



Report to Congress

This report describes the status of current research and rulemakings related to the safe deployment of new automated vehicle technology that may improve safety outcomes and incorporate novel vehicle designs that improve mobility and access for all.

AUTOMATED VEHICLES

Automated Vehicles

The Joint Explanatory Statement accompanying the Fiscal Year 2023 (FY23) Consolidated Appropriations Act, 2023 (H.R. 2617; Pub. L. 117-328), enacted on December 29, 2022,¹ requests the National Highway Traffic Safety Administration (NHTSA) to provide a status report of current research and rulemakings related to automated vehicles.² Specifically, as noted in the Joint Explanatory Statement accompanying the Act,³ NHTSA is requested “to submit a report within 90 days of enactment of this act on the status of current research and rulemakings related to the safe deployment of new automated vehicles (AV) technology that may improve safety outcomes, and incorporate novel vehicle designs that improve mobility and access for all.”

Introduction

Safety is the U.S. Department of Transportation’s (DOT) and NHTSA’s top priority. On January 27, 2022, the DOT announced its comprehensive National Roadway Safety Strategy⁴ for addressing the national crisis in roadway fatalities and serious injuries. Later that year, the DOT also released its Innovation Principles⁵ that emphasize investment in purpose-driven research and innovation to meet the challenges of the present and modernize a transportation system of the future. This document provides the status of NHTSA’s ongoing innovative research and rulemaking activities related to the safe deployment of new AV technology as requested in the Joint Explanatory Statement accompanying the FY 23 Consolidated Appropriations Act.

NHTSA develops annual research plans and budgets as part of a broader coordinated planning effort within the Department and as required by Congress. These annual plans are published as Annual Modal Research Plans (AMRPs),⁶ which are mandated in Sec. 6501 of the Fixing America’s Surface Transportation Act.⁷ AMRPs are developed each year to describe upcoming plans for agency safety research, including descriptions of research program areas, consistent with those described in annual budget requests contained in the President’s budget. AMRPs and annual budget requests are closely coordinated between NHTSA program offices, the Office of the Secretary of Transportation, and other operating administrations within DOT including: Office of the Assistant Secretary for Research & Technology— including their Intelligent Transportation Systems Joint Program Office and Highly Automated Systems Safety (HASS) Center of Excellence— Office of the Assistant Secretary for Transportation Policy, Office of the Chief Financial Officer and Assistant

¹ <https://www.congress.gov/bill/117th-congress/house-bill/2617>.

² Throughout this report, NHTSA uses the term Automated Driving System (ADS) as defined in SAE International (SAE) J3016, “Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems,” April 2021. A vehicle equipped with a SAE driving automation Level 4-5 ADS is also commonly referred to as an Automated Vehicle (AV). This report does not consider vehicle technologies that can be classified as SAE driving automation Levels 0-2, which are types of advanced driver assistance systems.

³ <https://www.congress.gov/117/crec/2022/12/20/168/198/CREC-2022-12-20-pt3-PgS9325-2.pdf>.

⁴ [USDOT National Roadway Safety Strategy](#).

⁵ [USDOT Innovation Principles](#).

⁶ <https://www.transportation.gov/administrations/assistant-secretary-research-and-technology/rdt-annual-modal-research-plans>.

⁷ [Fixing America’s Surface Transportation Act](#).

Secretary for Budget and Programs, Federal Highway Administration, Federal Motor Carrier Safety Administration, Federal Transit Administration, Federal Railroad Administration, Pipeline and Hazardous Materials Safety Administration, Federal Aviation Administration, Maritime Administration, and Great Lakes St. Lawrence Seaway.

Among the vehicle safety research programs described in recent AMRPs are the Automated Driving Systems (ADS) and Vehicle Electronics and Cybersecurity programs. Many of the research projects in these programs focus on SAE International (SAE) driving automation Levels 3-5 or ADS.

Aligned with the research program descriptions included in the AMRP documents, the following are the main categories of ADS research program areas:

1. System Safety Performance
2. Component & Subsystem Testing and Functional Safety
3. Crashworthiness and Alternative Cabin Design
4. Human Factors/Accessibility Considerations
5. FMVSS Conformance Research
6. Cybersecurity

ADS Research Overview

NHTSA's ADS research portfolio aims to advance the body of knowledge on ADS-equipped vehicle safety, their real-world performance, and equitable accessibility.

