



THE JOURNAL ON
TECHNOLOGY AND
PERSONS WITH
DISABILITIES

A Policy Proposal to Support Self-Driving Vehicle Accessibility

Julian Brinkley

Clemson University, School of Computing, Human-Centered Computing Division

Shaundra B. Daily

Duke University, Department of Computer Science

Juan E. Gilbert

University of Florida, Computer and Information Science and Engineering

julianbrinkley@clemson.edu, shani.b@duke.edu, juan@ufl.edu

Abstract

This article reviews and summarizes current legislation governing vehicle automation and provides policy recommendations aimed at encouraging autonomous vehicle accessibility.

Keywords

Transportation; Self-Driving Vehicles; Law and Policy; Accessibility; Visual Impairment; Advanced Driver Assistance Systems

Introduction

Emerging self-driving vehicle technology may be especially beneficial for persons who cannot otherwise operate conventional motor vehicles due to their disability (National Federation of the Blind). Despite recent legislation governing vehicle automation, however, Federal and State guidance regarding the accessibility of this technology is both limited and vague. Within this article we summarize the existing legal and regulatory environment for vehicle automation in the United States and make policy recommendations intended to encourage the accessibility of this emerging technology.

Background

Vehicles operating on public roads in the United States are subject to both Federal and State jurisdiction. The federal government, via the National Highway Transportation Safety Administration (NHTSA) of the U.S. Department of Transportation (DOT), is responsible for regulating motor vehicles and motor vehicle equipment. The DOT, through the Federal Highway Administration (FHWA) is also involved in the safety, evaluation, planning, and maintenance of the U.S. highway system and regulation of interstate motor carriers and commercial vehicle drivers. Individual states are responsible for regulating the driver (e.g. vehicle licensing), vehicle registration, traffic laws, enforcement, and all aspects of motor vehicle insurance and liability.

Federal Regulatory Role

At the Federal level there is an absence of enacted legislation that has been written with the intent to specifically address automated vehicles. As a result, the bulk of guidance regarding automated vehicles is the result of interpretations of existing statutes by the DOT and NHTSA. The National Highway Transportation Safety Administration

has a legislative mandate under Title 49 of the U.S. Code, Chapter 301, Motor Vehicle Safety, to issue Federal Motor Vehicle Safety Standards (FMVSS) (*Federal Motor Vehicle Safety Standards and Regulations*). As the agency responsible for both setting and enforcing FMVSSs, absent any specific legislation NHTSA has interpreted their mandate to include the ability to remove any vehicle, to include automated vehicles, from the public roadways if it is deemed a risk to public safety. Given that manufacturers must also certify their compliance with the FMVSS prior to selling their vehicles in the United States, NHTSA is a de facto gatekeeper of automated vehicles on public roadways despite the lack of formal legislation in this regard. To this end, NHTSA published the *Federal Automated Vehicles Policy* in September 2016, which has since been replaced by *A Vision for Safety 2.0 (Automated Driving System: A Vision for Safety 2.0)* in September 2017.

The DOT has issued Vehicle Performance Guidance for Automated Vehicles (VPGAV) (U. S. Department of Transportation) that outlines best practices for pre-deployment design, development and testing of this technology prior to commercial sale or operation on public roads. The VPGAV applies primarily to SAE level 5 fully autonomous vehicles, with some aspects applying to SAE levels 3 and 4 technologies (e.g. partially and highly automated vehicles). It is intended to include all classes of motor vehicles, while covering any organization testing, operating, or deploying automated vehicles. The VPGAV includes a 15-item safety assessment where manufacturers and developers are asked to explain how they are satisfying each topic area. The VPGAV was rescinded by federal authorities in 2017 with the introduction of A

Vision for Safety 2.0 under the argument that such guidance was “speculative in nature” and outside the scope of NHTSA’s authority.

