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National highway traffic safety administration autonomous vehicles

NHTSA demonstrates its dedication to saving lives on our nation’s roads and highways through its approach to the safe development, testing, and deployment of new and advanced vehicle technologies that have enormous potential for improving safety and mobility for all Americans. NHTSA supports the Safe System Approach, a data-driven, holistic, and equitable method to roadway safety that fully integrates the needs of all users. As part of this approach, vehicle safety technologies offer unique opportunities to reduce traffic deaths, injuries, and harm. In 2021, NHTSA issued a Standing General Order that requires manufacturers and operators of automated driving systems and SAE Level 2 advanced driver assistance systems equipped vehicles to report crashes to the agency. In 2020, NHTSA launched Automated Vehicle Transparency and Engagement for Safe Testing. As part of the AV TEST initiative, states and companies can voluntarily submit information about testing of automated driving systems to NHTSA, and the public can view the information using NHTSA’s interactive tool. In September 2016, NHTSA and the U.S. Department of Transportation issued the Federal Automated Vehicles Policy, which sets forth a proactive approach to providing safety assurance and facilitating innovation. Building on that policy and incorporating feedback received through public comments, stakeholder meetings, and Congressional hearings the agency issued Automated Driving Systems: A Vision for Safety. Skip to main content NHTSA’s mission is to save lives, prevent injuries, and reduce the economic costs of roadway crashes through education, research, safety standards and enforcement activity. Advanced vehicle technologies hold the promise not only to change the way we drive but to save lives. The continuing evolution of automotive technology aims to deliver even greater safety benefits than earlier technologies. One day, automated driving systems, which some refer to as automated vehicles, may be able to handle the whole task of driving when we don’t want to or can’t do it ourselves. NHTSA demonstrates its dedication to saving lives on our nation’s roads and highways through its approach to the safe development, testing, and deployment of new and advanced vehicle technologies that have enormous potential for improving safety and mobility for all Americans. Learn More AV 4.0, announced at CES in January 2020, builds upon Preparing for the Future of Transportation: Automated Vehicles 3.0 (AV 3.0) by expanding the scope to 38 relevant United States Government (USG) components which have direct or tangential equities in safe development and integration of AV technologies. AV 4.0 is structured around three key areas: USG AV principles, administration efforts supporting AV technology growth and leadership, and USG activities and opportunities for collaboration. AV 4.0 seeks to ensure a consistent USG approach to AV technologies, and to detail the authorities, research, and investments being made across the USG so that the United States can continue to lead AV technology research, development, and integration. Guidance On October 4, 2018, the Department of Transportation released new Federal guidance for automated vehicles – Automated Vehicles 3.0: Preparing for the Future of Transportation 3.0. This builds upon DOT’s 2.0: A Vision for Safety and provides guidance for states to consider for the training and licensing of test drivers. It also offers guidance for testing entities to consider driver engagement methods during testing. Additionally, NHTSA announced the ADS pilot, a preliminary step that seeks public comment on a national pilot research program to help safely test and deploy ADS-equipped vehicles. This collaboration could help aid the research and development of safety standards for advanced vehicle safety technologies. AV 3.0 offers our nation a plan to guide the development of exciting new technologies. As we embrace technological advances in motor vehicle transportation, safety must remain the top priority. Together, we can encourage new technologies that improve safety without hampering innovation. NHTSA reports across a number of topics addressing new vehicle technologies. See and download some recent NHTSA reports a Published Reports and Documents. Guidance U.S. DOT and NHTSA analyzed Federal Register docket (NHTSA-2016-0090) comments, public meeting proceedings and other stakeholder discussions, recent Congressional hearings, and state activities, and used this analysis as the foundation for improvements and refinements to develop NHTSA’s new voluntary guidance – Automated Driving Systems 2.0: A Vision for Safety. The new guidance is clearer, more streamlined, less burdensome and contains additional, more helpful information for states. The length of this guidance is significantly reduced from 2016’s Federal Automated Vehicles Policy and focuses on two sections: Section I: Voluntary Guidance for Automated Driving Systems; and Section II: Technical Assistance to States, Best Practices for Legislatures Regarding Automated Driving Systems. The following provides a brief comparison of the new Voluntary Guidance and the FAVP. This section provided guidance for manufacturers, developers, and other entities outlining a 15-point “Safety Assessment” for the safe design, development, testing and deployment of highly automated vehicles (HAVs). Revised and streamlined to emphasize the voluntary nature of the guidelines-no compliance requirement or enforcement mechanism. Focuses on the New Operating Guidance on Level 3 and above automated driving systems (ADS). Makes clear that assessments are not subject to Federal approval; no waiting period or delay to begin testing or deployment. Does not impose any new barriers or reporting requirements. Revises priority safety elements focus on the 12 aspects that are ready for implementation in the near term. Elements involving privacy, ethical considerations, registration, and the sharing of data beyond crash data remain important and are areas for