



**The Journal of Robotics,
Artificial Intelligence & Law**

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Autonomous Vehicles, Artificial Intelligence, and the Law

Paul Keller*

Autonomous vehicle technology and the artificial intelligence used to “drive” along our roads is a staggering achievement. Their use, however, raises significant legal issues that will need to be considered and addressed as these technologies become more prevalent. This article explores these issues in four areas: law and regulation; product liability; privacy/cybersecurity; and intellectual property.

Autonomous vehicles (“AVs”) have moved from the pages of science fiction to the streets in cities around the world. These robotic vehicles, many of which were built by robots, use state-of-the-art artificial intelligence (“AI”), and raise significant legal questions and challenges that the industry and policy makers need to consider.

This article explores these issues in four areas of U.S. law, including:

- Law and regulation;
- Product liability;
- Privacy/cybersecurity; and
- Intellectual property.

Law and Regulation

Although some of the current U.S. laws are flexible enough to address many of the issues raised by autonomous vehicles and the robotic and AI technology they contain and utilize, many legislatures (federal, state, and local) are enacting laws specifically aimed at these revolutionary devices.

The states were the first to enact legislation in this area. Since 2011, 41 states and Washington, D.C., have at least considered legislation related to autonomous vehicles, and at press time, 21 states¹ and Washington, D.C., have passed legislation related to autonomous vehicles. In addition, governors in five states² issued executive orders related to autonomous vehicles. It would not be

surprising if the automotive industry sees the prospect of complying with the different rules and regulations in all of these states (some of which might be mutually exclusive to each other) as a daunting task and not the preferred approach. Many in the industry favor a national strategy for autonomous driving technology and have sought Congressional action. It appears, however, that just with the “standard” driving of today, some of the U.S. laws governing the space will be directed by the federal government while others will remain with the states. One traditional area of state regulation is the issuance of driver’s licenses, yet AVs may mean that teenagers will no longer have this rite of passage because states are in the process of licensing robots to drive.

Currently, the capabilities of AI, including how it functions and potential applications, are still being learned by policy makers. Policy makers refer to goals such as “transparency” and “audit trails,” but these goals are not necessarily compatible with AI technology. There are no broadly applicable laws that regulate artificial intelligence as such. Instead, with respect to autonomous vehicles, we are just beginning to see laws that, for example, consider the AV the “driver.” Laws and regulations relating to the capabilities, limits, and transparency of AI will likely be forthcoming in the near future.

Federal Legislation

September 2017 brought federal legislation. The “Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution Act” (the “SELF DRIVE Act”) (H.R. 3388) unanimously passed the House of Representatives in early September. In late September, two Senators introduced a somewhat similar bill, The American Vision for Safer Transportation through Advancement of Revolutionary Technologies (“AV START”) Act (S. 1885), which passed the Senate Committee on Commerce, Science, and Transportation on October 4. Both bills would relate to vehicles weighing 10,000 pounds or less (which would exclude most heavy trucks and buses). The two bills would prohibit a state from enacting or enforcing a law or regulation regarding the design, construction, or performance of an “automated driving system” (“ADS”), “highly automated vehicle” (“HAV”), or component of an ADS.

The bills would allow states to enforce identical standards to those promulgated by National Highway Traffic Safety

Administration. The bills would also not preempt state laws or regulations relating to licensing, registration, insurance, law enforcement, or traffic management unless such a law is an unreasonable restriction on HAV or automated driving system design, construction, or performance. The bills would also not preempt motor vehicle franchise laws or common law claims.

The Senate bill (but not the House bill) would prohibit states from issuing licenses for “dedicated highly automated vehicle” (“DHAV”) in a way that discriminates against those with disabilities.

Both bills would permit automakers to get approval to sell up to 100,000 HAVs per year following the third year of enactment, as long the manufacturer could show that the approval is consistent with the public interest and that the HAVs are at least as safe as current vehicles with human controls (a “safety equivalence determination”). The House version would permit sales of up to 25,000 HAVs in the first year; the Senate version would permit up to 50,000. For clarity, although this section of the legislation is sometimes referred to as an “exemption,” automakers would have to meet the specified safety standards and would remain subject to common-law tort liability.

The bills would require each manufacturer of an HAV or ADS to submit a safety evaluation report to the Secretary of Transportation. Safety evaluation reports would be required to include descriptions of how the manufacturer is addressing nine subject areas (including automation functions), through documented testing, validation and assessment, relating to the development of the HAV or ADS that is the subject of the report. All safety evaluation reports would be made publicly available, with any confidential business information redacted. The Secretary would be able to use the information in reports for enforcement purposes, but would not be able to condition the introduction of autonomous vehicles into interstate commerce based on a review of the report or additional information.

