DRISI

CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Automated Vehicle (AV) Testing Data Sharing and Data Analytics

Establish an effective strategic and collaboration between AV companies and the California Department of Transportation (Caltrans) regarding data sharing.

Advanced Research

November 2025

Project Title:
Automated Vehicle (AV) Testing Data Sharing and Data Analytics

Task Number: 4152

Start Date: May 1, 2024

Completion Date: June 29, 2025

Task Manager:

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WHAT IS THE NEED?

As Connected and Automated Vehicles continue to advance from research towards deployment, many optimists predict that fully automated vehicles will be introduced to public roadways soon. However, there are variety of open questions and issues that need research, planning, and resolution at State and local transportation agencies to enable successful broad deployment.

One of the questions that need exploration is "what transportation infrastructure improvements or modifications are needed to improve automated vehicle (AV) performance?" In order to explore this question, a survey was conducted in 2020, in which 20 AV companies were surveyed regarding infrastructure needs for large-scale AV deployment. The surveyed companies include automated car start-up companies; automated truck start-up companies; AV technology provider start-up companies; traditional automotive car manufacturers; and traditional automotive parts manufacturers.

During communications with these AV companies, many of them expressed the willingness to have interactive engagement with the public agencies and share their AV testing data for the purpose of better maintaining the public roadway infrastructures. Therefore, under project we have the opportunity to optimize

Caltrans planning, operations, and maintenance by using the big data collected from AV sensors for example inspecting the roadway conditions and identifying the maintenance priorities.

Under this project meaningful communication between the government agencies and the AV industry will be conducted.

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system.

Therefore, one goal of this

project is to establish an effective strategic and collaboration between AV companies and Caltrans regarding data sharing. The other goal is to establish the methodology and best practice of sharing AV testing data and demonstrate the value of data exchange that can be used for Caltrans' planning, operations, and maintenance.

WHAT ARE WE DOING?

This task will take care of the following activities.

1. Conduct a review the background, current state of art, and near-term use of AV testing data generated by automated driving systems (ADS)
2. Explore and build innovative partnership between AV companies and Caltrans regarding AV
3. Obtain AV testing data from the companies who agree to share data for this project
4. Conduct data transfers, data quality control and data storing management.
5. Conduct data analytics and data visualization.

WHAT IS OUR GOAL?

The goal of this Agreement is to produce a report that provides specific recommendations for Caltrans regarding engaging with AV industry companies for data sharing, best practices of data sharing, valuable applications of utilizing the AV testing data for Caltrans' planning, operation, and maintenance.

WHAT IS THE BENEFIT?

Results of this project will help Caltrans in planning for optimizing Caltrans planning, operations, and maintenance efforts by using the big data collected from AV sensors.

WHAT IS THE PROGRESS TO DATE?

Project progress July 1, 2025 – September 30, 2025

1. Project Management (Task 1):

The PATH PI oversees project progress, budgeting, student recruitment for image labeling, and invoice resolution. A no-cost extension was approved, extending the project to April 30, 2026.

2. AV Data Sharing (Task 3):

PATH has engaged AV companies—Volkswagen, Nissan, Toyota, and Waymo—for data sharing. Discussions with Waymo focused on using video data for pothole detection. PATH is also involved in a Contra Costa County AV demo project, collecting high-quality video data from routes in Martinez. Rosbag files are downloaded via API, decoded, and stored locally for processing.

3. Data Server & Detection Tools (Task 4):

A 2TB expandable server was built to store AV data, with SSH access for Caltrans. Detection tools are being developed to detect lane marking deterioration and potholes, including those that estimate pothole dimensions to assess severity.

4. Data Analytics & Model Training (Task 5):

High-resolution cameras collected video in the East Bay, yielding 8,000 annotated images of road damage. A YOLOv12-mask model was trained, achieving mAP: 0.716 and mAP50–95: 0.432. While effective in daylight, performance drops in low-light. Future work includes dataset expansion and image augmentation to improve accuracy.