Law, Technology & Autonomous Vehicles

MATERIALS

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On May 7, 2016, Joshua Brown made history. The Canton, Ohio, resident became the first person to die in a self-driving car.

Brown, 40, had turned on Autopilot, the autonomous driving system of his Tesla Model S, and set the cruise control at 74 miles per hour. As his car raced down a highway west of Williston, Florida, a tractor-trailer came out of an intersecting road.

Tesla’s Autopilot is a technological marvel. It controls the car, using radar and cameras to scan the road. It keeps the car within lanes on highways. It brakes, accelerates and passes other vehicles automatically.

According to one of Tesla’s public statements, the camera on Brown’s car failed to recognize the tractor-trailer crossing the highway against a bright sky. As a result, the car did not brake, nor did it issue any warning to Brown. The car crashed into the trailer, killing Brown.
The automobile’s self-driving system was not at fault, according to an investigation conducted by the National Highway Traffic Safety Administration. The agency found that Autopilot was designed to prevent Tesla cars from rear-ending other vehicles but was not intended to handle situations when vehicles crossed the road from intersecting roadways. Thus, there were no “defects in the design or performance” of the system, the NHTSA concluded.

Brown was responsible for the crash, according to the agency. If he were paying attention, he would have seen the truck crossing the highway and had at least seven seconds to respond—sufficient time to avoid the collision.

No one knows for sure what Brown was doing in the last seconds of his life. But the other driver told police he heard a *Harry Potter* movie playing in the crushed automobile after the crash.

Tesla avoided liability for his death because Autopilot was intended to aid, not replace, human drivers. The technology, however, is changing. Google, Mercedes-Benz, Tesla, Uber and Volvo are some of the companies working to develop fully autonomous cars, intended to drive themselves without human intervention. Google’s prototypes don’t have steering wheels or brake pedals.

**WHO’S REALLY RESPONSIBLE?**

Matthew T. Henshon, a partner at Henshon Klein in Boston and chair of the Artificial Intelligence and Robotics Committee of the ABA Section of Science and Technology Law, says “people haven’t really thought ... through” who—or what—will be liable when fully autonomous cars crash, resulting in injury or death.

“This is going to burgeon into the most significant subject matter of the 21st century,” says Paul F. Rafferty, a partner in the Irvine, California, office of Jones Day.

The law, as it stands now, is simple. Human beings cannot delegate driving responsibility to their cars. In self-driving cars, a human must be ready to override the system and take control.

This rule has to be updated, according to the NHTSA’s September 2016 report on autonomous vehicles. The organization suggested that different legal standards should apply, “based on whether the human operator or the automated system is primarily responsible for monitoring the driving environment.” For the latter type of vehicles—dubbed “highly automated vehicles”—the HAV system should be deemed
the driver of the vehicle for purposes of state traffic laws, the NHTSA recommended. In other words, the HAV, not its passengers, should be criminally liable when traffic laws are violated.

There are good policy reasons for this, says Jeff Rabkin, a former prosecutor and now a partner in the San Francisco office of Jones Day. “If a passenger has no way to operate the vehicle, prosecuting the passenger would not serve any of the purposes of criminal law,” Rabkin says.

Similarly, it wouldn’t make a lot of sense to impose civil liability on the human occupants when the HAV has an accident. The NHTSA therefore has encouraged states to revise their tort laws to hold HAVs liable when there are crashes.

SHARING THE BLAME

Holding an HAV accountable is easier said than done. “Multiple defendants are possible: the company that wrote the car’s software; the businesses that made the car’s components; the automobile manufacturer; maybe the fleet owner, if the car is part of a commercial service, such as Uber,” says Gary E. Marchant, director of the Center for Law, Science and Innovation at the Sandra Day O’Connor College of Law at Arizona State University. “How would you prove which aspect of the HAV failed and who should be the liable party?”

Technical forensic investigations will be required. “Attorneys will need to hire experts to download the black boxes from the vehicles and evaluate the precise system failure that caused the accident—a time-consuming process that will surely add additional expense to litigation,” says Jeffrey D. Wolf, a partner at Heimanson & Wolf in Los Angeles.

This will complicate criminal prosecutions of HAV companies—and transform civil accident cases. Relatively simple negligence suits that involve two parties will be replaced with complex, lengthy and expensive product liability litigation with multiple defendants.

“What have been, to date, mostly straightforward cases of fault against an owner for improper handling of a car will now become cases that are much more expensive,” Wolf says.

As a result, many tort victims will be unable to obtain justice. “It will be difficult to accommodate driverless vehicles under the current common-law framework. We will need a new statutory scheme because otherwise it will be too costly for individuals to prosecute [tort] claims,” says Wayne R. Cohen, founder and managing partner at Cohen & Cohen in Washington, D.C.
He favors a strict liability regime that covers HAV-makers and subcontractors. “Otherwise, you will impede access to the civil justice system for anyone who is injured,” Cohen says.

Other experts worry that a strict liability regime would put an unfair burden on manufacturers of HAVs. “There will be far fewer accidents with HAVs, but when they occur the vehicle’s manufacturer will be sued. So carmakers will have more liability than they do now for making a safer product,” Marchant says.

**BENEFITS COME WITH A COST**

A strict liability regime could discourage companies from making HAVs. But public policy should encourage manufacturers of HAVs because studies have repeatedly concluded they’re far safer than human-driven cars.

A 2013 study by the Eno Center for Transportation (a nonprofit think-tank in Washington, D.C.), estimated that if 10 percent of the cars on U.S. roads were HAVs, 1,100 lives would be saved annually. If 90 percent of the cars were HAVs, 21,700 lives would be saved each year.

HAVs are expected to provide other benefits to society: easing traffic congestion; shortening travel time; burning less fuel; lowering emissions; and providing mobility to those who cannot drive, such as seniors and people with vision problems. If HAVs constituted 90 percent of cars on U.S. roads, the nation would save more than $355 billion per year, the Eno Center estimated.

Because a negligence standard might make it too expensive for crash victims to obtain justice and a strict liability standard might discourage companies from putting HAVs on the road, some people are contemplating other, less traditional methods for handling HAV tort liability. “Perhaps the creation of a no-fault system would be best, funded by buyers of autonomous vehicles or by a percentage of state motor vehicle fees,” Rafferty says.

