DRISI
CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

ADA Van as Tech Demonstrator for Disabled Travelers

This project develops an Americans with Disabilities Act (ADA) van to create high-definition (HD) maps, test precise Global Navigation Satellite System (GNSS), and demonstrate vehicle-to-cloud (V2C) work zone warnings.

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November 2025

Project Title:
ADA Van as Tech Demonstrator for Disabled Travelers

Task Number: 4290

Start Date: March 1, 2024

Completion Date: February 28, 2026

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) Division of Research, Innovation and System Information (DRISI) deserves to assume a leading position in transit automation, automated driving, connected automated vehicles (CAV), connected infrastructure, and vehicle communication (V2X). Presently, DRISI owns the connected infrastructure testbed at El Camino Real in Palo Alto, and is effectively working on utilizing it and demonstrating the benefits of the connected environment. The ADA Van project is driven by the need for a specialized platform to showcase and advance intelligent transportation technologies, particularly focusing on accessibility for individuals with disabilities and benefiting the broader transportation network. The project aims to create a "technology demonstration platform" for testing and exhibiting various sensor and software combinations in real-world scenarios. The project will contribute to developing intelligent transportation systems (ITS) with a focus on HD maps, high-precision GNSS, and V2C applications, all crucial for the advancement of connected and automated vehicles, improving transportation services, and enhancing the overall user experience. The ADA Van will serve as a mobile "mini-lab" for conducting advanced research and will specifically incorporate features designed to improve accessibility for individuals with disabilities, including precise vehicle localization for ramp deployment, automated vehicle location reporting for paratransit services, and a user-centric informational trip assistant. The project fosters collaboration and knowledge sharing between UC Berkeley PATH (Partners for Advanced Transportation Technology) and Caltrans DRISI, aligning research with practical needs, and promoting the adoption of innovative transportation solutions.

The fundamental need is for Caltrans DRISI to take the lead

Caltrans

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

nationally in emerging transportation technologies like transit automation, CAV, connected infrastructure, and V2X.

The ADA Van project is essential because it provides a specialized, mobile platform for immediately showcasing and testing intelligent transportation systems in real-world environments. This platform specifically focuses on improving accessibility for travelers with disabilities (such as precise ramp deployment and automated location reporting for paratransit). By creating this "mini-lab on wheels," DRISI can develop critical ITS elements like HD maps, high-precision, and V2C applications, which are vital for safer, more efficient automated vehicles and a better overall user experience. This project also strengthens the partnership with UC Berkeley PATH, ensuring research directly meets practical state needs.

WHAT ARE WE DOING?

UC Berkeley PATH will build a connected and automated bus that will be a lab on wheels for conducting a wide variety of cutting-edge experimental research in the areas of transit safety, safety of vulnerable road users (VRU), transit automation, V2X, user experience, AI applications for transportation (e.g., shared perception), air quality measurement, mobile drone platform, mobile access point in emergency scenarios. This bus will be built in cooperation with the Saxton Transportation Operations Laboratory (STOL), which is developing the CARMA platform (https://highways.dot.gov/research/operations/CARMA-products) – the brains for CAVs. The lab bus will be operated using CARMA.

The initial 18-month project involving the lab bus will include: 1) VRU protection at intersections and shared perception – augmentation of onboard sensing with information from infrastructure and informing infrastructure about the surrounding environment; 2) Cloud-based Conditional Transit Signal Priority (C-TSP), where the El Camino Real signals will receive GTFS-RS messages with bus locations and passenger counts; 3) Driver experience study at the intersections with and without VRU presence warnings.

WHAT IS OUR GOAL?

The primary goal of the ADA Van project is to establish a technology demonstration platform where different combinations of sensors and software modules can be used for various intelligent transportation applications. This platform, in the form of an ADA-compliant van, will serve as a "mini-lab on wheels" for conducting a range of advanced experimental research in areas like CAV, paratransit and micro-transit automation, disabled traveler assistance, and user experience. The van's capabilities will be demonstrated in controlled environments, such as GoMentum Station testbed, as well as on real city streets and California highways. The project aims to showcase the benefits of HD maps, high-precision GNSS, and V2C technologies in areas such as safety, traffic management, transit, and curb management.

WHAT IS THE BENEFIT?

- This project is a perfect complement to the El Camino Real Testbed, in which Caltrans invested for 17 years: together, they will demonstrate the value of connected infrastructure to transit buses and the technology bridge for cooperation between cities and transit agencies. Cities provide connected infrastructure that enhances transit safety and reliability, while transit collects and shares data that is valuable for cities – curb usage, violations, hazard hotspots.
- The lab bus is a vehicle for making DRISI an innovation leader nationwide – it would demonstrate creative thinking and vision of the management.
- One investment with significant benefits for several research areas: multimodality, safety, traffic operations, advanced research, and future research – e.g., air quality, drone applications, emergency response.

- It will be an attractor for the external (e.g., federal) funding and an enabler for partnerships, where DRISI will be a central player.
- It has the potential to be a perfect promotional and showcasing tool, enabling live, as opposed to PowerPoint, demonstrations.

WHAT IS THE PROGRESS TO DATE?

Significant progress has been made with van instrumentation and HD mapping software. The instrumentation focused on testing the camera, which was set up for real-time video streaming and geotagging. A reliable solution using high-end stereo cameras with USB streaming and onboard tagging was identified, tested, and fully installed in the van. Final hardware specs are pending.

The mapping software now overlays detected objects on the map and accurately identifies work zone elements. Development continues to expand detection to cones, signs, markings, people, equipment, curbs, parking, vehicle counts, and road conditions. These features support work zone safety, traffic monitoring, curb use, and asset management.