NHTSA's research plan aims to explore the technical challenges associated with the safe testing and eventual deployment of ADS-equipped vehicles. ADS-equipped vehicles are vehicles for which there may be no human driver, or for which the human driver can give up driving control to the ADS and is not expected to perform any driving-related tasks while the ADS is engaged. NHTSA's ADS research considers many types of vehicles, including passenger vehicles; light-, medium-, and heavy-duty trucks and buses; low-speed shuttles; and non-occupied delivery vehicles.

NHTSA coordinates its ADS research planning with broader efforts across the Department. The objectives, priorities, and strategic direction reflected in the following ADS research programs are aligned with the DOT's strategic goals⁸ and have been established through extensive engagement with stakeholders. In addition, several multimodal working groups routinely share ADS and related information across DOT. Likewise, NHTSA regularly collaborates with industry and other stakeholders through several mechanisms, including jointly conducted public workshops and summits and through the identification and development of industry-led standards. NHTSA also holds public meetings to inform the public about its ongoing research as well as planned activities, and to hear from stakeholder communities on emerging ADS research needs.⁹ NHTSA utilizes several approaches to disseminate research results to the public. This includes (but is not limited

⁸ [FY 2022-26 U.S. DOT Strategic Plan](#).

⁹ [NHTSA Safety Research Portfolio Public Meeting: Fall 2022](#).

to) technical reports published both on the agency's website and the National Transportation Library's Repository & Open Science Access Portal (ROSA-P),¹⁰ information shared during public meetings, conference presentations, and associated published conference proceedings.

The following sections describe the current ADS research areas with respect to these systems' potential to improve safety outcomes and incorporate novel vehicle designs that improve mobility and access for all.

Current Status of NHTSA's ADS Research

1. System Safety Performance

NHTSA conducts research to better understand the capabilities and limitations of ADS-equipped vehicles with respect to their safe operation. Vehicles equipped with ADS remain predominantly in the development and testing phase across several use-cases, including ride-hailing, transit, interstate freight, and local delivery, with limited deployments. The ADS safety performance research program explores methods, metrics, and tools for assessing the safety of ADS-equipped vehicles as a complete system. Research focuses on advancing multiple assessment methods, including simulation, test track, and on-road evaluations. The research also includes working with industry standards development organizations in establishing a common language for describing ADS test cases, and objective methods for selecting specific scenarios to efficiently test ADS performance or attributes of interest within the varying capabilities and limitations of a given use case. NHTSA's current system safety performance research consists of the following tracks:

- Test Scenario Taxonomy - NHTSA leverages and contributes to the research completed by various industry stakeholders in developing methods to describe driving scenarios in a commonly understandable format. NHTSA also collaborates with stakeholders and conducts new research to help define sample use-cases and scenarios that may be relevant to evaluating the safety performance of ADS-equipped vehicles having varying capabilities and feature sets.
- Metrics - NHTSA explores metrics that could support system-level assessment of how an ADS-equipped vehicle performs in various driving situations, complies with traffic laws, and avoids crashes. NHTSA conducts research independently and with industry collaboration to identify and evaluate various candidate driving performance indicators and assess their relationship to crash risk levels and/or safety outcomes.
- Test Methods and Tools - NHTSA's research includes the advancement of multiple assessment tools and methods, including simulation, closed course track testing, and on-road testing. Additional research is focused on evaluating the application of analytical methods that leverage operational data (or results) from various testing venues to develop safety performance metrics.

¹⁰ <https://rosap.ntl.bts.gov>.

