

THE REGULATORY ROAD FOR AUTONOMOUS VEHICLES: ABSENCE OF FEDERAL LAW HAMPERS U.S. DEVELOPMENT

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EXECUTIVE SUMMARY

Although there is currently no comprehensive federal regulation of autonomous vehicles, thoughtful and flexible federal regulation is needed to foster innovation and maximize safety in the United States. The absence of federal guidance has created a patchwork of regulations among the states. Autonomous vehicle (AV) manufacturers and autonomous technology developers are actively participating in states with moderate regulation, such as Arizona and Florida, supporting the proposition that reasonable regulation will not hinder innovation. In fact, such regulation is *needed* to provide more certainty to potential investors and encourage every state to join the new “passenger economy.” To that end, both the United States House of Representatives and the United States Senate have introduced bipartisan legislation that would regulate the passenger car AV industry, which is discussed below.

FEDERAL REGULATION OF AUTONOMOUS VEHICLES

THE EXECUTIVE BRANCH

The National Highway Traffic Safety Administration (NHTSA) is an agency of the U.S. Department of Transportation (DOT) responsible for regulating the safety, design, and performance of motor vehicles and motor vehicle equipment – including autonomous vehicles.¹ NHTSA, by issuing Federal Motor Vehicle Safety Standards (FMVSS), establishes standards for automobile manufacturers.²

In October 2018, NHTSA released its guidance [*Preparing for the Future of Transportation: Automated Vehicles 3.0 \(AV 3.0\)*](#). The guidance was intended to update and supplement NHTSA’s earlier guidance released in September 2017, which included [*Automated Driving Systems 2.0: A Vision for Safety*](#) and itself replaced the [*2016 Federal Automated Vehicle Policy*](#). Both the 2018 guidance and the 2017 guidance offer a non-regulatory approach to automated vehicle safety focused on providing voluntary guidance for automated driving systems and technical assistance to states.

In *AV 3.0*, DOT signaled its intention to revise federal safety rules that bar from the roads fully self-driving cars without equipment such as steering wheels, pedals, and mirrors. Perhaps more significantly, it addressed for the first time commercial vehicles of all sizes in addition to passenger vehicles. Because of the adverse impact such regulation would have on a huge employment sector, both DOT and the legislature previously had deemed commercial vehicles too contentious to address. In *AV 3.0*, DOT requires that all DOT sub-agencies prepare for and promote vehicle automation in its various modalities.

AV 3.0 calls for the removal of unnecessary barriers to the innovation of AV technologies, asserting that such technology has the potential to vastly enhance security and increase mobility. It also builds upon (but does not replace) DOT’s *Automated Driving Systems 2.0: A Vision for Safety*. In *AV 3.0*, U.S. Transportation Secretary Elaine Chao wrote that automation has the potential to “significantly” reduce traffic crashes and road deaths, but she added, the “public has legitimate concerns about the safety, security, and privacy of automated technology.” Secretary Chao “challenged Silicon Valley and other innovators” to address the concerns.

¹ See U.S. Department of Transportation, *Who We Are*, <https://www.transportation.gov/administrations>.

² See generally National Highway Traffic Safety Administration, *Laws and Regulations*, <https://www.nhtsa.gov/laws-regulations>.

In *AV 3.0*, DOT announced six principles for shaping policy on autonomous vehicles:

1. Prioritize safety;
2. Remain technology neutral;
3. Modernize its regulations to eliminate those that unnecessarily impede development or fail to address critical safety concerns;
4. Encourage a consistent regulatory and operational environment: Regulatory conflicts among federal, state, and local requirements create confusion, introduce barriers, and present compliance challenges;
5. Prepare proactively for automation: DOT will provide guidance, best practices, pilot programs, and “other assistance”; and
6. Protect and enhance freedoms, including preserving conventional human-operated vehicles while expanding access to transportation choices for the disabled and the older population.