A similar no-fault system was created to protect another socially beneficial product. “Vaccines made people safer, but there was great liability when something went wrong, so we had to change the liability regime,” Marchant says.

In 1986, Congress required vaccine-makers—in exchange for legal protections—to contribute to a no-fault compensation fund. Sufferers go before special vaccine courts that can’t award punitive dam-ages, only compensation. “They may need to set up something like that for driverless cars,” Marchant says.
Some experts warn it’d be premature to enact laws now. “Legislation changes slowly, and technology changes fast. Legislation can become obsolete very quickly,” Rabkin says.
 Autonomous Vehicles | Self-Driving Vehicles Enacted Legislation

Autonomous Vehicles

Many people consider autonomous vehicles to be a significant part of the future automotive industry.

As the technology for autonomous vehicles continues to develop, it may be necessary for state and municipal governments to address the potential impacts of these vehicles on road safety.

Each year, the number of states considering legislation related to autonomous vehicles has gradually increased.

- In 2017, 33 states have introduced legislation. In 2016, 20 states introduced legislation.
- Sixteen states introduced legislation in 2015, up from 12 states in 2014, nine states and D.C. in 2013, and four states in 2012.
- Since 2012, at least 41 states and D.C. have considered legislation related to autonomous vehicles.
- Governors in Arizona, Delaware, Hawaii, Idaho, Maine, Massachusetts, Minnesota, Ohio, Wisconsin, and Washington have issued executive orders related to autonomous vehicles.

Legislative Database

NCSL has a NEW autonomous vehicles legislative database, providing up-to-date, real-time information on autonomous vehicle legislation that has been introduced in the 50 states and the District of Columbia.
Federal Action

On Sep. 12, the National Highway and Transportation Safety Administration (NHTSA) released new federal Automated Driving Systems (ADS). *A Vision for Safety 2.0*, the latest guidance for automated driving systems and the states.

The guidance builds on NHTSA’s 2016 guidance. For more information on the 2016 guidance please see Alert.

Separated into two sections – voluntary guidance and technical assistance to states – the new guidance for international levels of automation 3-5, clarifies that entities do not need to wait to test or deploy their ADS, elements from the safety self-assessment, aligns federal guidance with the latest developments and termi clarifies the role of federal and state governments. The guidance reinforces the voluntary nature of the gui does not come with a compliance requirement or enforcement mechanism. The guidance attempts to prov

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should consider incorporating into legislation. Additionally, it includes DOTs view of federal and state roles
best practices for state legislatures and best practices for highway safety officials.

NHTSA’s updated guidance comes on the heels of the Sept. 6, passage of the SELF Drive Act (H.R. 3388
make several changes to federal law impacting autonomous vehicles. NCSL, along with several state gro
ters as the bill made its way through the House. The bill includes four main sections: expansion of feder
updates to federal motor vehicle safety standards (FMVSS); exemptions from FMVSS and a federal auton
advisory council. For more information on the House bill, see NCSL’s Info Alert.

On Sep. 28, the Senate Commerce Committee Chairman John Thune (R-S.D.) and Senators Gary Peters
Blunt (R-Mo.), and Debbie Stabenow (D-Mich.) unveiled legislation regarding autonomous vehicles—the F
for Safer Transportation Through Advancement of Revolutionary Technologies (AV START) Act. The Com
Committee will consider the legislation at a markup scheduled for Oct. 4. The AV START Act is similar to t
passed SELF DRIVE Act but does contain some significant differences. For more on the Senate bill, see N
alert.

In January 2016, U.S. Transportation Secretary Anthony Foxx unveiled new policy that updates the Nation
Traffic Safety Administration’s (NHTSA) 2013 preliminary policy statement on autonomous vehicles. This a
was made at the North American International Auto Show in Detroit in conjunction with a commitment of n
over the next 10 years to accelerate the development and adoption of safe vehicle automation. The new p
designed to facilitate and encourage the development and deployment of technologies with the potential t
Within six months, NHTSA will propose guidance to industry on establishing principles of safe operation fc
autonomous vehicles.

State Action

Nevada was the first state to authorize the operation of autonomous vehicles in 2011. Since then, 21 othe
Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Louisiana,
New York, North Carolina, North Dakota, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Vi
Vermont—and Washington D.C. have passed legislation related to autonomous vehicles. Governors in
Arizona, Delaware, Hawaii, Idaho, Maine, Massachusetts, Minnesota, Ohio, Washington and Wisc
issued executive orders related to autonomous vehicles.

Florida’s legislation, passed in 2012, declared the legislative intent to encourage the safe development, te
operation of motor vehicles with autonomous technology on public roads of the state and found that the st
prohibit nor specifically regulate the testing or operation of autonomous technology in motor vehicles on pi
Florida’s 2016 legislation expands the allowed operation of autonomous vehicles on public roads and elin
requirements related to the testing of autonomous vehicles and the presence of a driver in the vehicle.

Arizona’s Governor Doug Ducey signed an executive order in late August 2015 directing various agenc
any necessary steps to support the testing and operation of self-driving vehicles on public roads within Ari
ordered the enabling of pilot programs at selected universities and developed rules to be followed by the p
order established a Self-Driving Vehicle Oversight Committee within the governor’s office. On March 1m 2
Ducey added to the 2015 executive order with Executive Order 2018-04. The order includes updates to ke
emerging technology, including advancements toward fully autonomous vehicles, as well as requiring all a
driving systems to be in compliance with all federal and state safety standards.
can be used to prepare Delaware’s transportation network for connected and autonomous vehicles.

**Hawaii’s** Governor David Ige signed an executive order in November 2017 establishing a connected auto vehicles (CAV) contact in the governor’s office and requires certain government agencies to work with con for self-driving vehicle testing in the state.