- Simulation – NHTSA conducts research to understand how simulations are used to augment the performance assessment of the broad diversity of ADS use-cases. While simulation approaches have long been part of technology development processes to overcome the practical and safety challenges of exhaustively testing a full range of conditions in live, full-scale environments (i.e., vehicle-level on-road or test-track), their validity highly depends on the simulation model integrity. Accordingly, simulation may be the best option for some types of testing, while for others it may not even be an option. NHTSA is currently researching the feasibility of defining a reference simulation framework considering integrity expectations for simulation tools as well as scientific methods for scenario selection and coverage that could augment test track and on-road testing for ADS performance assessment.
- Test Track - Testing of ADS-equipped vehicles in a closed-course environment offers the opportunity for highly repeatable and objective performance evaluation of the full system under realistic, controlled conditions. However, there are inherent challenges associated with testing an Operational Design Domain¹¹ (ODD)-limited ADS-equipped vehicle in a test track that is not included in their ODD. Further, they need to be exposed to complex scenarios that entail the precise control of many actors around the tested vehicle. NHTSA’s research focuses on developing efficient methods for orchestrating complex, multi-actor maneuvers while allowing for selected parameters and test options to be varied in a scientific manner. NHTSA’s research scope includes the reliable testing of a variety of nominal and crash-imminent scenarios and this testing’s contribution to the validation of simulation models and their results.
- On-Road – Vehicles equipped with ADSs are developed to operate only within the specific geographical and other (light, weather, etc.) limitations of their ODD. Consequently, it may not be possible to independently assess the safety performance of an ADS outside of its ODD. As a result, NHTSA is researching the development of ground truth trip recorder tools that can be installed on an ADS-equipped vehicle. Such a system would record the surround view data with its own independent perception stack to identify scenarios and ADS behaviors of interest that are encountered during public on-road driving. The ground truth trip recorder is separate from the ADS itself and would not interfere with any aspects of the ADS functionality.
- Data Collection Methods - NHTSA is also researching other data elements and associated metrics that could be used to assess ADS operational safety performance in crashes, near-misses, other safety relevant events (e.g., system failure, ODD exit, etc.) and during nominal driving. NHTSA is also researching candidate operational approaches for collection and retention of the data (e.g., onboard storage, telemetry, etc.).

¹¹ “Operational Design Domain” refers to operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics. (SAE J3016 APR2021)

- ADS Testing Frameworks - NHTSA performs applied research on testing frameworks that synthesize methods and tools that may enable driving performance assessment of ADS-equipped vehicles. NHTSA exercises frameworks with an open-source ADS test vehicle to “test the tests” in nominal driving scenarios, during potential edge-cases, and in crash avoidance circumstances. Test method implementations consider various publicly proposed approaches, that often synthesize simulation, closed track, mixed mode testing on a closed track with simulated targets, and on-road performance monitoring.
- Operational Safety and Preventative Maintenance - As ADS capabilities mature, commercial deployments are expected to expand, particularly in fleet-operated mobility-as-a-service use cases. While some ADS manufacturers may own and operate their commercial fleets, others may sell their vehicles or partner with companies that specialize in transportation services and fleet operations. NHTSA is researching, in collaboration with FMCSA, the role fleet operators may play in maintaining ADS safety during operations as well as exploring possible risks related to ADS and ADS-equipped vehicle component maintenance and long-term reliability.

2. Component & Subsystem Testing and Functional Safety

NHTSA is researching the performance, reliability characteristics, and failure modes of ADS components and subsystems as a means of establishing a more complete understanding of the safety considerations within the emerging ADS-equipped vehicle use-cases through their design, development, and deployment stages. The functional architecture of a generic Automated Driving System (ADS) is often discussed in terms of three subsystems: perception, decision/path planning, and execution. It is also generally believed that understanding the performance characteristics of each subsystem could enhance confidence for the overall safety performance. NHTSA’s current component & subsystem research consists of the following tracks:

- Sensors and Perception - NHTSA is researching methods for characterizing the independent subsystem performance of ADS sensors and perception systems. Sensor specifications are generally based on standardized tests designed to minimize noise in what could be considered best-case conditions with ideal targets. However, this may not provide a good indication of the performance in the driving environment.
- Artificial Intelligence (AI) and Machine Learning (ML) Techniques - NHTSA is examining the use of AI and ML techniques in various stages of system development, tuning, testing, and deployment to review common practices, identify potential definitions, and understand current and planned usage in the ADS-equipped vehicle’s intended product lifecycle. These techniques are frequently used to develop a perception system’s object detection and classification functionality as well as the ADS decision strategy and path planning.
- Maneuver Execution - NHTSA has initiated research to develop methods for characterizing the maneuver execution subsystem capabilities (i.e., vehicle control actions of braking, throttle, and steering) and the ability of the ADS-equipped

vehicle to accurately follow path-planning instructions from the ADS's decision support system.

