



U.S. DEPARTMENT OF TRANSPORTATION AUTOMATED DRIVING SYSTEM GUIDANCE

In September 2017, the U.S. Department of Transportation (DOT), through the National Highway Traffic Safety Administration (NHTSA), issued updated guidance for entities engaged in the design and manufacture of autonomous vehicles and associated technologies. The guidance, entitled “Automated Driving Systems 2.0: A Vision for Safety,” replaces the Federal Automated Vehicle Policy released in 2016 and outlines 12 voluntary safety design elements for entities to consider when developing, testing, and deploying Automated Driving Systems (ADSs) on public roadways. As the guidance is not mandatory, there are no compliance requirements or enforcement mechanisms.

SAFETY ELEMENTS

1. SYSTEM SAFETY

NHTSA encourages entities to use robust processes, relying on best practices and standards, to design ADSs free of unreasonable safety risks.

2. OPERATIONAL DESIGN DOMAIN (ODD)

For each ADS incorporated into the vehicle, entities are encouraged to define the ODD, including the operating parameters for roadway types, geographic area, speed range, environmental conditions, and any other domain constraints.

NHTSA CONSIDERATIONS AND RECOMMENDATIONS

- Adopt guidance from established and accredited standards-developing organizations relevant to ADSs
- Consider standards and processes available in analogous industries (e.g., aviation, space, military)
- Incorporate hazard analysis and safety risk assessments into overall design process
- Use the ODD to define where and when the ADS is designed to operate
- Develop mechanisms for the vehicle to transition to a minimal risk condition when operating outside the ODD or conditions dramatically change

SAFETY ELEMENTS

3. OBJECT AND EVENT DETECTION AND RESPONSE (OEDR)

Entities are encouraged to document processes to confirm adequate OEDR system for their ADSs, which is necessary to ensure that automatic vehicles can detect and respond to common driving circumstances.

4. FALLBACK (MINIMUM RISK CONDITION)

When the ODD cannot operate safely, entities are encouraged to have a document process for transitioning from ADS to a condition with minimal risk.

5. VALIDATION METHODS

Entities are encouraged to develop validation methods to appropriately mitigate safety risks of their ADS approach.

6. HUMAN MACHINE INTERFACE

Entities are encouraged to consider how (and when) human occupants may need to interact with the ADS and to ensure driver readiness to do so.

7. VEHICLE CYBERSECURITY

To protect ADSs from intrusions and disruption, entities are encouraged to incorporate cybersecurity into the design of ADSs, including ongoing safety risk assessments for each ADS, the overall vehicle design into which ADS is incorporated, and the broader transportation ecosystem.

NHTSA CONSIDERATIONS AND RECOMMENDATIONS

- Configure OEDR to be able to respond to a variety of traffic conditions the vehicle is likely to encounter given the ODD
- Address pre-crash scenarios as part of the OEDR

- Design fallback options that allow for a human to assume operation of the vehicle or for the vehicle to obtain a minimal risk condition without driver intervention

- Validation tests should demonstrate how the ADS performs during normal operation, during crash avoidance, and during fallback strategies

- Consider the role of the human driver, occupants, and external actors the ADS will need to interact with
- For driverless vehicles, consider how the ADS status will be monitored at all times

- Follow established best practices for cyber vehicle physical systems
- Incorporate voluntary and best practice guidance
- Document how vehicle cybersecurity considerations are incorporated in ADSs
- Cooperate across the industry to share and report detected vulnerabilities
- Establish robust cyber incident response plans and incorporate cybersecurity into the design process

SAFETY ELEMENTS

8. CRASHWORTHINESS

Entities should consider possible scenarios in which human operated vehicles could collide with ADS-operated vehicles and design appropriate crash safety features.

9. POST-CRASH ADS BEHAVIOR

To return ADS vehicles to a safe state post-crash, entities are encouraged to test and deploy methods that reduce risks, such as shutting off the fuel pump and moving the vehicle to safety.