Beyond the VPGAV, much of what has been done at the Federal level has involved establishing guidelines and best practices designed to provide guidance to the states and provide commonality to state laws. Within *A Vision for Safety 2.0*, NHTSA proposes a set of guidelines for state legislatures related broadly to safety related issues involving partially, highly or fully automated vehicles while discouraging states from regulating safety and performance aspects of this technology (e.g. topics covered in the VPGAV). NHTSA has also established best practices for state highway safety officials. Generally, highway safety authority is used within each state to establish highway safety programs addressing driver education, testing, licensing, pedestrian safety, law enforcement, vehicle registration, crash prevention, and a number of other services.

State Regulatory Role

States have begun the process of passing legislation concerning automated driving technology to include self-driving vehicles. As of 2018, 33 states have introduced legislation concerning self-driving vehicles specifically (National Conference of State Legislatures). Twenty states introduced legislation in 2016. Twenty-one states have passed legislation related to self-driving vehicles and governors in six states have issued executive orders related to autonomous vehicles (Figure 1). While Nevada was the first to enact autonomous vehicle legislation, the states of California, Michigan, Florida and Tennessee have enacted the most legislation pertaining to automated vehicles.

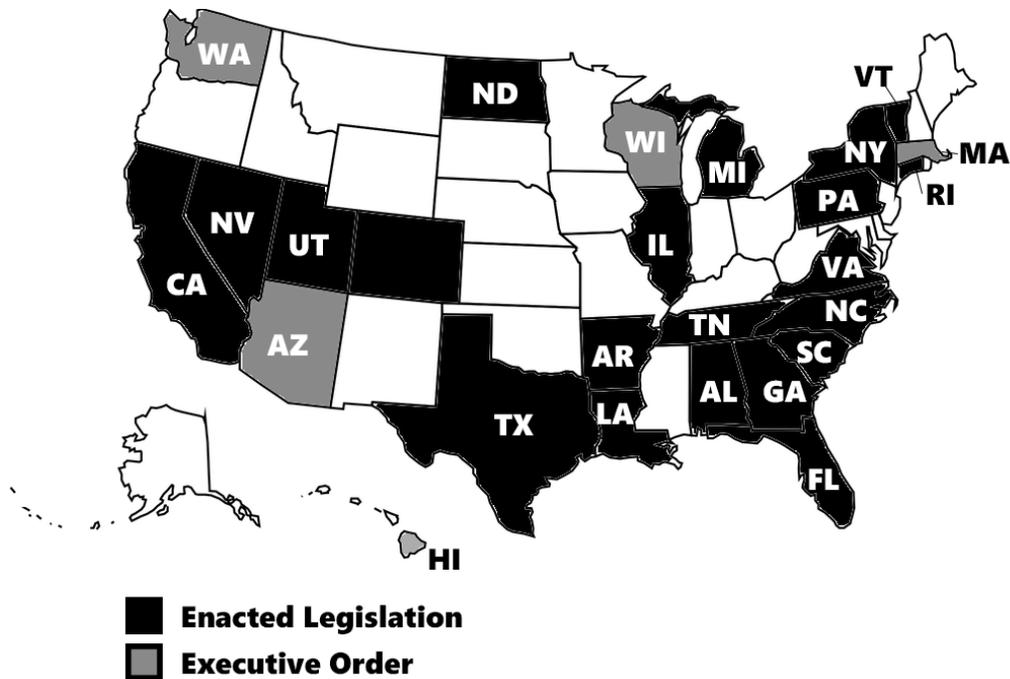


Fig. 1. Illustration of U. S. States with Enacted Legislation Related to AV Technology or Existing Executive Orders from the National Conference of State Legislatures (National Conference of State Legislatures).

