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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 California Department of Transportation (Caltrans) regarding data sharing

Advanced Research

MAY 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

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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 January 1, 2025 – March 31, 2025

The Partners for Advanced Transportation Technology (PATH) team has been engaging with the AV companies for data sharing. The companies included Volkswagen, Nissan, Toyota, and Waymo, who have been working on collaborating on using AV testing data with other state transportation agencies. We will continue this effort and reach out to more industry companies. For the discussion with Waymo, the focus will be on getting their AV testing data to identify and evaluate the potholes.

The PATH team has built a data server to store all the incoming AV testing data. The server has 2TB of embedded storage and is capable of expansion to accommodate a larger size of incoming data. The PATH team will use the Secure Shell (SSH) protocol and generate authentication for Caltrans stakeholders to access the server remotely. Additionally the PATH team had discussions with the Caltrans Division of Maintenance senior engineers to understand (1) the current/ existing practice of roadway condition monitoring (mainly roadway surface, markings, and signs), and (2) whether they have video images of degraded roadway conditions, such as potholes, faded markings, or damaged roadway signs. So that the PATH team could use those images to train machine learning models for automatic detection. The discussions were very helpful for the research team to understand the existing work and approaches to monitor the roadway conditions and where this project could contribute to the existing process.

The PATH team has also obtained example AV testing data, mainly the video data. The PATH team has also used this data to test the machine learning algorithms for roadway condition detection using You Only Look Once v8 (YOLO v8). YOLO v8 is a computer vision model architecture developed by Ultralytics. Based on the initial detection results (mostly road cracking, but no potholes), the PATH team is working on collecting video data with potholes and building a sufficient road image dataset for training purposes.