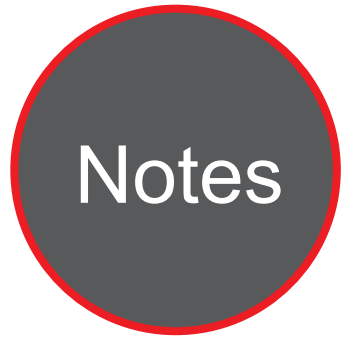




Caltrans Division of Research,
Innovation and System Information

Research



Transportation
Safety and
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Project Title:
Vehicle Infrastructure Integration

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Utilizing Connected And Automated Vehicles (CAVs) As Traffic And Road Monitoring Sensor

Fusing Connected and Automated Vehicle on-board sensing data with Basic Safety Messages to provide measures of road conditions and local traffic conditions.

WHAT IS THE NEED?

Connected and Automated Vehicles (CAVs) use a combination of on-board sensors, including Light Detection and Ranging (LiDAR), radar sensors, and cameras, to sense vehicles' surrounding environment. There is limited research on the use of CAV on-board sensing data as floating sensors for traffic and road condition measures.

As connected (or equipped) vehicles will coexist with unequipped vehicles, there is a need to research the use of CAV on-board sensing data for providing measures of road conditions and local traffic conditions which include both equipped and unequipped vehicles and share the estimated measures with connected infrastructure for improving the effectiveness of traffic control.

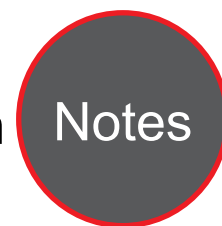
CAV collects extremely large quantities of on-board sensing data. The data will need to be processed locally to provide useful information regarding local traffic conditions and in turn, the processed information is shared with connected infrastructure via vehicle-to-infrastructure (V2I) communications.

WHAT ARE WE DOING?

This research will utilize a Berkeley Deep Drive (BDD) vehicle. The vehicle is instrumented with LiDAR, radar sensors, cameras, and an on-board unit for V2I communications.



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The researchers will conduct data collection using the BDD vehicle, analyze the characteristics of the sensors regarding the range and accuracy of object detection and classification, and determine the metrics for measuring road and local traffic conditions.

The research team will develop the sensor fusion platform and data fusion models to estimate the metrics. Field testing will be conducted at the California CV Test Bed and the performance of sensor fusion will be evaluated against the infrastructure-based camera traffic detection system.

WHAT IS OUR GOAL?

The goal of this project is to develop a sensor fusion platform that combines CAV on-board sensing data with Basic Safety Messages to provide measures of road conditions and local traffic conditions around CAV and to share the estimated measures with connected infrastructure. The provided local traffic measures comprise both equipped and unequipped vehicles.

WHAT IS THE BENEFIT?

CAV could potentially provide sufficient data quality to replace existing infrastructure-based traffic detection systems for traffic management and control. CAV can detect unequipped vehicles with on-board sensors. The research results will lead to better environment perception on the state roadways, including both equipped and unequipped vehicles, ultimately enhance the safety and mobility of California.

WHAT IS THE PROGRESS TO DATE?

This task is not yet on contract.