Policy Recommendation

Perhaps the most apparent conclusion that one may draw from a review of federal and state autonomous vehicles guidelines within the context of an accessibility discussion is the apparent absence of any meaningful legislation or guidance related directly to accessibility. It is not simply that accessibility guidance is weak or unenforceable; the guidance is essentially non-existent. This largely laissez faire approach to autonomous vehicle development taken by NHTSA has been championed by proponents in industry (Laris). They argue that a voluntary approach that lightly encourages manufacturers to continuously improve the technology minimizes the likelihood that burdensome regulations might stifle innovation and slow time to market. This approach to regulating the technology may make sense at the state level given that states are responsible for

regulating the driver (e.g. vehicle licensing), vehicle registration, traffic laws and enforcement. It is the federal government however that retains the authority to regulate self-driving vehicle technology directly and by failing to directly do so may perhaps inadvertently create conditions that will encourage inaccessibility.

In an attempt to strike a balance between the recognition that: 1) autonomous vehicle technology is still in its infancy, 2) stifling of new technology through regulation is an area of real concern, and 3) there are significant accessibility concerns regarding self-driving vehicles for consumers with a range of disabilities, we propose the following:

- A reintroduction and revision of the Vehicle Performance Guidance for Automated Vehicles;
- The inclusion of a dedicated section on accessibility within *A Vision for Safety* 3.0, anticipated in 2018 (Rogers).

Perhaps an immediate step that can be taken to encourage self-driving vehicle manufacturers to begin directly addressing accessibility is a reintroduction of a revised VPGAV. The original guidance directly addressed the human-machine interface but failed to address general accessibility in a meaningful way. Given that the VPGAV was intended to serve as a collection of best practices, we argue that including accessibility as a topic area may spur greater emphasis on accessibility without regulating any specific technical approach. The reintroduction of the VPGAV could be supported through the inclusion of a dedicated section on accessibility within version 3.0 of the federal AV guidance, *A Vision for Safety*. With NHTSA raising the profile of accessibility through its emphasis in federal guidance, manufacturers, fearful of regulation, might begin to more directly address the needs and concerns of disabled persons in the development of AV

technology. The implied threat of regulation has been used previously to spur technology companies to take action in other industries. Most recently, the threat of legislation has spurred Facebook to address potential political manipulation in its online advertising (Ingram) and Twitter to address “hate speech” on its platform (Volokh).

Notably absent from our policy recommendation is a call for a Section 508-esque (“Section 508 Law and Related Laws and Policies”) accessibility law for AV technology. We argue that the technology is currently too immature for such a law and that doing so at this early stage *may*, in unforeseen ways, inhibit the development of the technology. We argue that recent research suggests that there are multiple technical approaches that may be taken to address self-driving vehicle accessibility and that given the immaturity of the technology a relatively rigid approach may prove burdensome and unwarranted.

Conclusion

The concepts of accessibility and soliciting input from the community of disabled persons in the design of autonomous vehicles are covered in a very limited fashion in existing Federal and state laws and guidelines. In the *Federal Automated Vehicle Policy* document for instance, issues related to disabled persons are briefly mentioned; the word “disabled” specifically appears twice. In the more than 11,000 words of its 2017 replacement, “disabled” appears once and the discussion of disabled persons is similarly limited. These omissions suggest that a concerted policy and legislative effort is needed to address the accessibility of emerging self-driving vehicle technology. We argue that our policy proposal, if enacted in some form, may support a movement towards accessibility in autonomous automotive technologies without proving so burdensome as to stifle meaningful technical developments.

Works Cited

Ingram, David. "Facebook to Overhaul Political Ads after Threat of U.S. Regulation."

Reuters, 22 Sept. 2017. *Reuters*, <https://www.reuters.com/article/us-facebook-ceo/facebooks-zuckerberg-to-speak-about-protecting-elections-idUSKCN1BW2S9>.

Laris, Michael. "Updated Federal Driverless Policy Continues, and Expands, Hands-off

Approach." *Washington Post*, 12 Sept. 2017, https://www.washingtonpost.com/local/trafficandcommuting/updated-federal-driverless-policy-continues-and-expands-hands-off-approach/2017/09/12/7db413fc-97c9-11e7-82e4-f1076f6d6152_story.html.

National Conference of State Legislatures. "Autonomous Vehicles | Self-Driving

Vehicles Enacted Legislation." *NCSL*, 2 Jan. 2018, <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>.