**Idaho** Governor C.L. "Butch" Otter signed Executive Order 2018-01 on January 2, 2018 to create the Auto Connected Vehicle Testing and Deployment Committee to identify relevant state agencies to support the test deployment of autonomous and connected vehicles, discuss how best to administer the testing of autonomous connected vehicles in relation to issues such as vehicle registration, licensing, insurance, traffic regulation owner or operator responsibilities and liabilities under current law, review existing state statutes and administer and identify existing laws or rules that impede the testing and deployment of autonomous and connected roads and identify strategic partnerships to leverage the social, economic, and environmental benefits of a and connected vehicles. The committee must include two members of the Idaho Legislature, one appointe Speaker of the House and one appointed by the President Pro Tempore of the Senate.

**Maine** Governor Paul LePage signed Executive Order 2018-001 on January 17, 2018, creating the Maine Automated Vehicles (HAV) Advisory Committee to oversee the beneficial introduction to Maine of Highly A Vehicle technologies, and assessing, developing and implementing recommendations regarding potential initiated to advance these technologies. The committee shall evaluate and make recommendations regarding HAV Pilot Projects and require interested parties to contact the committee and apply for a permit prior to operating autonomous vehicles on public roadways in Maine.

**Massachusetts** Governor Charlie Baker signed an executive order in October 2016, “To Promote the Test Deployment of Highly Automated Driving Technologies.” The order created a working group on AVs and the expected to work with experts on vehicle safety and automation, work with members of the legislature on legislation, and support agreements that AV companies will enter with the state DOT, municipalities and st.

**Minnesota** Governor Mark Dayton issued Executive Order 18-04 on March 5, 2018, establishing a Governor Council on Connected and Automated Vehicles to study, assess, and prepare for the transformation and opportunities associated with the widespread adoption of automated and connected vehicles. The advisor include one member from each party from each legislative chamber.

**Ohio** Governor John Kasich signed Executive Order 2018-01K on January 18, 2018. The order created a new, "bring together those who are responsible for building infrastructure in Ohio with those who are developing advanced mobility technologies needed to allow our transportation system to reach its full potential by red and fatal crashes and improving traffic flow." Ohio Governor Kasich signed Executive Order 2018-O4K in allowing autonomous vehicles testing and pilot programs in the state. In order to do so, companies must apply to DriveOhio (created by the January 2018 EO) and submit information on their companies, intended areas to test in and other requirements. Autonomous vehicles tested in the state must have a designated oper they are not required to be inside the vehicle.

**Washington’s** Governor Jay Inslee signed an executive order in June 2017 to address autonomous vehic establish an autonomous vehicle workgroup. The order requires that state agencies with pertinent regulat “support the safe testing and operation of autonomous vehicles on Washington’s public roads.” It establish interagency workgroup and enables pilot programs throughout the state. The order specifies certain requi
Wisconsin's Governor Scott Walker signed an executive order in May 2017 creating the Governor's Steer on Autonomous and Connected Vehicle Testing and Deployment. The committee is tasked with advising the how best to advance the testing and operation of autonomous and connected vehicles in the State of Wisconsin. The order specifies the members of the committee, including six legislators from the state. The duties of the committee include identifying all agencies in the state with jurisdiction over testing and deployment of the vehicles, the agencies to address concerns related to issues such as "vehicle registration, licensing, insurance, traffic equipment standards, and vehicle owner or operator responsibilities and liabilities under current law," and current state laws and regulations that may impede testing and deployment, along with other tasks. The selected agencies are required to submit a final report to the governor by June 30, 2018.