further discussion and research. This section presented a distinction between Federal and state responsibilities for regulation of HAVs, and suggested recommended policy areas for states to consider with a goal of generating a consistent national framework for the testing and deployment of HAVs. Replaced with Best Practices for State Legislation: Clarifies and delineates Federal and state roles, strongly encouraging states not to codify into statute any portion of the Guidance. Provides best practices for legislatures, incorporating common safety-related components and significant elements regarding ADS that states should consider incorporating in legislation. Includes a new resource, limits the number of best practices and other suggested considerations, based on implementation resources developed by our roadway safety partners. Encourages public disclosure of Voluntary Safety Self-Assessments. This section outlined DOT’s current regulatory tools that can be used to accelerate the safe development of HAVs, such as interpreting current rules to allow for greater flexibility in design and providing limited exemptions to allow for testing of nontraditional vehicle designs in a more timely fashion. Included as a separate resource on NHTSA’s website with Information and Instructions for Requesting NHTSA Regulatory Activity. This section identified potential new regulatory tools and statutory authorities that may aid the safe and efficient deployment of new lifesaving technologies. Replaced with the Department’s governance approach to removing barriers to ADS and maintaining NHTSA’s self-certification and defect and recall authorities. Find the Voluntary Safety Self-Assessment (VSSA) template here, as well as a continuously updated index of VSSAs. The Federal Automated Vehicles Policy (FAVP) released in September 2016 is being replaced with new Voluntary Guidance to industry and States regarding automated driving systems (ADS). This Voluntary Guidance improves, streamlines and clarifies areas of concern that were raised by stakeholders in response to the FAVP. The policy creates a less burdensome, flexible framework that allows companies to innovate first, focusing on performance based outcomes to improve safety and mobility, instead of focusing their resources on passing bureaucratic hurdles. The new policy serves as NHTSA’s current operating guidance for Automated Driving Systems (ADS), SAE Automation Levels 3-5. Changes within the new Voluntary Guidance include: removing Level 2 systems; focusing data sharing initiatives on crash reconstruction; clarifying the safety elements NHTSA must consider, and voluntary safety self-assessment submissions. To be clear, NHTSA still retains full defect, recall, and enforcement authority over these vehicles. In the wake of the Federal Automated Vehicles Policy, States began to propose and pass legislation concerning Automated Driving Systems. In light of this and comments NHTSA received, certain elements were removed that were speculative in nature and outside of NHTSA’s authorities pertaining to privacy, registration and certification, and ethical considerations. These are important areas for further discussion and research, but it would be premature to include those considerations in this document. The changes to the State section include the addition of legislative principles to assist States considering legislation regarding ADS, and a focus and clarification of the assistance NHTSA offers highway safety offices within States. Lastly, to support manufacturers and other entities requesting regulatory action from NHTSA, the agency is offering a separate, instructional document, Understanding NHTSA’s Regulatory Tools: Instructions, Practical Guidance, and Assistance for Entities Seeking to Employ NHTSA’s Regulatory Tools at www.nhtsa.gov/laws-regulations. This work lays the groundwork for the Department to launch FAVP 3.0 which will more broadly address the surface transportation road network and leverage efforts of other modal administrations to include: Federal Highways Administration, the Federal Motor Carrier Safety Administration and the Federal Transit Administration in addition to the National Highway Traffic Safety Administration. The Department has begun working on a coordinated, comprehensive plan to actively encourage innovation, enable safe deployment of automated vehicles of all kinds and to enable an efficient transportation network over the coming years. The Voluntary Guidance is applicable to any motor vehicle or motor vehicle equipment operating on public roadways including, but not limited to, low-speed vehicles, motorcycles, passenger vehicles, medium-duty vehicles, and heavy-duty vehicles – large trucks and buses. The Voluntary Guidance focuses on vehicles that incorporate SAE Automation Levels 3 through 5 ADS. ADS may include systems for which there is no human driver, or for which the human driver can give control to the ADS and would not be expected to perform any driving-related tasks for a period-of-time. Various stakeholders commented that some of the safety elements outlined in the FAVP were not applicable to SAE L2 systems and thus recommended NHTSA remove SAE L2 systems from the FAVP. In addition, many SAE L2 systems are already providing safety benefits on the road today, such as lane departure warnings and parking assistance. For these reasons, the Voluntary Guidance and its associated safety elements are focused on systems in which the system takes over full control of the vehicle including monitoring of the environment or SAE Levels 3-5. However, parts of the Voluntary Guidance could be applied to any level of automation and NHTSA recommends companies use them for safe testing and development. Various stakeholders requested the adoption of a universal taxonomy by NHTSA and the industry at large for automation to ensure consistent terms and definitions are used for consumer education, legislative efforts, or otherwise. In an effort to maintain consistency with the SAE Industry standard SAE J3016, the Voluntary Guidance replaces the term “automated vehicles” with “automated driving technologies” and “highly automated vehicles (HAVs)” with “automated driving systems (ADS).” The Federal Motor Carrier Safety Administration (FMCSA), is the lead Federal Agency responsible for regulating and providing operational safety oversight (e.g., hours of service, drug and alcohol, hazardous materials, vehicle inspections) for commercial motor vehicles (CMVs) – trucks and buses. FMCSA partners with industry, safety advocates, and state and local governments to keep our nation’s roadways safe and improve CMV safety through regulation, education, enforcement, research, and technology. Currently, FMCSA is developing a Highly Automated Commercial Vehicle (HACV) Initiative roadmap that will structure how the agency approaches the unique challenge of automated vehicle technologies on commercial vehicles, their regulated community, and commercial drivers. It will also develop demonstrations of HACVs. Click here for additional information (PDF, 210 KB). The Federal Transit Administration (FTA) provides financial and technical assistance to local public transit systems, including buses, subways, light rail, commuter rail, trolleys, and ferries. FTA also oversees safety measures and helps develop next-generation technology research. FTA is pursuing policy initiatives and research planning activities surrounded automated bus transit vehicles. Click here for additional information. The Federal Highway Administration (FHWA) supports State and local governments in the design, construction, and maintenance of the Nation’s highway system (Federal Aid Highway Program) and various federally and tribal owned lands (Federal Lands Highway Program). Through financial and technical assistance to State and local governments, FHWA is responsible for ensuring that America’s roads and highways continue to be among the safest and most technologically sound in the world. Currently, FHWA is developing a Vision Statement, which looks at how automated vehicle technologies may interact with current infrastructure and affect future infrastructure planning. Click here for additional information. ADS bring high potential for increased safety benefits, which will ultimately result in fewer traffic related deaths. As a result, NHTSA created guidance that is voluntary in nature that will support the fast-paced environment of ADS. There is no compliance requirement so States should not codify (i.e., incorporate into State statutes) as legal requirements any phase of development, testing, or deployment. DOT strongly encourages States to allow NHTSA alone to regulate the safety and performance aspects of automated driving technologies. Instead, the Voluntary Guidance establishes a set of best practices that companies can use and are encouraged to consider (in addition to or instead of their own processes) to help develop safe automated driving technologies. The safety elements are believed by experts across the industry to be critical safety elements to incorporate into the design, testing, and deployment of automated driving technologies, but the voluntary guidance recognizes and emphasizes the voluntary aspect and elective nature in following it. However, all industry entities entering the space are subject to NHTSA’s defects, recall, and enforcement authority in accordance with NHTSA Enforcement Guidance Bulletin 2016-02: Safety-Related Defects and Automated Safety Technologies. The Voluntary Guidance is comprised of 12 safety elements following consensus from various experts across the industry as generally being associated with the more significant issues to consider and apply, as automated driving systems (ADS) are used on public roadways. As applicable, for each safety element, entities are encouraged to consider and document their use of industry standards, best practices, company policies, or other methods they have employed to safeguard that their systems will be safe under real-world conditions. System Safety Operational Design Domain (ODD) Object and Event Detection and Response (OEDR) Fall Back (Minimal Risk Condition) Validation Methods Human Machine Interface (HMI) Vehicle Cybersecurity Crashworthiness Post-Crash ADS Behavior Data Recording Consumer Education and Training Federal, State, and Local Laws The shared learning among automated driving technologies is paramount. However, there are significant concerns amongst the industry with the sharing of proprietary intellectual property information. There is also concern that there is a lack of clarity and consensus regarding new safety metrics. On the flip side, there is widespread support for the collection of uniform data for crash reconstruction. NHTSA’s current focus is on data recording needed for crash reconstruction, but the Agency encourages the industry to voluntarily collaborate on data sharing and appropriate new safety metric development. Not all data is equal and future data sharing efforts need to be clear what sort of data is being shared and by whom and for what. To this end, NHTSA will seek and support collaborative opportunities with all parties of interest to distinguish safety data from that used for other purposes. While ADS have the potential to provide enormous safety, convenience and other important benefits to consumers, stakeholders frequently raise privacy concerns as a potential impediment to deployment. Nevertheless, privacy is not directly relevant to motor vehicle safety and, generally, it is the Federal Trade Commission (FTC) and not the U.S. Department of Transportation or NHTSA that is charged with protecting consumer privacy. Most testing of ADS involves vehicles operated by professional test drivers and owned by commercial entities, neither of which have the same kind of privacy interests as private individuals. However, the evolution and deployment of these systems will involve private citizens who are likely to view some of the significant amount of vehicle data generated and used by automated driving systems as sensitive and personal (for example, precise real time geolocation data and, when drivers connect their mobile phones to a vehicle’s computer system, the contents of any resulting driver communications). For this