National Federation of the Blind. *National Federation of the Blind Resolutions for 2016* /

National Federation of the Blind. 2016, <https://nfb.org/2016-resolutions>.

National Highway Transportation Safety Administration. *Automated Driving System: A*

Vision for Safety 2.0. DOT HS 812 442, Sept. 2017.

---. *Federal Automated Vehicles Policy*. DOT HS 812 329, Sept. 2016.

---. *Federal Motor Vehicle Safety Standards and Regulations*. Mar. 1999,

<https://one.nhtsa.gov/cars/rules/import/FMVSS/index.html>.

Rogers, Greg. "USDOT Preparing Sweeping AV Policy Update, 3.0, Including Trucks

and Buses." *The Eno Center for Transportation*, 3 Nov. 2017,

<https://www.enotrans.org/article/usdot-preparing-sweeping-av-policy-update-3-0-including-trucks-buses/>.

“Section 508 Law and Related Laws and Policies.” *Section508.Gov*,

<https://www.section508.gov/content/learn/laws-and-policies>. Accessed 2 Jan.

2017.

U. S. Department of Transportation. *Fact Sheet: AV Policy Section 1: Vehicle Performance Guidance for Automated Vehicles*.

Volokh, Eugene. “Congress Members Threaten Twitter with Regulation If It Doesn’t Suppress ‘racially Divisive Communications’ and ‘Anti-American Sentiments.’” *Washington Post*, 10 Oct. 2017, <https://www.washingtonpost.com/news/volokh-conspiracy/wp/2017/10/10/congress-members-threaten-twitter-with-regulation-if-it-doesnt-suppress-racially-divisive-communications-and-anti-american-sentiments/>

Taking steps such as supporting the establishment by the industry of a Rail Ombudsman to investigate unresolved customer complaints, or introducing real-time information on the availability of assistance and services will make a real difference for disabled people. In the longer term, we also want to ensure that all future transport technologies and services are designed in a genuinely inclusive way, opening up new opportunities for disabled people. The Alliance also called for Congress to raise the existing 2,500-vehicle cap on exemptions for AVs, revamp road infrastructure to accommodate self-driving vehicles and approve tax incentives to support the vehicles' research and development. "The U.S. has always been a leader in innovation," said Jamie Boone, director of technology and innovation policy at Toyota Motor Corp. "My biggest concern is that we create this technology here and perfect this technology here and the policy and the regulatory structure does not allow us to actually deploy it here." Auto safety experts argue that self-driving cars may help improve road safety because around 94% of crashes are caused by humans. Self-driving cars cannot become a reality in the United States until state regulations catch up with the technology. That is why the Obama administration has laid out a \$4-billion plan to help create consistent state regulations on autonomous vehicles across the country and speed along testing of such vehicles. Another half-year goal is to develop a "model state policy on automated vehicles" that would help ensure consistent national policy toward the technology. The California proposal would also rule out individual ownership of self-driving cars by limiting autonomous vehicle vendors to simply leasing rather than selling the vehicles to consumers. An insurance policy in respect of an automated vehicle may exclude or limit the insurer's liability under section 2(1) for damage suffered by an insured person arising from an accident occurring as a direct result of "a self-driving vehicle". In 2021, a proposed German law proposed the "self-driving vehicle" would require an operating permit to be used as an automated vehicle. In an IEEE article, the senior technical leader for safety and driver support technologies at Volvo echoed a similar sentiment saying, "if we made a mistake in designing the brakes or writing the software, it is not reasonable to put the liability on the customer...we say to the customer, you can spend time on something else, we take responsibility." A Ford self-driving test vehicle indicates to a bicyclist that it is yielding to those in the crosswalk. In addition to the proposal to accelerate the industry coming together to work toward standardization, we continue to work in parallel with the International Organization of Standardization (ISO) and the Society of Automotive Engineers (SAE) to create a unified communication interface for self-driving vehicles.