The differences between the House and Senate bills would have to be reconciled before the legislation could be presented to the president for signature.

State Laws and Regulations

The states have enacted laws relating to autonomous vehicles for more than five years, frequently focused on studying the technology

and establishing geographic areas for the testing of the autonomous vehicles. In 2017, the most recently enacted legislation related to topics such as platooning, operating vehicles without a driver in the vehicle, insurance requirements, and testing conditions. Apparently reflecting confidence in the technology, states are beginning to pass laws that exempt the operators of autonomous vehicles from having a driver's license. Manufacturers are also utilizing artificial intelligence to test and "train" their autonomous vehicles.

Product Liability

By definition, autonomous vehicles will not be driven by a human driver, but by the combination of the complex machinery and decision-making capabilities of its computer systems and software. The use of AI to "operate" these cars raises new and complex questions of liability if the autonomous vehicle does not perform correctly, resulting in harm to someone or something.

As described above, the proposed federal legislation preserves common law tort liability for manufacturers of autonomous vehicles. In the United States, five states³ have enacted laws limiting product liability lawsuits against manufacturers for claims based on a defect in the autonomous vehicle—if the defect was caused when a third party created the vehicle into an autonomous vehicle, or if the equipment was defective when it was installed in the vehicle. Otherwise, manufacturers remain liable for any defects in the original design or in the manufacturing process. The remaining U.S. states have not indicated that they would treat product liability claims any differently for autonomous vehicles than for any other vehicle.

Although the standards for liability can vary by state, in order for liability to be imposed, product liability typically requires that a product must be found to have at least one of the following "defects": (1) design defect; (2) inadequate instructions or warnings; or (3) manufacturing defects. A detailed description of the standards and evidentiary requirements for each of these defects is beyond the scope of this article, but state laws have already begun to address these issues. For example, in Tennessee's new law enacted in 2017, the law deems the automated driving system to be the "driver" for liability purposes as long as it is engaged and operating properly.

Depending on the nature of the defect alleged, manufacturers could have a variety of potential defenses available, again varying

by state. Some states would permit a manufacturer to defend a claim by arguing that it should not be liable to the extent of the plaintiff's own negligence. Manufacturers may also be able to defend a defect claim by showing that the manufacturer could not have reasonably foreseen the defect based on the current state of the technology and scientific knowledge at the time of production. In addition, manufacturers typically have a duty to protect against misuses that "could reasonably have been anticipated" and not *all* misuses.

The automotive industry seems poised to use technology to drive some aspects of the issues of liability. Historically, the vast majority of the accidents that occur are caused by human error. As AV technology is used along-side "standard" human-driven cars, it is believed that the cause of car accidents will remain substantially the same, human error that causes accidents with human-driven cars and AVs. The industry hopes, however, that as more AVs are used, fewer accidents take place. While this transition is taking place, some in the industry are analyzing how to use technology to determine liability faster and more accurately. AVs have the impressive capability of surveying their surroundings all the time and conducting significant calculations concerning the landscape that is around them, including the movement of other vehicles and people, their speeds and directions. AVs may likely use artificial intelligence to determine whether the other actors on the road are behaving "properly" and/or within accepted limits. With this information on-board, AVs will be able to determine or at least "play back" how the accident occurred, who was doing what, as well as identify which vehicle or person was the "cause" of the altercation, and do all of this in near real time following an accident. The impact on the use of information in this way could have dramatic effects on law enforcement and the insurance industry.

Privacy/Cybersecurity

Privacy

Because autonomous vehicles are just starting to be used on public streets, it remains unclear what types of personal information those vehicles will collect and the uses to which that information will be put. Although the United States and other countries are struggling with laws and requirements relating to privacy in the

online arena, such as websites and social media sites, autonomous vehicles present additional issues. When a user registers with a website, the user typically consents to the provision of his/her information to the website. In contrast, with an autonomous vehicle, would each passenger have to provide a consent in order to board the vehicle? Does that also apply to passengers that are children and legally unable to consent? (Note that North Carolina's 2017 law requires an adult to be present in the vehicle if a passenger under 12 is in the vehicle.)