reason, NHTSA believes that privacy considerations are critical to consumer acceptance of ADS and should be taken into account throughout the design, testing and deployment process. As noted above, the FTC is the chief Federal Agency charged with protecting consumers’ privacy and personal information. Despite rapid changes in technology across numerous sectors, the FTC’s overall approach to privacy has remained consistent. The Agency uses law enforcement, policy initiatives, and consumer and business education to ensure that companies live up to their promises to safeguard consumers’ personal information. This gives consumers the confidence to take advantage of the many benefits of the ever-changing marketplace. NHTSA will continue to work closely with the FTC when motor vehicle safety matters have potential consumer privacy implications. For more information, visit www.ftc.gov. NHTSA removed the Registration and certification element in the new Voluntary Guidance given some States are already requiring this for testing purposes. NHTSA wants to ensure its efforts are not duplicative, but complementary. The Agency will explore how we can collaborate with our State partners in this realm. Further, other topics contained in the registration and certification element were already addressed in existing safety elements. Ethical considerations are essential to automated driving technology development. However, currently, there is no consensus around acceptable ethical decision-making given the depth of the element is not yet understood nor are there metrics to evaluate against. NHTSA plans to work with industry, States, and safety advocates to further research the establishment of an industry developed framework for addressing ethical considerations and fostering transparency in automated driving technology decision making. The Agency will also collaborate with industry to develop standard test and simulation scenarios that culminate in an ethical decision. Entities wishing to demonstrate how they considered the Voluntary Guidance for testing and deployment of their ADS can elect to submit a Safety Self-Assessment to NHTSA. The Safety Self-Assessment is intended to demonstrate to the public that NHTSA is: (1) monitoring the safety aspects of ADS; (2) supporting a collaborative relationship between NHTSA and the industry; (3) supporting new entrants as they deploy ADS; (4) encouraging the establishment of industry safety norms for ADS; (5) building public trust and confidence in the safety elements being considered by the industry as ADS are tested and deployed; and, (6) encouraging general knowledge and awareness of industry approaches to safety within the industry, NHTSA, and more broadly in the U.S. Department of Transportation. It also allows companies an opportunity to showcase their particular approach to safety, without needing to reveal proprietary intellectual property. However, entities are not required to submit a Safety Self-Assessment. There is no enforceable requirement to compel entities to submit a voluntary submission before testing or deployment. NHTSA has released a collection of best practices for legislative considerations for State partners, along with information that States can use to support the integration of ADS into State governance activities. The best practices are designed to clarify and delineate the Federal and State roles for the regulation of ADS and lay out a framework that the States may use as they write their laws and regulations surrounding ADS to ensure a consistent, unified national framework. For the collection of best practices, see Section 2 of the new policy: Technical Assistance to States, Best Practices for Legislatures Regarding Automated Driving Systems. States and local governments can proactively evaluate current laws and regulations so as not to unintentionally create barriers to ADS operation (e.g., requirements that a driver have at least one hand on the steering wheel at all times, requirements for State inspections, or even particular licensing requirements). States are encouraged to review and consider draft ADS policies and legislation and work together towards consistency. The goal of State policies need not be uniformity or identical laws and regulations across all States. Rather, the aim should be sufficient consistency of laws and policies to promote innovation and the expeditious widespread integration of ADS. The National Conference of State Legislatures provides centralized information on legislative proposals that in addition to our Technical Assistance to States, Best Practices for Regulatory Activity for Automated Driving Systems can be found at www.ncsl.org/research/transportation/autonomous-vehicles-legislative-database.aspx. States and local governments are also encouraged to work together to standardize and maintain road infrastructure including signs, traffic signals and lights, and pavement markings. This will support the safe operation of ADS and ensure the safety of human drivers, who will continue to operate vehicles on the roads for years to come. The Voluntary Safety Self-Assessment is a summary of information that entities may disclose to the public regarding how they have considered the safety elements detailed in Section I: Voluntary Guidance for ADS. NHTSA does not require submission of the Voluntary Safety Self-Assessment. Section II: Technical Assistance to States offers the idea of a safety and compliance plan. The plan is an additional tool States could consider if there is an application process for testing and deployment of ADS on public roads. Based on stakeholder discussions, the types of information contained in a plan could include a description of how an entity intends to assure public safety in such areas as test driver training, capabilities of the ADS, compliance with applicable State laws and regulations, and intended areas of ADS operation. The descriptions would include summary information, not confidential business information. Public Listening Session On Automated Driving Systems 2.0: A Vision for Safety November 6, 2017

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