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<th>STATE</th>
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<th>RELEVANT PROVISION</th>
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<tr>
<td>Alabama</td>
<td>SB 125 (2018)</td>
<td>Defines a truck platoon as “A group of individual commercial trucks traveling in manner at electronically coordinated speeds at following distances that are close but reasonable and prudent without the electronic coordination.” The bill also excludes trucks in a truck platoon from the state’s following too closely provisions if the platoon is engaged in electronic brake coordination and any other requirement set out by the Department of Transportation by rule.</td>
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<td>Alabama</td>
<td>SJR 81 (2016)</td>
<td>Established the Joint Legislative Committee to study self-driving vehicles.</td>
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<td>Arkansas</td>
<td>HB 1754 (2017)</td>
<td>Regulates the testing of vehicles with autonomous technology, relates to vehicles equipped with driver-assistive truck platooning.</td>
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<td>California</td>
<td>SB 1298 (2012)</td>
<td>Requires the Department of the California Highway Patrol to adopt safety standards and performance requirements to ensure the safe operation and testing of autonomous vehicles as defined, on the public roads in this state. Permits autonomous vehicles to be tested on the public roads in this state pending the adoption of safety standards and performance requirements that would be adopted under this bill.</td>
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<td>California</td>
<td>AB 1592 (2016)</td>
<td>Authorizes the Contra Costa Transportation Authority to conduct a pilot project for the testing of autonomous vehicles that do not have a driver seat in the driver’s seat and are not equipped with a steering wheel, a brake pedal, an accelerator, or an operator inside the vehicle, if the testing is conducted only at specified speeds.</td>
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<td>California</td>
<td>AB 669 (2017)</td>
<td>Extends the sunset date of the law allowing the testing of vehicle platooning with 100 feet between each vehicle from January 2018 to January 2020. Prohibits the testing if the autonomous vehicle operates at specified speeds.</td>
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<td>California</td>
<td>AB 1444 (2017)</td>
<td>Authorizes the Livermore Amador Valley Transit Authority to conduct a shared autonomous vehicle demonstration project involving autonomous vehicles that do not have a driver seat in the driver's seat and are not equipped with a steering wheel, a brake pedal, an accelerator.</td>
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| California | SB 145 (2017) | Repeals a requirement that the Department of Motor Vehicles notifies the Legislature of receipt of an application seeking an autonomous vehicle capable of operating without the presence of a driver inside the vehicle on public roads. Repeals
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<td>California</td>
<td>SB 1</td>
<td>This bill encourages the California Department of Transportation and cities and when possible, cost-effective and feasible, use funds under the Road Maintenance Rehabilitation Program to use advanced technologies and communications systems to recognize and accommodate advanced autonomous technologies that may include, but are not necessarily limited to, charging or fuel opportunities for zero-emission vehicles, and provision of infrastructure-to-vehicle communications for transitional or fully autonomous vehicle systems.</td>
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<td>Colorado</td>
<td>SB 213</td>
<td>Defines automated driving system, dynamic driving task and human operator. Allows a person to use an automated driving system to control a function of a motor vehicle if the system is capable of complying with every state and federal law that applies to system operation. Requires approval for vehicle testing if the vehicle cannot comply with every relevant state and federal law. Requires the Department of Transportation to submit a report on the testing of automated driving systems.</td>
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<tr>
<td>Connecticut</td>
<td>SB 260</td>
<td>Defines terms including “fully autonomous vehicle,” “automated driving system,” and “operator.” Requires the development of a pilot program for up to four municipalities to test fully autonomous vehicles on public roads in those municipalities. Specifies requirements for testing, including having an operator seated in the driver's seat and providing proof of insurance of at least $5 million. Establishes a task force to study autonomous vehicles. The study must include an evaluation of NHTSA's standards, state responsibility for regulating AVs, an evaluation of laws, legislation and regulations from other states, recommendations on how Connecticut should legislate and regulate autonomous vehicles, and an evaluation of the pilot program.</td>
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<tr>
<td>Florida</td>
<td>HB 1207</td>
<td>Defines “autonomous vehicle” and “autonomous technology.” Declares legislation that encourages the safe development, testing and operation of motor vehicles with autonomous technology on public roads of the state and finds that the state does not prohibit specifically regulating the testing or operation of autonomous technology in motor vehicle operations on public roads. Authorizes a person who possesses a valid driver's license to operate an autonomous vehicle, specifying that the person who causes the vehicle’s autonomous technology to engage is the operator. Authorizes the operation of autonomous vehicles in certain persons for testing purposes under certain conditions and requires an insurance, surety bond or self-insurance prior to the testing of a vehicle. Directs the Department of Highway Safety and Motor Vehicles to prepare a report recommending additional legislative or regulatory action that may be required for the safe testing and operation of vehicles equipped with autonomous technology, to be submitted no later than Feb. 12, 2014.</td>
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<td>Florida</td>
<td>HB 599</td>
<td>The relevant portions of this bill are identical to the substitute version of HB 1207.</td>
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<td>Florida</td>
<td>HB 7027</td>
<td>Permits operation of autonomous vehicles on public roads by individuals with a license. This bill eliminates the requirement that the vehicle operation is being conducted solely for testing purposes and removes a number of provisions related to vehicle operation during testing purposes. Eliminates the requirement that a driver is present in the vehicle.</td>
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<td>Florida</td>
<td>HB 7061 (2016)</td>
<td>Defines autonomous technology and driver-assistive truck platooning technology. Requires a study on the use and safety of autonomous technology and allows for a pilot project upon conclusion of the study.</td>
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<td>Georgia</td>
<td>HB 472 (2017)</td>
<td>Specifies that the law prohibiting following too closely does not apply to the non-leading vehicle in a coordinated platoon as a group of motor vehicles traveling in the same lane utilizing vehicle-to-vehicle communication technology to coordinate the movement of the vehicles.</td>
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<td>Georgia</td>
<td>SB 219 (2017)</td>
<td>Defines automated driving system, dynamic driving task, fully autonomous vehicle, minimal risk condition and operations. Exempts a person operating an automated motor vehicle with the automated driving system engaged from the requirement to possess a license. Specifies conditions that must be met for a vehicle to operate without a human driver present in the vehicle, including registration requirements.</td>
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<td>Illinois</td>
<td>HB 791 (2017)</td>
<td>Preempts local authorities from enacting or enforcing ordinances that prohibit the operation of automated vehicles equipped with Automated Driving Systems. Defines &quot;automated driving equipped vehicle.&quot;</td>
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<td>Indiana</td>
<td>HB 1290 (2018)</td>
<td>Defines “Vehicle platoon” to mean a group of motor vehicles that are traveling in a coordinated manner under electronic coordination at speeds and following distances that are closer than would be reasonable and prudent without electronic coordination. Truck platooning is exempt from the following too close provisions of three hundred feet. The bill also lays out an approval system for vehicle platooning in the state, including requiring the person or organization to file a plan for general vehicle platoon operations with the transportation commissioner.</td>
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<td>Kentucky</td>
<td>SB 116 (2018)</td>
<td>This bill allows a motor carrier to operate a platoon on Kentucky’s highways if the carrier provides notification to the Department of Vehicle Regulation and the Kentucky State Police, including a plan for general platoon operations. The Department of Vehicle Regulation then has thirty days from the date of receipt to review the notification plan submitted by the motor carrier and approve or reject the plan. If the department rejects a submitted plan, it must in writing provide the carrier with the reason for the rejection and guidance on how to resubmit the plan. Only commercial motor vehicles shall be eligible to operate in a platoon. An appropriate endorsed driver who holds a valid commercial driver's license shall be present on the wheel of each commercial motor vehicle in a platoon. A commercial motor vehicle in a platoon shall not draw another motor vehicle in the platoon. Each commercial motor vehicle involved in a platoon shall display a marking warning other motorists and law enforcement of the vehicle may be part of a platoon. The department shall promulgate administrative regulations to set forth procedures for platooning, including required elements of the plan.</td>
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This bill created the Commission on Autonomous Vehicles to coordinate efforts among agencies and knowledgeable stakeholders to inform the development of a process for an autonomous vehicle tester to demonstrate and deploy for testing purposes a driving system on a public way. The commission will consist of at least 11 members.

The commission shall:
- Develop a recommendation for a process to evaluate an autonomous vehicle tester to demonstrate and deploy for testing purposes a driving system on a public way;
- Review existing state laws and, if necessary, legislation for the purposes of governing autonomous vehicle testers and the testing, demonstration, deployment and operation of automated driving systems on public ways;
- Monitor state compliance with federal regulations as they relate to autonomous vehicles;
- Consult with public sector and private sector experts on autonomous vehicle testing in order to develop a process that is appropriate; and
- Invite the participation of knowledgeable stakeholders to provide written and oral comments on the commission's assigned duties.

By January 15, 2020, the Commissioner of Transportation shall submit an initial written report on the progress of the commission and by January 15, 2022, the Commissioner of Transportation shall submit a final written report that includes findings and recommendations for presentation to the joint standing committee of the Legislature having jurisdiction over transportation matters.

