Project Title

State of the Practice of Crash Reporting in the US and Implications for CAV Safety Assessment

University

Utah State University

Principal Investigators

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Research Needs

Connected and autonomous vehicles (CAVs) are becoming increasingly prevalent in the US, with most new vehicles having some form of Automated Driving System (ADS) or Advanced Driver Assistance Systems (ADAS). In this proposal, CAV refers to connected vehicles, autonomous vehicles, connected-autonomous vehicles, and vehicles with ADS or ADAS. There has been significant research into the possible safety impacts of these vehicles and technologies, most coming to the conclusion that safety will improve. However, most of these studies rely on driving data, simulations, models, or surrogate safety data, which make large-scale application and assessment of current safety implications difficult for state and local transportation agencies. Even in states on the forefront of autonomous vehicle development and testing, such as Utah, there are no mechanisms in crash reporting procedures for documenting CAV-related crashes.

In the USDOT Roundtable on Data for Automated Vehicle Safety, there was discussion of crash reports as high-value data for assessing automated vehicle safety features and performance [1]. One potential solution offered was the standardization of reports across states and the incorporation of ADS usage in those reports. The need for developed reporting procedures for crashes involving ADS was also mentioned in NHTSA's "Automated Driving Systems 2.0: A Vision for Safety" in 2017 [2]. This need was reiterated in the "Automated Vehicles 4.0: Ensuring American Leadership in Automated Vehicle Technologies" [3]. As of this proposal, one of the most recent USDOT publications regarding AVs, "Automated Vehicles Comprehensive Plan," does not explicitly mention crash reporting guidance [4], though two of its objectives are to "provide guidance to industry to encourage transparency and adoption of best practices" and "explore new approaches to safety assurance and investigate innovative models and tools to evaluate the safety of ADS technology." Though CAV technology is quickly progressing and increasing in commercial availability, there is still little to no explicit federal guidance on standardization of crash reporting.

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At the state level, there is significant variability in preparedness for CAVs. While the number of states with enacted legislation regarding CAVs has increased in recent years, there is little to no consistency. Figure 1 shows that there are still a number of states that have yet to enact any legislation on this matter.
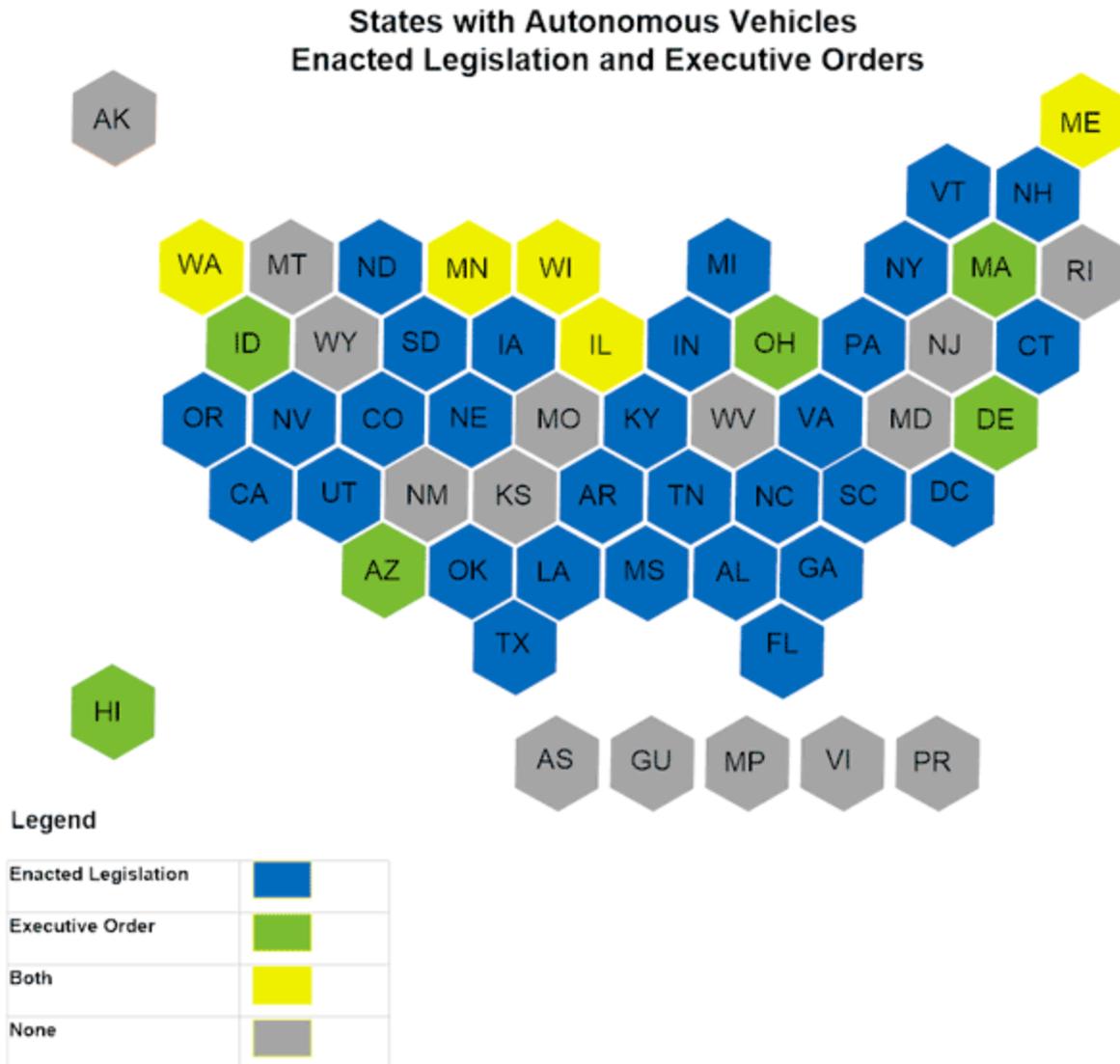

