

Maintenance

MAY 2025

Project Title:

Equipment Simulators

Task Number: 4299

Start Date: June 1, 2024

Completion Date: August 31, 2026

Task Manager:

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Heavy Equipment Simulator Training Optimization

This project plans to provide an optimized heavy equipment simulator training for use in Caltrans maintenance.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) is looking to improve the training program it provides to its Maintenance personnel operating heavy equipment. Prior research done under Task ID 3833 has proven that training using heavy equipment simulators is beneficial to Caltrans. Caltrans would benefit from an optimized simulator training program to support training efforts at the Maintenance Equipment Training Academy (META) and in the Districts.

WHAT ARE WE DOING?

In this research, the Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center at the University of California (UC) Davis will conduct human subject research using META's John Deere/CM-Labs simulator and fully immersive Caterpillar simulator with its optional virtual reality glasses. A CM-Labs minimal immersion desktop simulator system will also be used by UC Davis student volunteers to test training routines before being performed by Caltrans trainers on Caltrans premises. The results of the study are expected to allow the quantification of factors such as the training effectiveness ratio. AHMCT will provide training schedules, tasks, and logistics recommendations for Caltrans' Division of Maintenance's training program. The results will be compiled in a final report summarizing the study results and future recommendations.

WHAT IS OUR GOAL?

The goal of this project is to evaluate the effectiveness heavy equipment simulator training and see how best to improve Caltrans' training efforts.



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WHAT IS THE BENEFIT?

The results of this research will lead to a more optimal training program for Caltrans. A well-defined training program will lead to a safer training environment and reduced training costs. This research will also allow Caltrans to estimate return on investment using quantification of factors such as the training effectiveness ratio.

WHAT IS THE PROGRESS TO DATE?

Kick-off meeting was held on August 1, 2024. Project panel meetings were held on September 11, 2024, and on November 1, 2024. Contractor observed META's Advanced training held at Yuba City on August 8, 2024, and August 29, 2024. Contractor procured and set up the CM-Labs desktop simulator at UC Davis campus for easy-access to volunteers. Contractor is working with the instructor of UC Davis's Field Equipment Operation class (ABT 049) to conduct human subject research on student volunteers. Contractor is observing the ABT 049 class during Fall Quarter to determine what exercises can be correlated to Caltrans training exercises.

A 3-month no-cost time extension was approved, extending the project timeline until August 31, 2026. Project panel meetings were held on November 1, December 5 and December 18, 2024. Training on the desktop simulator was held by CM-Labs on November 7, 2024. Contractor reviewed simulator exercises comparable to Caltrans trainings. Contractor observed ABT 049 class and discussed ways to test volunteer student skills with class instructor and teaching assistants.

Project panel meetings were held on February 19 and March 19, 2025. Contractor assisted Caltrans META instructors on 3-day simulator training pilot.

Contractor analyzed collected Caltrans training data to improve future data collection process. Contractor is actively recruiting student volunteers for human subject research.