Additionally, the Commissioner of Transportation shall adopt rules, in consultation with the Department of Public Safety and the Department of the Secretary of State, to evaluate and authorize an autonomous vehicle tester to demonstrate and deploy for testing purposes an automated driving system on a public way. The Commissioner of Transportation may immediately prohibit an operator or autonomous vehicle tester from testing an automated driving system if the Commissioner of Transportation, in consultation with the Commissioner of Public Safety and the Secretary of State, determines that the test poses a risk to public safety or that the operator or autonomous vehicle tester fails to comply with the requirements as established by rule.

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| Maine  | HP 1204 (2018) | This bill created the Commission on Autonomous Vehicles to coordinate efforts among agencies and knowledgeable stakeholders to inform the development of a process for an autonomous vehicle tester to demonstrate and deploy for testing purposes a driving system on a public way. The commission will consist of at least 11 members. The commission shall:
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<p>| Michigan | SB 995 (2016) | Allows for autonomous vehicles under certain conditions. Allows operation without a person in the autonomous vehicle. The requirement that commercial vehicles maintain a minimum following distance of 500 feet does not apply to vehicles in autonomous driving systems. |
| Michigan | SB 997 (2016) | Defines automated driving system. Allows for the creation of mobility research centers where automated technology can be tested. Allows immunity for automated technology manufacturers when modifications are made without the manufacturer's consent. |
| Michigan | SB | Exempts mechanics and repair shops from liability on fixing automated vehicles. |</p>
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<td>Michigan</td>
<td>SB 169</td>
<td>Defines &quot;automated technology,&quot; &quot;automated vehicle,&quot; &quot;automated mode,&quot; expressing the need for automated vehicles by certain parties under certain conditions, defines liability of the original manufacturer of a vehicle on which a third party has installed an automated system, direct state DOT with Secretary of State to submit report by 2016.</td>
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<td>Michigan</td>
<td>SB 663</td>
<td>Limits liability of vehicle manufacturer or upfitter for damages in a product liability lawsuit resulting from modifications made by a third party to an automated vehicle or a vehicle technology under certain circumstances; relates to automated mode control.</td>
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<td>Mississippi</td>
<td>HB 1343</td>
<td>This bill defines &quot;Platoon&quot; to mean a group of individual motor vehicles traveling in a manner at electronically coordinated speeds at following distances that are close enough to be reasonable and prudent without such coordination. The bill also creates an exception from the state’s following too closely traffic law for the operator of a nonlead vehicle in a platoon, if the platoon is operating on a limited access divided highway with multiple lanes in each direction and the platoon consists of no more than two motor vehicles.</td>
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<td>Nebraska</td>
<td>LB 989</td>
<td>This bill defines automated driving system and other relevant terms. The bill states that a driverless-capable vehicle may operate on public roads in the state without a controlling human driver physically present in the vehicle, as long as the vehicle meets the following conditions: (1) The vehicle is capable of achieving a minimal risk condition if a failure of the automated driving system occurs that renders the system unable to perform the dynamic driving task within its intended operational design domain, if any; and (2) during driverless operation, the vehicle is capable of operating in compliance with the traffic and motor vehicle safety laws and regulations of this state that govern the operation of the dynamic driving task, including, but not limited to, safely negotiating railroad crossings, unless an exemption has been granted by the department of motor vehicles (DMV) that affects vehicle operations at railroad crossings. Before an automated-driving-system-equipped vehicle may operate on the public roads in the state, a person must submit proof of financial responsibility satisfactory to the DMV that satisfies the requirements of the Motor Vehicle Safety Responsibility Act. A person must also register the automated-driving system-equipped vehicle with the DMV.</td>
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| Nebraska | | Such a network may provide transportation of persons or goods, including: (a) |}
| | | transportation, including transportation for multiple passengers who agree to share |}
| | | whole or in part; and (b) Public transportation. (2) An on-demand driverless-capable |}
| | | network may connect passengers to driverless-capable vehicles either (a) exclusively |}
<p>| | | as part of a digital network that also connects passengers to human drivers who provide transportation services, consistent with applicable law, in vehicles that are not driverless-capable. |
| | | The Nebraska Rules of the Road shall not be construed as requiring a conventional driver to operate a driverless-capable vehicle that is being operated by an autonomous system, and the automated driving system of such vehicle, when engaged, shall not be required to fulfill any physical acts required of a conventional human driver to perform the driving task. |
| | | The bill also clarifies responsibilities in the event of a crash or collision: (1) The driving-system-equipped vehicle shall remain on the scene of the crash or collision; (2) The owner of the automated-driving-system-equipped vehicle, if capable, or a person named in the event notification, the automated-driving-system-equipped vehicle owner, shall report any crash or collision to the appropriate local law enforcement agency; (3) The DMV is the sole and exclusive state agency that may implement this act. (4) Any political subdivision shall not impose requirements, including performance standards, specific to the operation of automated driving-system-equipped vehicles, autonomous systems, or on-demand driverless-capable vehicle networks in addition to the requirements in this act. The state or any political subdivision thereof shall not impose a tax or other requirements on an automated-driving-system-equipped vehicle, an automated system, or an on-demand driverless-capable vehicle network, where such tax or other requirements relate specifically to the operation of automated-driving-system-equipped vehicles. |