States with Autonomous Vehicles Enacted Legislation and Executive Orders

Legend

Enacted Legislation	🟦
Executive Order	🟩
Both	🟨
None	⬜

Figure 1. *States with autonomous vehicles enacted legislation and executive orders, as of February 2020 [5]*

Further, of the over eighty pieces of legislation across the US, only seven explicitly cover crash reporting of CAV-involved crashes. The list below summarizes the state legislation concerning CAV crash reporting [5]:

- Iowa SF 302-2019: "In the event of an accident in which a system-equipped vehicle is involved, the vehicle shall remain at the scene of the accident and the vehicle's owner or a person on behalf of the vehicle's owner shall promptly report the accident to law enforcement authorities."
- Nebraska LB 989-2018: "The bill also clarifies responsibilities in the event of a crash or collision: (1) The automated-driving-system-equipped vehicle shall remain on the scene of the crash or collision and the owner of the automated-driving-system-equipped vehicle, if capable, or a person on behalf of the automated-driving-system-equipped vehicle owner, shall report any crash or collision."
- Nevada AB 69-2017: "Requires the reporting of any crashes to the department of motor vehicles within 10 days if the crash results in personal injury or property damage greater than $750."
- Oregon HB 4063-2018: "The proposed legislation shall be consistent with federal law and guidelines and shall address the following issues: (A) Licensing and registration; (B) Law enforcement and accident reporting; (C) Cybersecurity; and (D) Insurance and liability."
- Tennessee SB 151-2017: "Modifies laws related to unattended motor vehicles, child passenger restraint systems, seat belts, and crash reporting in order to address ADS-operated vehicles."
- Utah HB 101-2019: "Requires the owner or a person on behalf of the owner to report the accident, and the vehicle to remain on the scene. If the owner is not on board, he must communicate certain information related to the vehicle, the ADS, and the insurance to the persons involved or a peace officer."
- Vermont SB-149-2019: "Operators and testers must comply with NHTSA's standards relating to the testing of automated vehicles and report to the Agency of Transportation any motor vehicle crash within 72 hours."

There is a national consensus on the need for CAV crash data and that updated and standardized crash reporting is important for robust assessment of CAV safety. However, there are clear gaps in guidance and significant inconsistencies in a crash-reporting process that is normally handled state-by-state.

Research Objectives

The overall purpose of this project is to assess the state of the practice of crash reporting in the US in the context of CAVs. The proposed project will accomplish the following objectives:

1. Conduct a comprehensive review of current crash reporting practices.
2. Conduct a review of current guidance and definitions regarding CAV safety and reporting at state, federal, and industry levels.
3. Compile a list/summary of best practices, definitions, challenges, and knowledge gaps and identify possible recommendations for state agencies regarding CAV crash reporting.

Research Methods

In the proposed research, an extensive literature review will be conducted on the topics of crash reporting, CAV safety assessment, and CAV legislation. Additionally, a review of publicly accessible crash reporting procedures and forms will be conducted on a state-by-state basis. In particular, researchers will be looking for previously acknowledged or assessed challenges and best practices, as well as assessing what data is already being collected with crash reporting.

The results of the review will inform the structure and scope of interviews with transportation agency personnel. Researchers expect the interviews could include agencies with little to no public-facing crash reporting information, agencies that are already collecting some CAV data via crash reporting, and agencies that are known to be forward-thinking in the area of CAVs. Possible topics to be covered in the interviews may include:

- Further details regarding the agency's crash reporting procedures and forms
- Experiences with quality and accuracy of collected crash data
- Experiences with changing crash reporting procedures (i.e., challenges, best practices)
- Agency definitions and terminology
- Expectations of future changes to crash reporting
- Current and expected agency (or state) policies and activities regarding CAVs

Most likely, these interviews will not fall under the umbrella of "human subject research" and thus will not require Institutional Review Board (IRB) approval. However, if this project is approved, the researchers will conduct the necessary steps with the Utah State University IRB to confirm.

