DRISI

Caltrans Division of Research, Innovation and System Information

# Research Notes

## Evaluation of Commercial Forward-Looking Infrared Driver Assistance Technology for use in Emergency Tow Trucks and Snowplows

This research will evaluate Commercial Off the Shelf (COTS) Infrared (IR) Advanced Driver Assistance Systems (ADAS) for operation of Caltrans fleet in low-visibility conditions.

Maintenance

JUNE 2022

Project Title:
Evaluation of Commercial Forward-Looking Infrared Driver Assistance Technology for use in Emergency Tow Trucks and Snowplows

Task Number: 4128

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Completion Date: November 30, 2024

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### WHAT IS THE NEED?

The California Department of Transportation (Caltrans) Division of Maintenance needs to operate tow trucks and snowplows in extreme weather and low-visibility conditions to ensure that bridges and roads remain open. Dense fog, snow, and heavy rain conditions are prevalent in many parts of the state. Such low-visibility conditions create challenging environments for Caltrans emergency tow trucks and impede their timely and effective response to collisions, and their ability to open the roadways. Timely clearance of collision scenes and disabled vehicles also reduces the likelihood of additional collisions.

Caltrans needs ADAS that will improve the safety and efficiency of emergency tow truck and snowplow operations. This will enable Caltrans to operate appropriately outfitted machinery under low-visibility conditions by providing operators with warning systems and the ability to observe and avoid obstacles.

### WHAT ARE WE DOING?

Advanced Highway Maintenance & Construction Technology (AHMCT) will evaluate commercial off-the-shelf forward-looking IR-ADAS for use in emergency tow trucks and snowplows that primarily operate respectively in District 3 (South Lake Tahoe area) in snow and District 4 (Bay area) in fog, where both areas feature low-visibility weather conditions (e.g., at night, in dense fog or smoke, rain and snow).

The proposed research will initially focus on understanding the principles of operation of commercially available IR-ADAS technologies. This will enable researchers to understand the

pros and cons of each approach and hence, will make AHMCT better equipped in selecting the right technologies for the applications of interest. AHMCT will communicate with the corresponding companies to better understand their terms of use, costs, guarantees, requirements, complexities, and legal issues associated with incorporation of their systems into the Caltrans tow truck and snowplow fleet. This will be followed by selection of top systems (depending on the associated costs) for procurement and evaluation.

The evaluation component of the proposed research will include two phases:

1. Evaluation under safely controlled conditions: In this phase we will evaluate ADAS system performance under low visibility and including pre-selected obstacles e.g., moving objects, humans, vehicles, etc.
2. Evaluation in uncontrolled conditions: In this phase, the vehicle will be driven in low visibility conditions along various routes of interest (within Districts 3 and 4) and normal obstacles that happen to be encountered (naturally) will be the subjects of our evaluation.

## WHAT IS OUR GOAL?

The goal of this research is to deploy and evaluate COTS IR camera-based collision avoidance technology and driver assistance systems on tow trucks and snowplows under low-visibility conditions.

## WHAT IS THE BENEFIT?

Clearing traffic collisions quickly, would reduce congestion and the risk of secondary collisions. Similarly, snowplows need to clear roads regardless of visibility conditions under extreme weather conditions. IR-ADAS and obstacle detection systems can potentially enable early detection and identification of pedestrians, animals, bicyclists, vehicles, and other obstacles that have a thermal signature in poor visibility conditions such as dark rural highways, fog, and snowfall. This will improve the safety of the traveling public and reduce their hazards and exposure. It will also improve Caltrans operator safety and effectiveness.

## WHAT IS THE PROGRESS TO DATE?

A focused group meeting was held on June 13, 2022 with AHMCT researchers and the customer to further discuss the scope of research for this task. The final scope of work for this task is still being developed with the customer and the researchers. Once the proposal is completed and approved by the customer, a start work order will be initiated. For more information, please contact the task manager.