Besides revising FMVSS, specific issues that *AV 3.0* addresses include the following:

- Given the novelty and sophistication of AV technologies, new safety standards will focus on performance outcomes rather than dictate the means for achieving those outcomes;
- NHTSA will retain the current certification process – whereby manufacturers self-certify compliance of their products with applicable standards – and be charged with promoting self-certification with international partners;
- NHTSA will seek comment on changes that would streamline and modernize its procedures for processing applications for exemptions from FMVSS, including eliminating delays associated with seeking public comment to exemption applications;
- NHTSA will seek to implement a national pilot program for the testing and development of AV technology (DOT canceled the “Automated Vehicle Provider Grounds” adopted by the Obama administration); and
- In conjunction with the Labor, Commerce, and Health and Human Services departments, DOT will study the workforce impacts of automated vehicles.

As in past iterations of NHTSA guidance, *AV 3.0* highlights the need for cybersecurity and privacy against cyberattacks. DOT encourages a coordinated effort across the government and private sectors for cyber situational awareness and a unified approach to cyber incidents, including the voluntary exchange of information regarding vulnerabilities and threats.

DOT intends to focus its research resources on (a) developing strategies to remove barriers to innovation; (b) evaluating the impacts of AV technology, especially regarding safety; and (c) addressing market failures and other compelling needs, such as access to transportation for the disabled. This report analyzes twelve safety design elements and provides safety goals and approaches to achieve the objectives.³

1. System Safety: NHTSA encourages entities to design autonomous vehicles with the goal of eliminating unreasonable safety risks by conducting a hazard analysis and a safety risk assessment.⁴ The report also mentions considering the transportation ecosystem and designing safety plans for addressing malfunctions.⁵
2. Operational Design Domain: NHTSA encourages entities to document and publish reports on the design domain for autonomous vehicles, including information regarding what roadway types upon which the vehicle is intended to operate safely, geographic area, speed range, and environmental conditions.⁶
3. Object and Event Detection and Response: NHTSA encourages entities to document their assessment, testing, and validation of object and event detection response technologies under both normal and hazardous driving conditions (i.e., control loss, lane change/merge, backing and parking maneuvers).⁷

³ See *AV 2.0*.

⁴ *Id.* at 5.

⁵ *Id.*

⁶ *Id.* at 6.

⁷ *Id.* at 7.

4. Fallback (Minimal Risk Condition): The autonomous vehicle should be capable of detecting when the autonomous driving has failed and enable the driver to regain control of the vehicle – recognizing that humans may be inattentive, under the influence of alcohol or other substances, drowsy, or otherwise impaired.⁸
5. Validation Methods: Entities are encouraged to develop strategies to validate their technology and mitigate safety risks through simulation, track testing, and on-road testing.⁹
6. Human Machine Interface: At a minimum, the vehicle should be capable of informing the human operator that the vehicle is functioning properly, currently in automatic mode, currently unavailable for use, malfunctioning, or request a transition of controls.¹⁰
7. Vehicle Cybersecurity: Entities are encouraged to develop robust systems to protect against cybersecurity threats and vulnerabilities.¹¹
8. Crashworthiness: Entities are encouraged to consider how to best protect vehicle occupants in the case of a crash, including seating and interior configurations, as well as occupants of various ages and sizes.¹²
9. Post-Crash Automated Driving System Behavior: Entities should create methods of returning autonomous vehicles to a safe state after crashes, including actions like shutting off the fuel pump, removing motive power, and discharging electrical power.¹³
10. Data Recording: There is currently no standardized system for collecting data related to autonomous vehicle accidents, but entities are encouraged to collect and share data related to malfunctions, degradations, and failures.¹⁴ Vehicles should be designed to record crash data so that the circumstances around the accident can be reconstructed and studied.¹⁵
11. Consumer Education and Training: Entities are encouraged to develop, document, and maintain employee, dealer, distributor, and consumer education and training programs to address the anticipated differences in the use and operation of autonomous vehicles from those of the conventional vehicles that the public owns and operates today.¹⁶
12. Federal, State, and Local Laws: Entities are encouraged to document their compliance plans for all applicable federal, state, and local laws.¹⁷

AV 3.0 builds on previous guidance, *A Vision for Safety*, which also addresses the different responsibilities of NHTSA relative to the states.¹⁸

1. NHTSA's Responsibilities
 - a. Setting FMVSS for new motor vehicles and motor vehicle equipment (with which manufacturers must certify compliance before they sell their vehicles)
 - b. Enforcing compliance with FMVSS
 - c. Investigating and managing the recall and remedy of noncompliance and safety-related motor vehicle defects nationwide
 - d. Communicating with and educating the public about motor vehicle safety issues

⁸ *Id.* at 8.