- **High-Definition Mapping** - NHTSA is researching industry uses of high-definition maps in ADS safety assessment. HD maps are often used by ADS developers to create a ground truth understanding of their operating environment. They are used as part of localization, perception and path planning processes.
- **Localization Methods** - NHTSA has initiated a project to develop test methods to characterize the capabilities of ADS-equipped vehicle localization systems, designed to establish the vehicle's precise location on the roadway relative to static points of reference included in HD maps.

NHTSA's functional safety research deals with safety risk management associated with potential failures in sensors, components, systems, and software implementation, as well as operator errors and environmental changes. NHTSA's current research applies functional safety¹² and safety of the intended functionality (SOTIF) processes¹³ to a generic remote operation (teleoperation) concept for an SAE driving automation Level 4 ADS-equipped vehicle. ADS developers may incorporate teleoperation in their operational strategy in case the system cannot adequately respond in a particular scenario and transition into a safe state. The project considers the entire system (e.g., communication components of the vehicle, communication network, remote operation station, etc.) comprehensively as the subject of the analysis.

3. Crashworthiness and Alternative Cabin Design

Vehicle crash mechanics are not expected to be directly affected by the driving automation system itself. However, without the need for a human to operate a vehicle manually, occupant crash safety must now consider alternative seating positions, as ADS-equipped vehicle occupants could adopt a wider range of seating postures and orientations with respect to the vehicle's travel direction. For example, increased seat recline angles could be anticipated. Vehicles equipped with ADSs may also incorporate novel occupant compartment designs and occupant restraint systems. Changes in occupant seating and restraint systems will likely affect the injury mechanisms and risk factors.

NHTSA's ongoing research investigates changes to occupant safety in ADS-equipped vehicles by generating biomechanical data for various-size occupants in forward and rear facing seating configurations, in both upright and reclined postures; evaluating existing

¹² As dynamic driving tasks are transferred from the human driver to the ADS, driving functions such as sensing, recognition, decision making, and vehicle control actions (e.g., brake, throttle, and steering) are effectively performed by a collection of integrated hardware and software subsystems and components of the ADS. The design of subsystems and components to both reduce risk of critical system failures (that impact safety) to reasonable levels as well as to recover from or withstand system failures (i.e., fail safe) is known as functional safety.

¹³ Safety of the Intended Functionality (SOTIF) analysis focuses on analyzing safety risk related to as-designed system performance limitations and human interactions with such systems.

Anthropomorphic Test Devices (ATDs or crash test dummies) and Human Body Model biofidelity and response in these seating configurations; and developing improved tools that can be used to measure injury risk associated with novel restraint and seat designs in a wide range of seating configurations. NHTSA's research has led to a refined understanding of human response and injury metrics for alternative seating and crash conditions, and this understanding drove adaptations to ATDs for use in forward- and rear-facing reclined seating configurations. Through these research efforts, NHTSA will develop tools that can represent human occupants in the seating situations that may become more prevalent in ADS-equipped vehicles.

Additionally, novel configurations of ADS-equipped vehicles have the potential to provide greater access to mobility for people with disabilities, if designed to do so. NHTSA is conducting research to support current and future vehicle safety improvements, such as evaluating test methods for near side impact crashes involving occupants seated in wheelchairs and automated securement systems.

Finally, types of ADS-equipped vehicles that are intended for delivery only and are not designed for human occupancy may present new challenges with respect to crash compatibility with existing vehicles, road users, and roadside hardware. NHTSA continues to research this field to develop best practices.

4. Human Factors / Accessibility Considerations

ADS-equipped vehicles may provide mobility options not previously afforded to people with physical, sensory, and/or cognitive disabilities, if purposely designed to do so. NHTSA is conducting human factors research to better understand mobility and the information needs of people with varying disabilities riding in ADS-equipped vehicles and how such information can be implemented effectively with a human-machine interface to establish necessary situation awareness.

Several research questions stem from potential seating preference changes in future vehicle designs (enabled by ADS) as many of NHTSA's FMVSS focus on particular seating positions and thus, changes in seating preferences could impact the safety protections provided by those FMVSS. Hence, NHTSA is studying how seating preference may change in future ADS-equipped vehicle designs. NHTSA is also researching how existing telltales, indicators, controls, and warnings may apply to ADS-equipped vehicles with SAE driving automation Level 4-5 features, particularly where occupants may be positioned in various seating configurations.

