WHAT IS THE NEED?

In the past, the United States Department of Transportation has provided financial and technical support to the California Department of Transportation (Caltrans) test bed site in Palo Alto, CA, for developing the Connected and Automated Vehicles (CAV) infrastructure.

Currently, the test bed site is fully operational and consists of 16 intersections. As Caltrans is preparing to achieve the deployment of at least 20 CAV upgraded intersections on the test bed to meet the Signal Phase and Timing (SPaT) challenge by January of 2021. Expanding the intersections from 16 to 31 at the test bed will provide a better setting for application developers to complete the testing and development of both the vehicle and infrastructure components as many of the CV applications require longer CV equipped corridors for applications to work properly.

WHAT ARE WE DOING?

This research entails the following tasks:

1. Expand the California CV test bed to meet the National Operations Center of Excellence’s requirements for the SPaT challenge.
2. Develop, implement, and conduct field tests for Transit Signal Priority (TSP) application
3. Support the deployment of CV in California
WHAT IS OUR GOAL?

The objective of this research is to achieve a fully functional test bed with 31 intersections that will allow various private and public entities to develop CV applications.

WHAT IS THE BENEFIT?

The improved test bed will provide a platform for software engineers to develop various CAV transportation applications that will improve the throughput and safety for vehicular movements on highways, arterial, and surface streets; and ultimately help drivers in cutting travel times, saving fuel and improving safety.

WHAT IS THE PROGRESS TO DATE?

The research team completed the implementation of using channel 180 to Tx and Rx all Dedicated Short Range Communication messages on test bed RSUs and test vehicle’s OBU. The research team conducted the field testing in July 2020 to ensure the existing CV applications are working properly on channel 180.

The research team participated in the project quarterly review meeting on July 14, 2020. Staff from Caltrans DRISI, VTA, and the research team attended the review meeting. The research team reported progress made during the last quarter and discussed with VTA on installing OBU on 5 VTA buses. They participated in a follow-up conference meeting with VTA Maintenance on July 22, 2020 to discuss technical details for OBU installation.

On July 28, 2020, the researchers and the Caltrans Project Manager worked with VTA Maintenance staff in the VTA North Yard to install OBU on one VTA 60-foot BRT bus. A successful field communication test with the OBU instrumented VTA BRT bus traveling round-trip along the California CV Test Bed was conducted on August 5, 2020. TSP worked well with all DSRC messages Tx and Rx on channel 180. The DSRC-based TSP system obtained positive feedback from VTA Maintenance staff and driver participated in the field communication test.

The research team participated in the conference meeting with NoTraffic on August 24, 2020 to discuss steps to install NoTraffic sensors at four test bed intersections. On September 9, 2020, the research team participated in the sensor installation planning meeting with Caltrans DRISI, Caltrans District 4, and NoTraffic. The team conducted a site survey on September 15, 2020 to determine the desired location to mount NoTraffic sensors and approaches to provide power to the sensors.

On September 23, 2020, the team had a conference meeting with the City of Palo Alto to discuss the possibility of mounting NoTraffic sensor on the city-owned luminary pole and utilize luminary power for the sensor. It turned out this approach is not feasible as the city-owned luminary power has 220 volts while the sensor requires up to 120 volts. The team modified the installation design to mount all NoTraffic sensors on Caltrans owned signal poles and mast arms; and conducted another site survey on September 24, 2020 to check the conduit condition for polling power cables from the Caltrans power cabinet to the poll box near the signal pole where the NoTraffic sensor is going to be installed. Caltrans District 4 Maintenance crew will start cable polling effort at the four intersections. We are expecting to complete the NoTraffic sensor installation in the next quarter.

On September 3, 2020, the research team received version 6.13 2070-1C update from Caltrans Operations, which upgrade the Linux kernel from 2.6.35 to 3.12.74 and glibc from 2.11.1 to 2.28. The research team followed the upgrade instruction to upgrade the exiting 2070-1C card but failed due to corrupted upgrade file error. Caltrans Traffic Operations will provide the research team a newer version of 2070-1C update to overcome the upgrade error.