

Advanced
Research

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Project Title:
Vehicle Infrastructure Integration

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Collect Data Using Connected Vehicles (CV) For Real-Time Or Future Use

Collect Connected Vehicle real-time data to monitor the traffic condition on the road and to optimize the throughput in real time.

WHAT IS THE NEED?

Current Intelligent Transportation System (ITS) equipment used for "sensing" the operations of highways are very limited, both in geographic coverage and in the measured data they can provide. To effectively monitor, measure, and manage the Daily Vehicle Hours of Delay on the transportation network, transportation agencies must again focus on actively reducing peak period travel times and delay for all modes through closer collaboration between the road and vehicles.

Connected Vehicle (CV) can provide real-time data to California Department of Transportation (Caltrans) so that this data can be used not only to monitor the traffic condition on the road, but also to optimize the throughput in real-time, support ITS planning activities, and keep travelers informed about travel conditions.

As CV become more prevalent, CV will produce massive quantities of data that will need to be reduced, managed, and analyzed to provide useful information for real-time traffic management, and archived for offline planning and evaluation purposes. There is a need for a mechanism in place for data collection, processing, analysis, dissemination of information to the Traffic Management System (TMS), and data archiving.

Furthermore, messages transmitted between CV and connected infrastructure include mandatory and optional data elements. Some of the optional data elements would be beneficial to



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collect for the use of traffic management but are subject to on-board unit (OBU) vendors' support. Conduct testing and evaluation of the mechanism for data collection, analysis, and information dissemination in a real-world setting with OBUs from multiple vendors will help to address the interchangeability issue, leading to more robust and effective CV data collection.

WHAT ARE WE DOING?

The research team will develop a data collection plan summarizing

1. what to measure for the use of traffic management;
2. what data to collect and how to measure;
3. what information to disseminate to the TMS and with what communication protocol; and
4. how to evaluate the accuracy of the measures

The research team will develop application software to communicate with the Road-Side Unit (RSU) for collecting CV data, process the data and estimate the identified measures, and to transmit the estimated measures to TMS. To improve the quality of CV positioning, the research team will support Radio Technical Commission for Maritime Services broadcasts at the data collection site.

An evaluation study will be performed to assess the accuracy of the estimated measures by comparing with the data collected by Bluetooth and Wi-Fi readers.

Furthermore, a website will be developed to report the operational status of RSUs, and to visualize travel time/speed estimated based on collected CV data.

WHAT IS OUR GOAL?

The objective of this task is to use CV to collect the following real-time data so that this data can be used by Caltrans to monitor the traffic condition on the road and to optimize the throughput in real time:

- Vehicle speed/travel times
- Origin-destination data
- Vehicle classification
- Vehicle lane position (which lane is the vehicle in)

WHAT IS THE BENEFIT?

CV technology has the potential to advance traffic management systems to carry out operations functions. This research will address the technology gap on gathering useful information from CV data and integrating this new information into operations.

WHAT IS THE PROGRESS TO DATE?

This task is not yet on contract.