Not only will the passengers likely be sending their information from the autonomous vehicle (such as data through use of internet-connected devices), the vehicle itself may be broadcasting information, such as geolocation data. The U.S. Supreme Court has already expressed reservations regarding travel data accumulated over time to determine, for example, information about an individual's religion or health issues—typically very sensitive information.⁴ In addition, autonomous vehicles are intended to transmit and collect information from the infrastructure as well as from other vehicles.

Note that privacy is one area of difference between the House and Senate versions of the federal legislation described. The House version would require manufacturers to have a privacy plan including “a method for providing notice to vehicle owners or occupants about the privacy policy.” The House version would not require manufacturers to include in the privacy policy information about owners or occupants that cannot reasonably be linked to the vehicle, or information that is anonymized or encrypted. The Senate version does not include privacy requirements.

Cybersecurity

In contrast to privacy, both the House and Senate bills address cybersecurity. Autonomous vehicles raise potential security risks from a variety of sources, both internal and external to the autonomous vehicle. Both bills would require each manufacturer to maintain a written plan to identify cybersecurity risks and the response to them. The Senate version contains more detailed requirements relating to the cybersecurity plan than does the House version.

In brief, the cybersecurity issues include hacking and malware, bugs and other coding errors, and the “decisions” of the algorithms used by the autonomous vehicle. These issues raise a variety of risks,

ranging from trivial to potentially life-threatening, so the Senate version of the legislation requires a manufacturer to conduct a risk-based analysis in the written cybersecurity plan.

Intellectual Property

The developments in autonomous vehicles and artificial intelligence technologies have led to thousands of patent filings in the United States:

- artificial intelligence;
- adaptive cruise control;
- autonomous emergency braking;
- lane keeping; and
- laser imaging detection and ranging (“LIDAR”).

“Artificial Intelligence” patent filings alone now run into the thousands (see Figure 1).

Perhaps one of the best known safety features of autonomous vehicles is automatic emergency braking, when the vehicle uses a system to “sense” an imminent collision with another object and automatically applies the brakes without any human intervention. There has been a material increase in the number of patent applications in this area (see Figure 2).