| Nevada | AB 511 | Authorizes operation of autonomous vehicles and a driver’s license endorsement for operators of autonomous vehicles. Defines “autonomous vehicle” and directs the Department of Motor Vehicles (DMV) to adopt rules for license endorsement and operation, including insurance, safety standards and testing. |
| Nevada | SB 140 | Prohibits the use of cell phones or other handheld wireless communications devices while driving in certain circumstances, and makes it a crime to text or read data on a cellular device while driving. Permits use of such devices for persons in a legally operating autonomous vehicle. These persons are deemed not to be operating a motor vehicle for the purposes of traffic regulations. |</p>
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<tr>
<td>Nevada</td>
<td>SB 313 (2013)</td>
<td>Relates to autonomous vehicles. Requires an autonomous vehicle that is being highway to meet certain conditions relating to a human operator. Requires proof of insurance. Prohibits an autonomous vehicle from being registered in the state, or tested on a highway within the state, unless it meets certain conditions. Provides that the manufacturer of a vehicle that has been converted to be an autonomous vehicle by a third party will not be liable for certain injuries.</td>
</tr>
<tr>
<td>Nevada</td>
<td>AB 69 (2017)</td>
<td>Defines terms including “driver-assistive platooning technology,” “fully autonomous vehicle” and “automated driving systems.” Requires the DMV to adopt certain regulations relating to autonomous vehicles. Permits the operation of fully autonomous vehicles in the state without a human operator in the vehicle. Specifies that the original manufacturer is not liable for damage or injury caused by an unauthorized third party. Allows the DMV to adopt certain regulations relating to autonomous vehicles. Requires that the DMV report on testing and demonstration.</td>
</tr>
<tr>
<td>New York</td>
<td>SB 2005 (2017)</td>
<td>Allows the commissioner of motor vehicles to approve autonomous vehicle tests and demonstrations. Requires supervision and testing. Specifies requirements for operation, including insurance of five million dollars. Defines autonomous vehicle as one that uses driver-assistive platooning technology on highways in the state. Preempts local regulation. Requires the reporting of any department of motor vehicles within 10 days if the crash results in personal injury or property damage greater than $750 or $2,500 to be imposed for violations of laws and regulations relating to autonomous vehicles. Permits the operation of fully autonomous vehicles on highways in the state without a human operator in the vehicle. Specifies that the original manufacturer is not liable for damage caused by an unauthorized third party. Allows the DMV to adopt certain regulations relating to autonomous vehicles. Imposes an excise tax on the connection of a fully autonomous vehicle for the purpose of providing transportation services. Specifies requirements for autonomous vehicle companies, including a permitting requirement, prohibitions on discrimination, and addressing accessibility. Permits the use of fully autonomous vehicles by motor carriers and taxi companies if certain requirements are met.</td>
</tr>
<tr>
<td>New York</td>
<td>AB 9508 (2018)</td>
<td>This bill amends SB 2005 of 2017 (see above) to add additional language regarding autonomous vehicle demonstrations and tests. Such tests and demonstrations shall be conducted under the direct supervision of the New York state police and in a form or manner prescribed by the superintendent of the New York state police. Additionally, a law enforcement interaction plan shall be included as part of the demonstration and application that includes information for law enforcement and first responders on how to interact with such a vehicle in emergency and traffic enforcement situations.</td>
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<tr>
<td>North Carolina</td>
<td>HB 469 (2017)</td>
<td>Establishes regulations for the operation of fully autonomous motor vehicles on public highways of this state. Defines autonomous vehicle as one that uses driver-assistive platooning technology on highways in the state. Preempts local regulation. Requires the reporting of any department of motor vehicles within 10 days if the crash results in personal injury or property damage greater than $750 or $2,500 to be imposed for violations of laws and regulations relating to autonomous vehicles. Permits the operation of fully autonomous vehicles in the state without a human operator in the vehicle. Specifies that the original manufacturer is not liable for damage caused by an unauthorized third party. Allows the DMV to adopt certain regulations relating to autonomous vehicles. Imposes an excise tax on the connection of a fully autonomous vehicle for the purpose of providing transportation services. Specifies requirements for autonomous vehicle companies, including a permitting requirement, prohibitions on discrimination, and addressing accessibility. Permits the use of fully autonomous vehicles by motor carriers and taxi companies if certain requirements are met.</td>
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<tr>
<td>North Carolina</td>
<td>HB 716 (2017)</td>
<td>Modifies the follow-too-closely law to allow platooning.</td>
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<tr>
<td>North Dakota</td>
<td>HB 1065 (2015)</td>
<td>Provides for a study of autonomous vehicles. Includes research into the degree to which automated motor vehicles could reduce traffic fatalities and crashes by reducing the dynamic driving task. Requires a report on testing and demonstration.</td>
</tr>
<tr>
<td>North Dakota</td>
<td>HB 1202 (2017)</td>
<td>Requires the department of transportation to study the use of vehicles equipped with automated driving systems on the highway and the data or information stored or gathered by the use of those vehicles. Also requires that the study include a review of the methods for dealing with licensing, registration, insurance, data ownership and use, and inspection and how they should apply to vehicles equipped with automated driving systems.</td>
</tr>
<tr>
<td>Oregon</td>
<td>HB 4059 (2018)</td>
<td>This bill exempts a person operating a vehicle that is part of a connected autonomous vehicle system from the traffic offense of following too closely. “Connected automated vehicle system” is defined as “a system that uses vehicle-to-vehicle communication technology to coordinate the braking of a lead vehicle with the braking of one or more following vehicles.”</td>
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## Autonomous Vehicles | Self-Driving Vehicles Enacted Legislation

