



MAY 2021

Project Title:  
Driver Assistance For Winter  
Maintenance Using GPS

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## Mountain Pass Road Opening (MPRO) Implementation and Training

Build eight new MPRO units to help maintenance crews on three different highways to open snow-covered mountain passes closed for winter.

### WHAT IS THE NEED?

Due to limited usage and difficulties maintaining high mountain pass roadways, California Department of Transportation (Caltrans) allows several of them to close over each winter season. In the spring, Caltrans Maintenance crew must re-open these passes for the traveling public. In heavy snowfall winters, closed mountain pass highways can build up 30 to 40 feet of snow, making it extremely difficult and hazardous to locate and clear the road.

Caltrans has a need to improve the safety and efficiency of mountain pass opening operations. The Advanced Highway Maintenance and Construction Technology Research Center (AHMCT) at University of California (UC), Davis previously developed, tested, and successfully demonstrated a field-ready GPS-based MPRO system in a Caltrans funded research task. The system has been tested over several seasons on both State Route (SR) 108 (Sonora Pass) and SR 120 (Tioga Pass). Caltrans Division of Maintenance has a need to develop more MPRO systems that can be easily transferred between pieces of equipment used during pass opening operations.

### WHAT ARE WE DOING?

Caltrans is working with AHMCT at UC Davis to conduct this task. AHMCT will redesign the MPRO system to include current commercial off-the-shelf (COTS) technology, modifications to enhance system portability, and any needed software revisions for compatibility with an appropriate up-to-date operating system.



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Once the system redesign is complete, AHMCT will produce two of the updated systems for each of the four winter closure locations identified by Caltrans. These sites are District 9, SR108, Sonora Pass eastern slope; District 9, SR120, Tioga Pass; and District 10, SR4, Alpine (two locations each with its own crew). The effort will produce eight systems in total. Additionally, AHMCT will provide training to Caltrans selected staff for ongoing usage, support, and maintenance of the systems.

The primary deliverables for this research are eight MPRO systems based on the new design, staff training, and system documentation.

## WHAT IS OUR GOAL?

The goal of this effort is to provide Caltrans with an efficient and safe way to open the snow-covered mountain passes each spring. To achieve this, the research team will modernize the MPRO system, redesign it for enhanced portability, update the software for compatibility with a new operating system, and provide training to Caltrans staff to support their future operator training and system installation.

## WHAT IS THE BENEFIT?

Caltrans will have a modernized MPRO design that is easy to operate and is portable. This system will provide a safer environment for the maintenance crews responsible for opening these mountain passes and allow for the passes to be opened sooner. Another benefit is a reduction in equipment repair costs caused by hitting guardrail, rocks, or other roadway features hidden by snow.

This research also ensures that Caltrans is using the latest technology to help with snow clearing operations.

## WHAT IS THE PROGRESS TO DATE?

As of July 2021, nine mobile MPRO units were built and tested on State Route 108, Highway 4, and State Route 120. The MPRO software was installed on a tablet with the Android operating system. The researchers had operator training during the Spring 2021 pass opening season and demonstrated the system. The system performed on all three mountain passes. The MPRO was able to give accurate GPS data despite the dense tree coverage on Highway 4. The researchers are now documenting all the research and progress in a draft final report that will be delivered to Caltrans in September 2021. The research team is going to meet with the Division of Maintenance in October 2021 to discuss the future maintenance needs for this system.

For additional information, please contact the Task Manager.