DRISI

CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Future Mobility Research Center (FMRC) Contract

To identify and execute a diversified portfolio of multi-disciplinary transportation research projects with collaboration among California Partners for Advanced Transportation Technology (PATH) staff, UC Berkeley faculty, and post graduate research students.

Advanced Research

November 2025

Project Title:
Future Mobility Research Center

Task Number: 4260

Start Date: January 12, 2024

Completion Date: December 31, 2026

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) needs an academic partner to assist in the task of understanding, considering, and utilizing Intelligent Transportation System (ITS) technologies that may be exceptionally beneficial to California's travelers. California PATH Research Center is a critical component in the statewide ITS Research Program focusing on improving mobility and safety with advanced ideas, technologies, and a deployment emphasis. It provides Caltrans the tools needed to meet its Safety and System Performance goals by conducting leading-edge research, evaluating and conducting controlled experiments and field operational tests, and developing public/private/academic partnerships, using the expertise of a knowledgeable and experienced staff in ITS research.

WHAT ARE WE DOING?

In partnership with Caltrans staff, the PATH research team will assist the Department in the following research focus areas:

Transportation Safety Research Program: focuses on investigations of driving behavior, efficient means to investigate crashes and identify solutions, collision avoidance systems, safety and mobility applications for connected vehicle (CV) and automated vehicle (AV) systems, safety performance of highway networks and managed lanes and provide for increased safety and mobility by focusing on the communications technologies, which is the basic premise and promise of Connected Vehicles.

Traffic Operations Research Program: focuses on advancing the state-of-the-art in traffic management and traveler

Caltrans

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

information systems and producing results that can be implemented in the field. Ongoing research projects fall in the following major categories: CV/AV test-bed development and deployment, integration of traffic signals and ramp meters, integrated corridor management (ICM), variable speed limits and coordinated ramp metering for freeway traffic control, traffic surveillance, methodologies for data processing, analysis and performance measurement, development and application of modeling tools, and formulation and testing of advanced operational strategies for intersections, arterials, freeways and corridors.

Mobility and Multi-Modal Applications Program: encompasses a wide variety of activities including the integration of vehicular and infrastructure technologies that improve safety and mobility including passenger, transit, and heavy vehicles. PATH research team will work closely with transit and traffic operation agencies to address real world problems in Bus Rapid Transit (BRT), adaptive transit signal priority, seamless connection among different transport modes, transit safety, connected transportation, and automated vehicle activities.

CV/AV Applications Development Program: focuses on a variety of applications development activities, including truck platooning, cooperative adaptive cruise control, Eco-Driving, connected automation, adaptive traffic signals based on CV/AV data, signal preemption, intelligent signals and pedestrian assistance are few to mention.

WHAT IS OUR GOAL?

To develop solutions to the problems of California's surface transportation systems through cutting edge research by harnessing the knowledge of transportation researchers, working in conjunction with experts in the fields of information technology, electrical engineering, civil engineering, mechanical engineering, economics, transportation policy, and behavioral studies.

WHAT IS THE BENEFIT?

PATH Research Center is beneficial for the success and growth of the Department's multi-disciplinary, multi-campus research program involved in ITS research by providing research management services. Working closely with Caltrans staff, PATH will identify potential synergistic ventures between State and National level research programs, solicit and secure external funding from a variety of sources to leverage the core research support funded by Caltrans, provide outreach, and serve as a liaison between Caltrans and other federal and state agencies nationwide.

WHAT IS THE PROGRESS TO DATE?

The PATH research team Primarily completed task 1-3 with several subtasks still work in progress.

Deliverable 1.1c: AI-Based Extraction of Features for RPS (Road Protection Score) Calculation

This research advanced UC Berkeley's Scenic–VerifAI toolchain to support scalable roadway-safety testing that tightly linked simulation with real-world data. ScenicNL converted diverse inputs, including natural-language narratives, TIMS (Transportation Injury Mapping System) crash records, and DMV (Department of Motor Vehicle) reports—into executable Scenic scenario programs, enabling automated high-quality test generation. ScenicQuery then matched simulated scenarios with labeled real-world video and time-series data, closing the simulation-to-reality loop and helping identify field-testing gaps. In collaboration with PATH and Caltrans, the team defined priority scenarios and evaluated the system on agency-relevant needs. The project delivered open-source enhancements, documented workflows, and validated safety insights.

Deliverable 3.3a: Cloud-Based Connectivity Exploration

The team completed initial training sessions on traffic simulation and digital twins, and a third

session focused on cloud-based and direct C-V2X (connected Vehicle to Everything) connectivity was scheduled.

Deliverable 3.3b: Digital Infrastructure Data Standardization Exploration
The project developed a scalable and flexible digital work zone at Richmond Field Station (RFS) capable of integrating multiple data sources. The goal was to demonstrate the system, identify next-step enhancements, and develop high-value tools such as automated work-zone risk assessment. Live demonstrations were conducted on Demo Day at RFS, featuring Transportation Research Center (TRC) Smart Barrels.

Workshops and Partnership Building: The **DRIVE AI Seminar** and **Demo Day at RFS** were hosted by PATH as part of this task. The effort leveraged research conducted under this contract, as well as other ongoing collaborations between PATH and Caltrans, in two primary ways. First, it ensured that the research provided broad value to Caltrans, including divisions beyond DRISI such as Traffic Operations and the Office of Sustainability. Second, it helped build larger partnerships between PATH, Caltrans, and organizations across the public and private sectors, laying the groundwork for deployment-focused projects and pursuing funding opportunities from non-Caltrans sources.