10. DATA RECORDING

Entities are encouraged to establish a process to collect and store vehicle crash data in accordance with privacy and legal considerations.

11. CONSUMER EDUCATION AND TRAINING

Entities are encouraged to adopt educational and training programs for employees, dealers, and consumers that address the different operating considerations with ADS.

12. FEDERAL, STATE, AND LOCAL LAWS

Entities are encouraged to document intended compliance practices for all applicable Federal, State, and local ADS laws.

NHTSA CONSIDERATIONS AND RECOMMENDATIONS

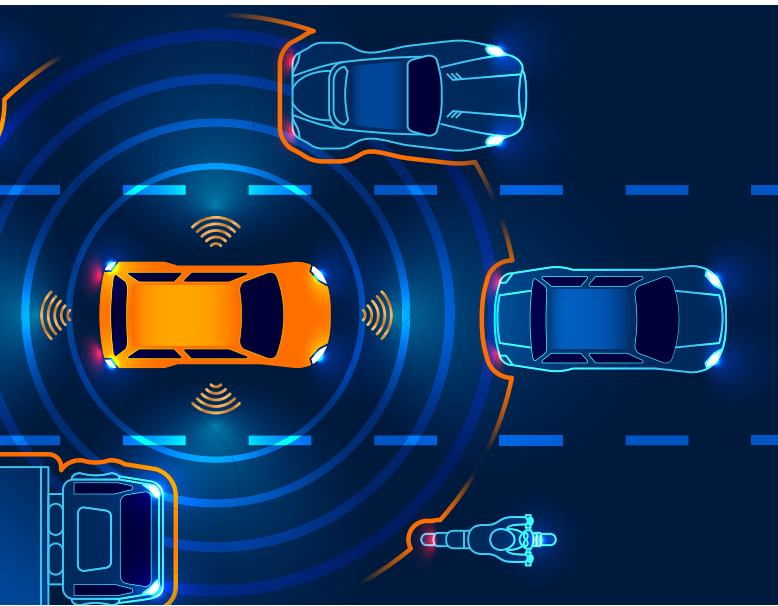
- Design occupant protection systems that function in both traditional and non-traditional seat configurations
- For unoccupied ADS vehicles, provide geometric and energy absorption compatibility with existing vehicles

- Consider collecting and relaying relevant crash data to a central location (e.g., collision notification center)
- Make documentation of the crash and impacted ADSs available to vehicle repair facilities

- Adopt voluntary data recording guidance, best practices, design principles, and standards issued by accredited standards organizations
- Record, at a minimum, all data relevant to the crash to enable crash reconstruction

- Ensure staff, including marketing and sales, understand the technology and can educate dealers and consumers

- Design ADSs to account for all applicable traffic laws when operating in automated mode
- Develop processes to update and adapt ADSs to account for new laws and regulations



RELATIONSHIP BETWEEN FEDERAL AND STATE REGULATIONS

States are strongly encouraged not to incorporate the safety guidance into State statutes. The DOT believes leaving NHTSA to regulate the safety and design of ADSs avoids conflicting Federal and State laws and regulations. To facilitate the division in regulatory jurisdiction, NHTSA recommends State legislatures:

1. Provide technology neutral environments
2. Provide licensing and registration procedures
3. Provide reporting and communication methods for Public Safety Officials
4. Review traffic laws and regulations that may serve as barriers to operation of ADSs

DOCUMENTATION AND SELF ASSESSMENTS

For nearly all of the safety elements, NHTSA recommends that entities thoroughly document processes for designing, implementing, and testing the safety elements. Where applicable, NHTSA also encourages entities to document design decisions based on analyses of safety risk and testing data.

In addition to documenting internal processes as part of ADS development, NHTSA also encourages entities to conduct a voluntary self-assessment of how they address the safety elements. The assessment can be based on industry best practices, an entity's own best practices, or other appropriate method, and entities are encouraged to make these assessments publically available. However, there is no mandatory requirement for entities to submit or make public such an assessment.



For additional information, contact Honigman's Autonomous Vehicle Group Leaders

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