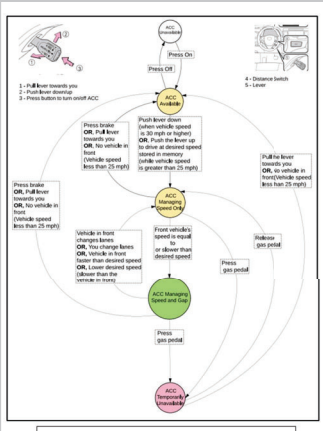
Research Summary

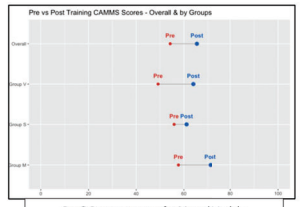
Impact of Advanced Driver Assistance Systems (ADAS) on Road Safety and Implications for Education, Licensing, Registration, and Enforcement

Research Need

Drivers can misunderstand functionalities of complex ADAS functions, and over-attribute capability to such vehicle systems. This can increase potential for misuse thus affecting driver behavior and transportation safety. There exists a critical gap in our understanding of the potential impacts of the deployment and proliferation of ADAS in vehicles.



State Diagram visualization of ACC



Pre & Post-test scores for Mental Models

UMass Amherst Driving Simulator

Goals/Objectives

This study aims at better understanding the impact of ADAS technologies on driver safety. Detailed objectives include:

• Conduct a literature and market review of the current state of commercially-available ADAS technologies, including driver monitoring systems as applicable, to document manufacturers' offerings, and develop an understanding of the distribution of ADAS-equipped motor vehicles in the State via RMV vehicle registration data.

• Examine drivers' knowledge of ADAS systems, types of driver errors associated with the use of ADAS, and potential for ADAS misuse. Study the impact of drivers' knowledge of ADAS on its use/misuse.

• Develop and evaluate mitigation approaches to improve drivers' understanding of ADAS technologies and the roles and respo nsibilities of the driver.

Methodology

The methods for this project include:

- systematic review of scientific literature and trade reports and ADAS deployment by vehicle manufacturers.
- Analysis of distribution of ADAS equipped systems in MA via Registry of Motor Vehicle data.
- Development and deployment of survey to examine drivers' knowledge, use, perception, and attitudes towards vehicle ADAS.
- Design, and development of training approach to accelerate drivers' understanding of ADAS.
- Evaluation of training using human subjects in an experimental context using driving simulation.

Key Findings

The research proposes a methodology for assessing deployment of ADAS in vehicles, and makes recommendations data gathering.

An important finding is that drivers of new vehicles with ADAS are not supported in their understanding of the technology, with many drivers experimenting with systems during driving. The research also shows that targeted training results in improved understanding of these technologies among drivers.

Use of Findings

There are two important ways that the findings can be used. First, it is critical to understand deployment of ADAS in the commonwealth for epidimiological and crash dataset purposes. This research underlines the complexity and burden of trying to gather this data. This finding thus spotlights a critical need to ease data collection about ADAS systems in vehicles, potentially at the registration level. Driver/Dealer volunteered information during vehicle registration can ease and expedite this.

Second, the research shows that targeted training improves drivers' understanding of these systems, with some indication of improved safety behaviors as well. This can be translated to driver training efforts at various levels, including at driver ed programs, and using 'train the trainer' approaches. This also will srve to improve awareness about novel advanced vehicle technologies among law enforcement and first responders.

The next logical & critical step of this research is to examine the impact of training on specific demographics (teens, fleet operators, senior drivers), and to further refine the training and position it within the driver education curriculum framework in Massachusetts.

Research and Technology Transfer Section
MassDOT Office of Transportation Planning
Planning.Research@dot.state.ma.us

Project Information

This project was completed as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

Principal Investigators:
Anuj K. Pradhan
Performing Organization:
UMass Amherst
Project Champion:
Daniel A. Sullivan
Project Start Date:
Jun 1, 2021
Project Completion Date:
March 31, 2022
MassDOT Research Project Number:
22-027
Key Words:
Automation, Human Factors, Driver safety

massDOT
Massachusetts Department of Transportation