Additionally, some entities may choose to use a remote operator, also referred to as a teleoperator, to guide or control the motions of an ADS-equipped vehicle manually under certain circumstances. In shared mobility applications, there could be vehicle occupants in these vehicles who are unfamiliar with the system and any next steps that may follow. This research explores human factors concepts to support remote intervention strategies. The research seeks to identify different methods of remote operation; identify relevant design factors for each method; and assess how the method of operation and design may impact how remote human assistants may intervene and how vehicle occupants may be affected.

ADS-equipped vehicles and, particularly, those without a human fallback driver present may change or influence the behavior of pedestrians, bicyclists, passengers, and other humans sharing the roadway. NHTSA conducts research to understand human behavior in response to automation and the new challenges such interaction may bring.

Finally, ADS-equipped vehicles may be utilized for the transportation of children. NHTSA is researching child-specific safety considerations in ADS-equipped vehicles, including child restraint system installation and usage in unconventional seats or seating configurations. NHTSA is also researching safety and operational considerations for ADS-equipped vehicles with unattended children as passengers. Separately, NHTSA is investigating sensor systems with the ability to detect unattended children and prevent heat stroke occurrence, which could be integrated into traditional or ADS-equipped vehicles.

5. Federal Motor Vehicle Safety Standard (FMVSS) Conformance Research

The absence of a need for human drivers in mature ADS-equipped vehicles creates opportunities for vehicle manufacturers to design new vehicle architectures that may remove driving controls, change seating configurations, and consider new interfaces for passengers. Existing methods of compliance demonstration with FMVSSs often specify human drivers or driver controls and may be challenging to be applied to such unconventional vehicle designs. NHTSA conducted a comprehensive review of the FMVSSs to identify language in the standards and associated compliance test procedures that may conflict with architectures, designs, and features of SAE driving automation Level 4 ADS-dedicated vehicles (ADS-DV). The regulatory text of each relevant standard was reviewed, industry stakeholder input was sought, and methods were developed that may help translate regulatory requirements to accommodate unconventional configurations.

Additionally, NHTSA's research looked at such translations to support interpretations regarding how the performance requirements of FMVSS would continue to apply to ADS-DVs, while additional language describing new methods to test ADS-DVs could help determine compliance to the safety performance objectives of those FMVSS.

6. Cybersecurity

Cybersecurity challenges and concerns may not be unique to emerging/future ADS-equipped vehicles. In fact, cybersecurity is already a major consideration for modern vehicles, particularly those that include many sub-systems similar to those which may be present for ADS-equipped vehicles, such as perception systems, wireless connectivity to off-board systems, and lower driving automation level vehicle control systems (e.g., automatic emergency braking). While the broader vehicle cybersecurity knowledge is applicable to all systems within the full driving automation spectrum, NHTSA continues to research whether higher levels of driving automation may introduce unique cybersecurity challenges in finding, mitigating, and managing cybersecurity risks that may not be addressed by contemporary approaches and, if so, what new tools and methods may be necessary to appropriately mitigate such risks in deployed units. That said, NHTSA's research efforts will continue to emphasize the importance of partnering with broader stakeholder groups to implement the cybersecurity best practices at each manufacturer and developer, and across all vehicle types, including on those equipped with ADS, to

address potential safety risks to the public. NHTSA released its latest iteration of these best practices in September 2022.¹⁴ Additionally, NHTSA is supporting workforce development opportunities to train and develop more professionals in the field of motor vehicle cybersecurity. For example, in collaboration with the Automotive Information Sharing and Analysis Center (Auto-ISAC), NHTSA is finishing its pilot test of a training curriculum for vehicle cybersecurity professionals with technical staff from the members of Auto-ISAC, and other interested public members to tune and finalize a cybersecurity training program tailored to the automotive industry.^{15,16}

Status of NHTSA's Current ADS Rulemakings

NHTSA is establishing the Office of Automation Safety in 2023 by consolidating several ongoing efforts within NHTSA's Office of Rulemaking. The Office of Automation Safety will develop and manage exemptions and develop and establish regulations and safety standards related to motor vehicles equipped with ADS. Centralizing resources into one office will increase the effectiveness, coordination and efficiency of developing exemptions and safety standards for motor vehicles equipped with ADS.