⁹ *Id.* at 9.

¹⁰ *Id.* at 10.

¹¹ *Id.* at 11.

¹² *Id.* at 12.

¹³ *Id.* at 13.

¹⁴ *Id.* at 14.

¹⁵ *Id.*

¹⁶ *Id.* at 15.

¹⁷ *Id.* at 15.

¹⁸ *Id.* at 20.

2. States' Responsibilities

- a. Licensing human drivers and registering motor vehicles in their jurisdictions
- b. Enacting and enforcing traffic laws and regulations
- c. Conducting safety inspections, where states choose to do so
- d. Regulating motor vehicle insurance and liability

Code of Federal Regulations (CFR)

Title 49, Subtitle B, Chapter V of the Code of Federal Regulations addresses regulations related to transportation generally. For example, 49 CFR § 571.3 defines a driver as “the occupant of a motor vehicle seated immediately behind the steering control system.” But some autonomous vehicles are designed to operate without a driver behind the steering control system. On February 4, 2016, NHTSA – in response to a letter from Google – reinterpreted “driver” to mean “whatever (as opposed to whoever) is doing the driving.”¹⁹

Petitions for Rulemaking

On January 11, 2018, General Motors petitioned NHTSA for an exemption from 16 FMVSS for an autonomous vehicle.²⁰ The petition requested an exemption on an either/both basis: (1) that it would make easier the development or field evaluation of a new motor vehicle safety feature providing a level of safety at least equal to that of the standard; and (2) that it would make the development or field evaluation of a low-emission vehicle easier without unreasonably lowering the safety performance of the vehicle.²¹ As of August 1, 2018, NHTSA is still “evaluating the petition for completeness.”²²

THE LEGISLATIVE BRANCH

H.R. 3388: SELF DRIVE Act

On September 6, 2017, the United States House of Representatives passed the Safely Ensuring Lives Future Deployment and Research in Vehicle Evolution Act (SELF DRIVE Act).²³ This bill encourages the testing and deployment of autonomous vehicles by preempting states from enacting laws regarding the design, construction, or performance of highly automated vehicles or driving systems.²⁴

S. 1885: AV START Act

On September 28, 2017, Senator Thune (R-SD) introduced the AV START Act.²⁵ This bill would allow federal preemption for autonomous vehicle design and safety.²⁶ Five senators have blocked the bill from being approved by unanimous consent over concerns about the safety of autonomous vehicles.²⁷ As of August 1, 2018, autonomous vehicle experts predict that the AV START bill is unlikely to pass given the other legislative

¹⁹ Undated letter from Paul A. Hemmersbaugh, Chief Counsel of NHTSA, to Chris Urmson, Director of Google’s self-driving car project, <https://isearch.nhtsa.gov/files/Google%20--%20compiled%20response%20to%2012%20Nov%20%2015%20interp%20request%20--%204%20Feb%2016%20final.htm>.

²⁰ Petitions to NHTSA, <https://www.nhtsa.gov/laws-regulations/petitions-nhtsa>.

²¹ *Id.*

²² *Id.*

²³ See The Library of Congress, *H.R.3388-SELF DRIVE Act*, <https://www.congress.gov/bill/115th-congress/house-bill/3388>.

²⁴ *Id.*

²⁵ See The Library of Congress, *S.1885-AV START Act*, <https://www.congress.gov/bill/115th-congress/senate-bill/1885>.

²⁶ *Id.*

²⁷ See, e.g., Eric Kulisch, “Lobbying Push Targets Holdouts on Autonomous Vehicle Bill,” *Automotive News* (Mar. 16, 2018), <http://www.autonews.com/article/20180316/MOBILITY/180319765/lobbying-senate-holdouts-av-start-act>; John McKinnon, “Self-Driving Car Safety Legislation Stalls in the Senate,” *The Wall Street Journal* (Feb. 12, 2018), <https://www.wsj.com/articles/self-driving-car-safety-legislation-stalls-in-the-senate-1518436800>.

priorities and the few working days remaining on the Senate’s calendar,²⁸ but it is possible that the bill could be attached to a larger piece of legislation.²⁹