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<tr>
<th>STATE</th>
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<tr>
<td>Oregon</td>
<td>HB 4063 (2018)</td>
<td>This bill establishes a Task Force on Autonomous Vehicles and clarifies that the Department of Transportation is the lead agency responsible for coordination of vehicle programs and policies. The Task Force will consist of 31 members, including members from the Senate and two members from the House, with each chamber represented by one member of each party. Members of the legislature appointed to the task force are nonvoting members and may act in an advisory capacity only. The task force shall develop recommendations for legislation to be introduced in the odd-numbered year regular session of the Legislative Assembly regarding the deployment of autonomous vehicles on highways. The proposed legislation shall be consistent with law and guidelines and shall address the following issues: (A) Licensing and regulation; (B) Law enforcement and accident reporting; (C) Cybersecurity; and (D) Insurance. The task force may study and consider the potential long-term effects of autonomous deployment to be addressed in future legislation, including the following: (a) Road and infrastructure design; (c) Public transit; (d) Workforce changes; or (e) responsibilities relating to cybersecurity and privacy. The task force must submit a report with recommendations for legislation to the interim committee of the legislature related to transportation no later than September 2018.</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>SB 1267 (2016)</td>
<td>Allows the use of allocated funds, up to $40,000,000, for intelligent transportation system applications, such as autonomous connected vehicle-related technology, in addition to other specified uses.</td>
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<tr>
<td>South Carolina</td>
<td>HB 3289 (2017)</td>
<td>Specifies that minimum following distance laws for vehicles traveling along a highway do not apply to the operator of a vehicle traveling in a platoon.</td>
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<tr>
<td>Tennessee</td>
<td>SB 2333 (2016)</td>
<td>Allows a motor vehicle to be operated, or to be equipped with, an integrated electronic display visible to the operator when autonomous technology is engaged.</td>
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<tr>
<td>Tennessee</td>
<td>SB 1561 (2016)</td>
<td>Redefines &quot;autonomous technology&quot; for purposes of preemption. Defines &quot;driving mode&quot; and &quot;dynamic driving task.&quot;</td>
</tr>
<tr>
<td>Tennessee</td>
<td>SB 676 (2017)</td>
<td>Permits the operation of a platoon on streets and highways in the state after the person provides notification to the department of transportation and the department of safety.</td>
</tr>
<tr>
<td>Tennessee</td>
<td>SB 151 (2017)</td>
<td>Creates the &quot;Automated Vehicles Act.&quot; Defines a number of terms. Modifies laws related to unattended motor vehicles, restraint systems, seat belts, and crash reporting in order to address ADS-operated vehicles. Specifies that ADS-operate from licensing requirements. Permits ADS-operated vehicles on streets and highways in the state without a driver in the high or full automation mode.</td>
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<td>Texas</td>
<td>HB 1791</td>
<td>Allows the use of a connected braking system in order to maintain the appropriate distance between vehicles. Specifies “braking system” means a system by which the braking of one vehicle is electronically coordinated with the braking system of another vehicle.</td>
</tr>
<tr>
<td>Texas</td>
<td>SB 2205</td>
<td>Defines a number of terms, including “automated driving system,” “automated vehicle,” “entire dynamic driving task” and “human operator.” Preempts local regulation of motor vehicles and automated driving systems. Specifies that the owner of an automated driving system is the operator of the vehicle when the system is engaged and that the owner is considered licensed to operate the vehicle. Allows an automated motor vehicle to operate in the state regardless of whether a human operator is present in the vehicle, as long as certain requirements are met.</td>
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<tr>
<td>Utah</td>
<td>HB 373</td>
<td>Authorizes the Department of Transportation to conduct a connected vehicle technology testing program.</td>
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<tr>
<td>Utah</td>
<td>HB 280</td>
<td>Requires a study related to autonomous vehicles, including evaluating NHTSA and AAMVA standards and best practices for ensuring appropriate safety features and regulatory strategies and developing recommendations.</td>
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<tr>
<td>Utah</td>
<td>SB 56</td>
<td>This bill amended HB 373 of 2015 (see above) to define a “connected platooning system” to mean a system that uses vehicle-to-vehicle communication to electronically coordinate the speed and braking of a lead vehicle with the speed and braking of one or more following vehicles.</td>
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<tr>
<td>Virginia</td>
<td>HB 454</td>
<td>Allows the viewing of a visual display while a vehicle is being operated autonomously.</td>
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<td>Vermont</td>
<td>HB 494</td>
<td>Requires the department of transportation to convene a meeting of stakeholders with expertise on a range of topics related to autonomous vehicles. The secretary of transportation must report to the House and Senate committees on transportation regarding the recommendations related to automated vehicles, including proposed legislation.</td>
</tr>
<tr>
<td>Washington</td>
<td>HB 2970</td>
<td>The Washington State Transportation Commission must convene an executive work group to develop policy recommendations to address the operation of autonomous vehicles on public roadways in the state.</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>DC B 19-0931 (2012)</td>
<td>Defines &quot;autonomous vehicle&quot; as &quot;a vehicle capable of navigating District roadways, interpreting traffic-control devices without a driver actively operating any of the control systems.&quot; Requires a human driver &quot;prepared to take control of the autonomous vehicle at any moment.&quot; Restricts conversion to recent vehicles, and addresses the original manufacturer of a converted vehicle.</td>
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<tr>
<td>Washington, D.C.</td>
<td>DC B 22-0901 (2018)</td>
<td>By July 1, 2019, the District Department of Transportation, in consultation, as needed, with the Office of the Chief Financial Officer and any District agencies or organizations such as DC Surface Transit, shall make publicly available a study that evaluates and recommends regarding the effects of autonomous vehicles on the District, including: (1) The effect on the District’s economic development and employment; (2) The impact on the District government’s revenue, including motor vehicle registration fees, motor vehicle fuel taxes, residential parking permit fees, parking meter revenue, fines and fees for infractions or parking, standing, stopping, and pedestrian infractions, and commercial parking taxes; (3) The impact on the infrastructure, traffic control systems, road use, congestion, curbside management, and public space; (4) The impact on environment and public health; (5) The impact on public safety in the District, including the safety of other road users such as bicyclists; (6) The impact on the District’s disability community; (7) The impact on the various transportation modes in the mass transit, shared-use vehicles, and public and private vehicles-for-hire; and (8) The need for and use of autonomous data from autonomous vehicle manufacturers and public and private vehicle-for-hire companies.</td>
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<td>Wisconsin</td>
<td>SB 695 (2018)</td>
<td>This bill defines a “platoon” as a group of individual motor vehicles traveling in a manner at electronically coordinated speeds. This bill creates an exception for traffic law requiring the operator of a motor truck with a gross weight of more than 500 pounds to maintain a distance of not less than 500 feet behind the vehicle immediately preceding.</td>
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Additional Resources