The following provides a status of NHTSA's current ADS rulemaking as reflected in the Fall 2022 Unified Agenda of Regulatory and Deregulatory Actions.¹⁷

1. Facilitating New Automated Driving System Vehicle Designs for Crash Avoidance Testing (RIN 2127-AM00) - Through an Advanced Notice of Proposed Rulemaking (ANPRM), NHTSA previously sought comment on crash avoidance test procedures to facilitate the safe introduction and certification of new ADS-equipped vehicle designs. NHTSA is assessing what requirements may be necessary to maintain (or exceed) existing levels of safety while enabling innovative vehicle designs and removing or modifying those requirements that would no longer be appropriate if a human driver will not be operating the vehicle. NHTSA is currently analyzing comments received on the ANPRM and considering the next steps.
2. Framework for ADS Safety (RIN 2127-AM15) - This ANPRM requested comment on the development of a framework to objectively define, assess, and manage ADS safety performance while ensuring the needed flexibility to enable further innovation. NHTSA is currently analyzing comments and considering next steps.
3. Considerations for Telltales, Indicators, and Warnings in Vehicles Equipped with ADS (RIN 2127-AM07) - This upcoming ANPRM notice would seek comments on amending the FMVSS to address the applicability and appropriateness of safety messaging (telltales, indicators, and warnings) in new vehicle designs without conventional driver controls. NHTSA is currently developing the ANPRM.

¹⁴ [Cybersecurity Best Practices for the Safety of Modern Vehicles. September 2022.](#)

¹⁵ [Automotive Cybersecurity Training — Automotive ISAC](#)

¹⁶ [Vehicle Cybersecurity Training Curriculum Pilot Testing | NHTSA](#)

¹⁷ [Fall 2022 Unified Agenda of Regulatory and Deregulatory Actions. January 2023.](#)

Appendix –Published NHTSA Research Reports and Rulemaking Notices Concerning ADS

Published Research

System Safety Performance

- [Advanced Test Tools for ADAS and ADS](#)
- [A Framework for Automated Driving System Testable Cases and Scenarios](#)
- [Review of Simulation Frameworks and Standards Related to Driving Scenarios](#)
- [An Approach for the Selection and Description of Elements Used to Define Driving Scenarios](#)

Component & Subsystem Testing and Functional Safety

- [Safety of the Intended Functionality of Lane-Centering and Lane-Changing Maneuvers of a Generic Level 3 Highway Chauffeur System](#)
- [Foundations of Automotive Software](#)

Crashworthiness ADS Research

- [Biomechanical Responses and Injury Assessment of Post Mortem Human Subjects in Various Rear-facing Seating Configurations](#)
- [Head Trajectories of Post Mortem Human Surrogates in Moderate-Speed Rear Impacts](#)
- [Rear-Seat Frontal Crash Protection Research with Application to Vehicles with Automated Driving Systems](#)
- [Occupant Safety in Vehicles Equipped with Automated Driving Systems, Part 1: Initial Evaluation of Usability, Stability, and Injury Prediction Capabilities](#)
- [Occupant Safety in Vehicles Equipped with Automated Driving Systems, Part 2: Crash Safety Considerations for Out-of-Position Occupant Posture in Vehicles with Automated Driving Systems - Field Data Investigation](#)
- [Occupant Safety in Vehicles Equipped with Automated Driving Systems, Part 3: Biofidelity Evaluation of GHBMCM50-OS Against Laboratory Sled Tests](#)
- [Crash Simulations Between Non-Occupied Automated Driving Systems and Roadside Hardware](#)

Human Factors ADS Research

- [Automated Driving Systems' Communication of Intent with Shared Road Users](#)
- [Development of an Automated Wheelchair Tiedown Restraint System](#)

Federal Motor Vehicle Safety Standard (FMVSS) Conformance Research

- [Final Report - FMVSS Considerations for Vehicles with Automated Driving Systems: Volume 1](#)
- [Final Report - FMVSS Considerations for Vehicles with Automated Driving Systems: Volume 2](#)

Cybersecurity

- [Cybersecurity Best Practices for the Safety of Modern Vehicles 2022](#)
- [Cybersecurity of Firmware Updates](#)

Published Rulemaking Notices

- [Occupant Protection for Automated Driving Systems Final Rule](#)
- [Framework for Automated Driving Systems Safety ANPRM](#)
- [Facilitating New Automated Driving System Vehicle Designs for Crash Avoidance Testing ANPRM](#)