A LACK OF REGULATION

Heidi King, Deputy Director of NHTSA, stated “[a]t this point the technology is so nascent I don’t think it is appropriate today to regulate this technology.”³⁰ But groups have criticized NHTSA for not doing enough to regulate this burgeoning industry.³¹ NHTSA has been slower to establish regulatory guideposts than agencies like the Food and Drug Administration (FDA) or Federal Aviation Administration (FAA).³²

For reference, the FDA requires drugs to undergo a thorough approval process, including animal testing, applications that include testing results, clinical trials (often with thousands of patients), and facility inspections.³³ From pre-clinical testing to approval, the average drug or device takes 12 years to be approved by the FDA.³⁴ Other holistic studies have estimated the time from initiation of research to FDA approval to be 36 years.³⁵ Further, the costs associated with gaining FDA approval of a new drug is estimated to be more than \$1 billion.³⁶ Because of this meticulous process, the FDA ensures that American consumers benefit from access to “the safest and most advanced pharmaceutical system in the world.”³⁷

NHTSA’s current hands-off approach allows states to respond to the local concerns of residents, manufacturers, and interest groups. While a lack of federal regulation can allow innovation to thrive, this uncertainty can also hinder entities from investing in innovative autonomous technology. Notably, a national manufacturer may hesitate to produce autonomous vehicles today because the vehicles need to have 50 different state laws programmed into them.

Further, a lack of federal regulation can be dangerous; the crash in Tempe, Arizona, may have been prevented if, for example, the vehicle was not programmed to react more slowly to objects that might be “false positives” like plastic bags or if NHTSA regulated testing on public roads.³⁸ Regulators are certainly considering the benefits of autonomous vehicles relative to the costs of our current transportation scheme: In 2016 alone there

²⁸ See Eric Kulisch, “Hopes Fade for Senate Action on Self-Driving Bill,” *Automotive News* (July 8, 2018), <http://www.autonews.com/article/20180708/OEM11/180709784/autonomous-vehicle-legislation-hopes-dim-senate>.

²⁹ See Chris Teale, “US Senate Considers ‘Different Possibilities’ to Pass AV START Act,” *Smart Cities Dive* (June 14, 2018), <https://www.smartcitiesdive.com/news/us-senate-av-start-act-possibilities-passage/525776/>.

³⁰ See Ryan Beene, “Self-Diving Cars Don’t Need Rules Yet, U.S. Regulator Says,” *Bloomberg* (July 12, 2018), <https://www.bloomberg.com/news/articles/2018-07-12/self-driving-cars-don-t-need-rules-yet-u-s-regulator-says>.

³¹ See, e.g., Catherine Chase, et al., “Congress Is Trying to Pass Legislation to Make Self-Driving Cars Safer. It Doesn’t Go Far Enough,” *CNBC* (June 12, 2018), <https://www.cnb.com/2018/06/12/self-driving-car-legislation-in-congress-doesnt-go-far-enough.html>.

³² See Colin Colter, “Technological, Regulatory Innovation Needed to Ensure Safety in Autonomous Vehicle Research,” *Duke Today* (Apr. 9, 2018), <https://today.duke.edu/2018/04/technological-regulatory-innovation-needed-ensure-safety-autonomous-vehicle-research>.

³³ See U.S. Food and Drug Administration, “Learn About Drug and Device Approvals,” <https://www.fda.gov/ForPatients/Approvals/default.htm>.

³⁴ See Gail Van Norman, MD, “Drugs, Devices, and the FDA: Part 1: An Overview of Approval Processes for Drugs,” *JACC: BASIC TO TRANSLATIONAL SCIENCE* (Mar. 10, 2016), <https://www.sciencedirect.com/science/article/pii/S2452302X1600036X>.

³⁵ See Laura McNamee, et al., “Timelines of Translational Science: From Technology Initiation to FDA Approval,” *PLOS ONE* (May 8, 2017), <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0177371#abstracto>.

³⁶ *Id.*

³⁷ See U.S. Food and Drug Administration, “What We Do,” <https://www.fda.gov/aboutfda/whatwedo/>.

