



Caltrans Division of Research,  
Innovation and System Information

# Research



Advanced  
Research

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Project Title:  
Connected and Vehicle  
Application Development

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## Utilizing Connected And Automated Vehicles (CAVs) As Floating Sensors For Cooperative Traffic Control And Road Condition Monitoring

A research project to develop a sensor fusion platform that combines connected and Automated Vehicle (CAV) on-board sensing data with connected Vehicle-Basic Safety Messages (CV-BSMs) to provide measures of road conditions and local traffic conditions around the CAV and to share the estimated measures with connected infrastructure.

### WHAT IS THE NEED?

Connected and Automated Vehicles (CAVs) use a combination of on-board sensors, including LiDAR, radar, and cameras, to sense vehicles' surrounding environment. Current research in intelligent traffic signal control (e.g., MMITSS – Multi-Modal Intelligent Traffic System, TOSCo – Traffic Optimization for Signalized Corridors, etc.) focuses on using exchange infrastructure data (e.g., MAP – Geographic Intersection Description, SPaT – Signal Phase and Timing, RTCM corrections) and connected vehicle location data (e.g., BSM – Basic Safety Message) to manage traffic flow. The valuable data from the Autonomous Vehicle (AV) sensors are not yet made available for traffic controllers. There is a need to exchange the data available from the vehicle sensors to the infrastructure. This project fills this gap.

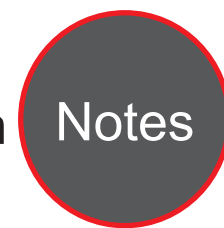
### WHAT ARE WE DOING?

The objectives of this project are:

1. To develop a vehicle-based research platform that fuses its AV sensor data with BSMs received from nearby connected vehicles and communicates this fused data to roadside infrastructure in real time.
2. To define a strategy and CV-CAV data communication format that is compliant with existing governing standards.
3. To develop a queue estimation model that combines CV-CAV data set with infrastructure sensing data.



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## WHAT IS OUR GOAL?

The goal of this project is to develop a sensor fusion platform that combines CAV on-board sensing data with CV-BSMs to provide measures of road and local traffic conditions around the CAV and to share the estimated measures with connected infrastructure.

## WHAT IS THE BENEFIT?

The results of this project will enable access to the CAV data set that could substantially improve the traffic management capabilities of an intelligent intersection, because connected and automated vehicles identify all road users (vehicles and pedestrians) including those that have not yet implemented CV technology.

## WHAT IS THE PROGRESS TO DATE?

Quarterly meeting was conducted on July 06, 2021. Due to various technical challenges, the work is not progressing according to the schedule. A no cost time extension is planned which will be submitted in January 2022. This extension will extend the contract to April of 2023.