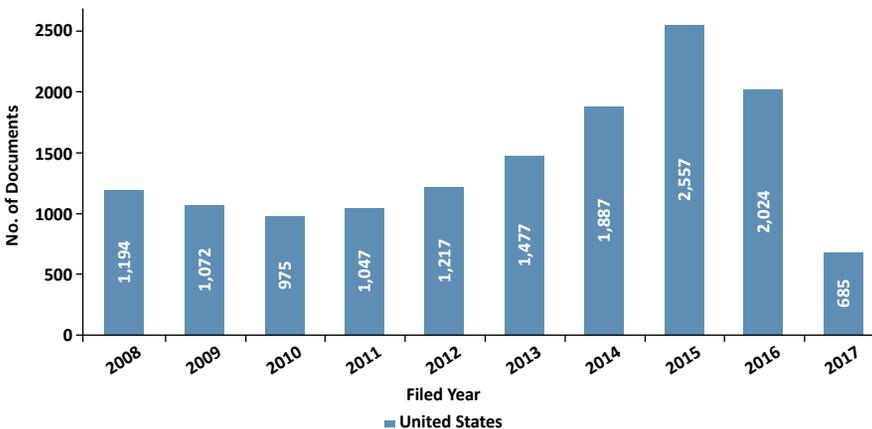


Figure 1. U.S. Artificial Intelligence By Filed Year

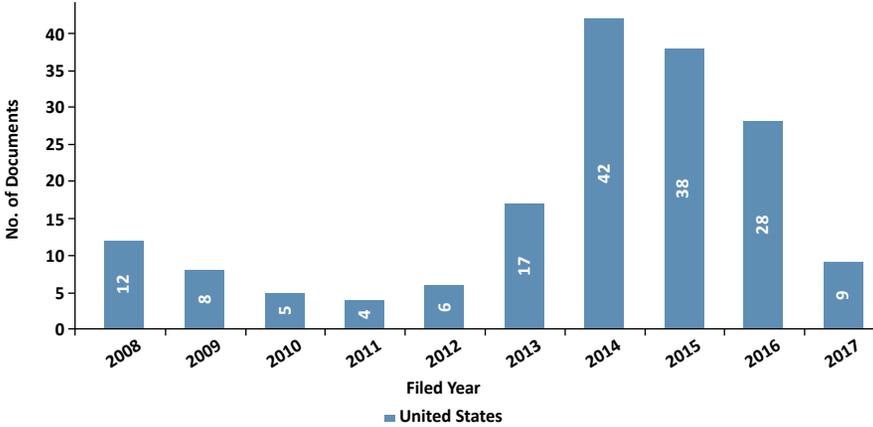


Figure 2. U.S. Autonomous Emergency Braking By Filed Year

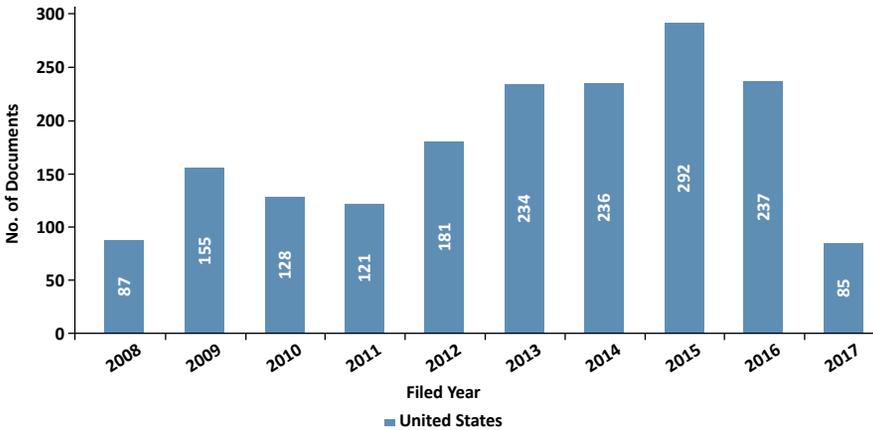


Figure 3. U.S. Lane Keeping By Filed Year

Another popular safety feature of autonomous vehicles is the ability to correct a vehicle’s course if it drifts out of a lane marking. Known as “lane-keeping assist,” the technology corrects the vehicles course by using a counter-steer torque to bring the vehicle back into the lane. (See Figure 3.)

Autonomous vehicles can use lasers to estimate distances to objects, and the technology is known as Laser Imaging Detection and Ranging, or LIDAR. Patent applications in this area have also increased of late. (See Figure 4.)

The area of autonomous vehicles is relatively recent, but patent infringement lawsuits and inter partes review petitions have already been filed. To date, patent assertion entities are predominantly the plaintiffs in these lawsuits.

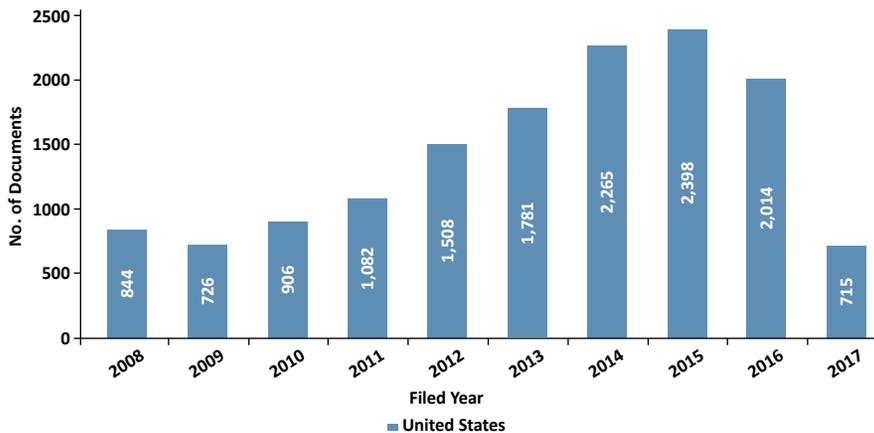


Figure 4. U.S. LIDAR By Filed Year

As autonomous vehicles become more common and the artificial intelligence they use to operate become more robust, so too does the run to the U.S. Patent and Trademark Office to protect the technologies. Companies should revisit their patent procurement and enforcement strategies to make sure that they are consistent with the new realities of this evolving space.

Conclusion

Autonomous vehicle technology and the artificial intelligence used to “drive” along our roads is a staggering achievement. Their use, however, raises significant legal issues that will need to be considered and addressed as these technologies become more prevalent.

Notes

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1. Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Louisiana, Michigan, New York, Nevada, North Carolina, North Dakota, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, and Vermont.
2. Arizona, Delaware, Massachusetts, Washington, and Wisconsin.
3. District of Columbia, Florida, Michigan, Nevada, and Tennessee.
4. *United States v. Jones*, 565 U.S. 400 (2012).