³⁸ See Johana Bhuiyan, “Uber’s Self-Driving Software Detected the Pedestrian in the Fatal Arizona Crash But Did Not React in Time,” *Recode* (May 7, 2018), <https://www.recode.net/2018/5/7/17328104/uber-self-driving-crash-arizona-software-elaine-herzberg>.

were 37,461 fatalities from traffic-related accidents.³⁹ Weighing the scale of innovation versus regulation is a difficult task, but with the rapid advancements in autonomous vehicles, a flexible regulatory framework will prove essential.

CROSS-CULTURAL CONSIDERATIONS

Countries across the globe realize that it is only a matter of time before self-driving vehicles take over the roads; however, public perception of a driverless future appears to vary across cultures. In March 2018, global market research and consulting firm Ipsos conducted a study on the global perception of self-driving vehicles. In Asian countries such as India, China, and South Korea, respondents were about twice as likely to be in favor of self-driving cars compared to those from the United States, Germany, and the United Kingdom.⁴⁰ Ipsos researchers also concluded that developed economies are more resistant to driverless cars and that people in developing countries believe that self-driving cars would make life more enjoyable, economical, safer, and friendlier to the environment. For example, 49% of polled people in India described themselves as in favor of self-driving cars and excited to use them, and an additional 46% of respondents in India were “unsure” about self-driving cars but found the idea interesting. Similarly, in China 46% of respondents were in favor and 50% of respondents were unsure but found the idea interesting. Additional countries are depicted here:⁴¹

Country	In favor of self-driving cars and can't wait to use them	Unsure about self-driving cars but find the idea interesting	Against self-driving cars and would never use them
India	49%	46%	5%
China	46%	50%	5%
South Korea	38%	55%	8%
United States	22%	54%	24%
Germany	19%	50%	31%
United Kingdom	19%	57%	24%
Canada	18%	58%	24%

Source: Ipsos

³⁹ See Daisuke Wakabayashi, “Self-Driving Uber Car Kills Pedestrian in Arizona, Where Robots Roam,” *The New York Times* (Mar. 19, 2018), <https://www.nytimes.com/2018/03/19/technology/uber-driverless-fatality.html>.

⁴⁰ Niall McCarthy, “Global Opinion Divided on Self-Driving Vehicles,” *Forbes* (Apr. 13, 2018), <https://www.forbes.com/sites/niallmccarthy/2018/04/13/global-opinion-divided-on-self-driving-cars-infographic/#390c3c8911of>.

⁴¹ *Id.*

The electric vehicle market may serve as an example for the future of autonomous vehicles. In 2017, China took the lead in electric vehicle production.⁴² Experts cite China's investments in infrastructure and charging network, government subsidies of its auto industry, and ability to keep the cost of electric vehicles down as the reasons for their success.⁴³ To be sure, the favorable perception of self-driving vehicles in Asia has not gone unnoticed. Some industry commentators believe that the trend of technology being developed in the United States and applied in places like China may continue in the autonomous vehicle market.⁴⁴

CONCLUSION

Development of AV technology faces immense technical challenges, yet successful development of the AV industry carries potentially enormous financial and societal benefits – from reclaiming leadership of the automotive industry to dramatically safer and cheaper transportation systems.⁴⁵ However, development of AV raises legitimate societal concerns, from bystander safety during testing to cybersecurity to job loss. Through its guidances, the DOT has demonstrated that it understands the important issues but does not consider addressing them within its technical nor policy expertise. State-by-state regulation is constitutionally questionable and would hamstring the AV industry. Accordingly, well-considered federal legislation is necessary to strike the appropriate balance between empowering the AV industry while protecting the public safety and welfare.

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⁴² Patrick Hertzke, et al., “Dynamics in the Global Electric-Vehicle Market,” *McKinsey Insights* (July 2017), <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/dynamics-in-the-global-electric-vehicle-market>.

⁴³ Amanda Lee, “China’s Electric Car Market Is Growing Twice as Fast as the US. Here’s Why,” *South China Morning Post* (Apr. 27, 2018),

<https://www.scmp.com/business/companies/article/2143646/chinas-ev-market-growing-twice-fast-us-heres-why>.

⁴⁴ Steve Dickinson, “Self Driving Cars in China: The Absence of Non-Technical Barriers,” *China Law Blog* (July 17, 2018), <https://www.chinalawblog.com/2018/07/self-driving-cars-in-china-the-absence-of-non-technical-barriers.html>.

⁴⁵ See *AV 3.0* at page ii.