The literature review, crash reporting review, and interview results will be analyzed both qualitatively and quantitatively as appropriate. Some potential analyses may include:

- Compilation and summarization of previous CAV safety assessment methods, with a focus on performance measures and scope
- Statistical and/or graphical analyses of current crash reporting, particularly the number of fields on crash reporting forms, consistency/variation in terminology used, and frequency of different types of data that are collected
- Statistical analysis or summarization, as appropriate, of interview responses

A final report will include the methodology and results of the reviews, interviews, and analyses. In addition to the final report, additional products may be developed by the researchers as appropriate based on the results. Some potential deliverables may include brochures/white papers with concise information on different topics for reference by practitioners or recorded webinars that present the project results.

Furthermore, this project would run concurrently with a project proposed to the Utah Department of Transportation titled "Investigation of Existing Utah Crash Data to Estimate ADAS-related Crash Rates." The results of this UDOT project would contribute to this proposed project. In particular, the researchers expect that the in-depth review of Utah crash data and reports in the context of CAVs will help inform the results of this proposed project.

Expected Outcomes

This project is expected to provide an overview of current crash reporting practices and guidelines for accommodating CAVs in the crash reporting process. One expected finding is that the vast majority of states do not have any formal capabilities of recording CAV-involved crashes. In particular, the researchers anticipate determining both commonly and uncommonly collected data in crash reports, including their general quality and accuracy as reported by transportation officials. This information will be used to inform guidance for future changes to crash reporting in the context of CAVs. Furthermore, by providing guidance to transportation agencies on best practices, common industry definitions, and any other relevant information found through the course of this project, an anticipated impact is the improvement of CAV-crash reporting and subsequent CAV safety assessments. The project final report will include clear guidance and recommendations for reference by practitioners.

Relevance to Strategic Goals

The proposed project contributes to the U.S. Department of Transportation (USDOT) strategic goal of Safety, as identified by the FAST Act. The findings of this project will improve crash reporting across the US and thus improve safety analyses, particularly in the context of CAVs. Safety is a primary goal of not only the USDOT but all state and local transportation agencies. This new technology presents significant uncertainty with respect to safety and the improvement of reporting and assessment will influence future policies and safety regulations.

Educational Benefits

Two graduate students will be involved in the research. Through the project activities, the graduate students will learn more about current practices and procedures of transportation agencies and establish connections with transportation practitioners throughout the US via the interviews. The results of the project may be incorporated into USU's Transportation Data and Safety course and Traffic Operations Analysis course as appropriate.

Technology Transfer

Research results will be disseminated through publication in peer-reviewed professional journals and presentations at state and national meetings and conferences. Research results will also be incorporated into relevant education, training, outreach, and workforce development activities. All data collected from the research project will be stored in a repository such that the information will be easily retrievable by researchers in academic, public, and private sectors. There has already been a stated interest from UDOT regarding the use of this data.

Work Plan

The proposed project will be carried out over a 12-month period under the following timeline:

Task	Duration	Completion Date*
Literature Review We will conduct a comprehensive literature review on crash reporting, CAV safety assessment, and CAV legislation. This task will also include confirmation with IRB that the interviews would not qualify as human subject research.	2 months	2
Crash Reporting Review We will conduct a review of publicly accessible crash reporting procedures and forms on a state-by-state basis.	2 months	4
Agency Interviews We will develop and conduct interviews with relevant agency personnel based on the results of the Literature Review and Crash Reporting Review.	3 months	7
Compilation and Analysis We will compile the information collected from the reviews and interviews into relevant categories for reference. Quantitative and qualitative analyses of the information will be conducted as appropriate. Assessments and recommendations will be developed.	3 months	9
Development of Deliverables The reviews and interview findings, compilations, and assessments/recommendations will be written in the final report. Any other deliverables that were developed through the course of the project will be finalized.	2 months	12

* Months after start of project

Project Cost

Total Project Costs: $160,000
MPC Funds Requested: $ 80,000
Matching Funds: $ 80,000
Source of Matching Funds: Utah State University – $70,910
                               Utah Department of Transportation – $9,090

References

[1] US Department of Transportation, "Roundtable on Data for Automated Vehicle Safety: Summary Report," US Department of Transportation, Washington, DC, 2018.

[2] National Highway Traffic Safety Administration, "Automated Driving Systems 2.0: A Vision for Safety," US Department of Transportation, Washington, DC, 2017.

[3] National Science & Technology Council, US Department of Transportation, "Automated Vehicles 4.0: Ensuring American LEadership in Automated Vehicle Technologies," US Department of Transportation, Washington, DC, 2020.

[4] US Department of Transportation, "Automates Vehiclles Comprehensive Plan," US Department of Transportation, Washington, DC, 2021.

[5] National Conference of State Legislatures, "Autonomous Vehicles: Self-Driving Vehicles Enacted Legislation," 18 February 2020. [Online]. Available: https://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx [Accessed 29 March 2021].