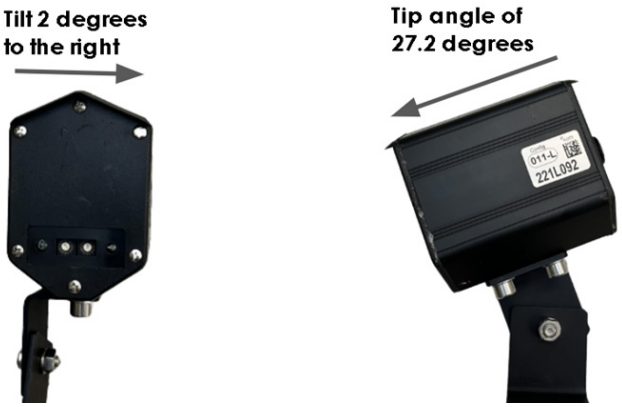

Image 5: iComs TMA-011 LV pedestrian detector as mounted for testing