

DRISI

CALTRANS DIVISION OF RESEARCH,
INNOVATION AND SYSTEM INFORMATION

Advanced
Research

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Project Title:

Connected and Automated
Vehicle Application Development

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Research Results

Collect Data using Connected Vehicles (CV) for Real-Time or Future Use

A research project to address the technology gap in gathering useful information from CV data and integrating this new information with Traffic Management Center (TMC) operations through real-time CV data collection, analysis, and information dissemination between connected infrastructure and the TMC.

WHAT WAS THE NEED?

Connected Vehicles (CV) provided real-time data to Caltrans, allowing the data to be used not only for monitoring traffic conditions on the road but also for optimizing real-time throughput, supporting ITS planning activities, and keeping travelers informed about travel conditions.

As connected vehicles became more prevalent, CV produced massive quantities of data that needed to be reduced, managed, and analyzed to provide useful information for real-time traffic management. Additionally, the data needed to be archived for offline planning and evaluation purposes. Therefore, a mechanism was established for data collection, processing, analysis, dissemination of information to the TMC, and data archiving.

Moreover, messages transmitted between connected vehicles and connected infrastructure included both mandatory and optional data elements. While some of the optional data elements would have been beneficial to collect for traffic management purposes, their collection depended on the support provided by On-Board Unit (OBU) vendors.

WHAT WAS OUR GOAL?

The goal of this research project was to address the technology gap in gathering useful information from CV data and integrating this new information with TMC operations through real-time CV data collection, analysis, and information dissemination between connected infrastructure and the TMC.



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WHAT DID WE DO?

The objective of the research was to utilize CV for collecting real-time data, which could then be used by the TMC to monitor traffic conditions on the road and optimize throughput in real-time. The specific data elements targeted for collection were:

1. Vehicle speed/travel times
2. Origin and destination
3. Vehicle classification
4. Vehicle lane position (which lane is the vehicle in)

The main steps involved in achieving this objective were:

1. Developing a data collection plan to ensure appropriate collection, processing, and dissemination of CV data in alignment with the project objectives.
2. Creating roadside applications for collecting, processing, and disseminating CV data to the Traffic Management System (TMS).
3. Collecting and evaluating data to assess the accuracy of the estimated metrics.

WHAT WAS THE OUTCOME?

The work throughout this project showcased a bench system that collects and processes CV data to support freeway applications and management. Current RSU deployments focus on connected intersections. This project explored applying CV technology to connected freeways and developed some core applications on estimating freeway traffic conditions using CV data, including:

- Travel speed/travel time,
- Origin and destination,
- Vehicle classification, and
- Vehicle lane position

WHAT IS THE BENEFIT?

Conducting testing and evaluation of the mechanism for data collection, analysis, and information dissemination in a real-world setting with OBUs from different vendors helped to address the interchangeability issue associated with using OBUs from various vendors. This led to a more robust and efficient use of CV data for TMC operations.

LEARN MORE

TBD - Final report link.