**NCSL Resources**

- Autonomous Vehicle Legisbrief, April 2017
- State Legislatures, Jan. 2017 Article
- Autonomous Vehicle Legisbrief, February 2014
- State Legislatures, March 2013 Article
- Transport Report April/May 2014

**State Resources**

- California Department of Motor Vehicles [webpage on Autonomous Vehicles](#)
- Florida Department of Highway Safety and Motor Vehicles [Autonomous Vehicles report](#) (February 1
- Georgia House [Autonomous Vehicle Technology Study Committee report](#) (December 2014)
- Iowa Department of Transportation [Automated Vehicle Technologies Project Vision Document](#) (March
- Kentucky Transportation Center, [Analysis of Autonomous Vehicle Policies](#) (March 2017)
- Louisiana Transportation Research Center, [Investigation into Legislative Action Needed to Accommodate Safe Operation of Autonomous Vehicles in the State of Louisiana](#) (October 2016)
- Pennsylvania [Autonomous Vehicles Testing Policy Task Force](#) (June 2016), Draft Final Report (Nov
- Vermont Agency of Transportation, [Preparing for Automated Vehicles in Vermont](#) (January, 2018)

**Other Resources**

- University of Michigan Transportation Research Institute [Survey on Driver Automation Preferences](#)
- NHTSA policy on Automated Vehicles
- NHTSA Human Factor Evaluation for Automated Vehicles
- Governors Highway Safety Association, [Autonomous Vehicles Meet Human Drivers: Traffic Safety in the United States](#)
- Center for the Study of the Presidency & Congress, [The Autonomous Vehicle Revolution—Fostering with Smart Regulation](#)
- [Automated Vehicle Crash Rate Comparison Using Naturalistic Data](#): The Virginia Tech Transportation Institute released a report that assesses driving risk in the United States nationally and for the Google Self-Driving Project by considering crash rates reported to the police, crash rates for different types of roadways that give rise to unreported crashes.

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Despite two fatal accidents involving semi-autonomous cars occurring within days of each other in March, testing of the technology continues. On April 2, California expanded its testing rules to allow for remote monitoring instead of a safety driver inside the vehicle. Waymo and another company have since applied to begin testing vehicles without drivers in the state. While neighboring states Arizona and Nevada also allow testing without a safety driver, California is both the most populous state and also the home to many of the companies’ testing vehicles. States should learn from regulations that promote innovation and safety at the same time.

Setbacks in Autonomous Vehicle testing

An Uber vehicle with a safety driver struck and killed a pedestrian in Tempe, Arizona on March 18; Uber quickly suspended all testing of its autonomous fleet while it investigates the causes of the crash. On March 23, the driver of a Tesla in autonomous mode died when the vehicle crashed into a highway median in Mountain View, California. Tesla has not suspended the feature in its vehicles while the company and the National Highway Traffic Safety Administration (NHTSA) investigate the causes of that crash. Since proponents highlight the safety improvements of driverless cars, these fatalities will invite stricter scrutiny of the claims of the technology.

As their name implies, safety drivers have played an important role in autonomous vehicle development. They receive special training to assume control when onboard computers encounter a situation that the vehicle cannot navigate by itself. Driving conditions can change quickly and the safety driver must remain alert constantly. However, advancements in driverless technology promise to eliminate human inputs altogether.
With no steering wheel or a gas pedal, a computer would control the engine and steering based on inputs from onboard sensors. Passenger shuttles without any of these features have launched in Las Vegas, the University of Michigan, and in San Ramon, California.

A look at state laws

![Map of the United States showing states that have passed laws on autonomous vehicles](https://www.brookings.edu/blog/techtank/2018/05/01/the-state-of-self-driving-car-laws-across-the-u-s/)

Source: National Conference of State Legislatures

While the U.S. Department of Transportation and NHTSA periodically update their guidelines for autonomous vehicles, individual states are already passing relevant laws. However, they differ on basics like the definition of “vehicle operator.” Tennessee SB 151 points to the autonomous driving system (ADS), while Texas SB 2205 designates a “natural
person” riding in the vehicle. Meanwhile, Georgia SB 219 identifies the operator as the person who causes the ADS to engage, which might happen remotely in a vehicle fleet. These distinctions will affect how states license both human drivers and autonomous vehicles going forward.

The most popular topic, with 11 state laws, is exemptions to following distance rules that allow for truck platooning. Drivers typically maintain an appropriate following distance from other vehicles to account for speed, road conditions, and human reaction times when traffic comes to a stop. With wireless communication, a line of trucks can accelerate and brake over much shorter distances. Closer following distances in a truck platoon lowers air resistance on the following vehicles, with fuel savings that add up quickly for multiple trucks hauling cargo over long distances. The popularity of platooning laws suggests a wider focus on commercial applications of autonomous vehicle technology on the state level.

Many other state laws call for studies of autonomous driver systems, though no states have yet published their findings. Of all the states, North Dakota has considered what happens to the data produced by self-driving cars. SB 2012, enacted in 2017, calls for the state Department of Transportation to study “the data or information stored or gathered by the use of those vehicles.” A failed bill from the same year, HB 1394, would have granted ownership of data to the vehicle’s owner and allowed sharing of data with the consent of the customer. Given the number of sensors built in to autonomous vehicles and the amount of data they generate, determining privacy protections will be an important aspect of new regulations.

Laboratories of democracy, and self-driving cars

Looking at the database of autonomous vehicle legislation from the National Conference of State Legislatures, we can track the progress of states in passing legislation. Twenty-two states and the District of Columbia have passed laws and an additional 10 state governors have issued executive orders regarding the operation of autonomous vehicles, while ten other state legislatures have considered legislation and the remaining eight state legislatures have not considered any.
California requires companies that test self-driving cars in the state to report the number of miles driven as well as the number of disengagements, or times a human driver taken control from the autonomous system. The number of disengagements per vehicle mile driven must have fallen enough to warrant a relaxing the rule to require a safety driver.

Total Autonomous Vehicle Miles Driven in California, 2014-2017

Source: California Department of Transportation
Autonomous Vehicle Disengagements in California, 2014-2017

Source: California Department of Transportation

Within two years, 20 companies had collectively logged over 1 million miles of autonomous driving. Growth in miles driven slowed after September 2016 as more states passed laws to attract self-driving car testing. Around the same time, average disengagements per mile leveled off at 5 per 1,000 vehicle miles, or one disengagement every 200 miles driven. The stability in this figure over 14 months may have prompted California Department of Transportation to relax its rules on having a safety driver in the front seat.

The two vehicle fatalities in March emphasize the human costs of testing technology. Fully realized, replacing human drivers with artificial intelligence could drastically reduce motor vehicle deaths, a toll that claimed over 40,000 lives in the U.S. in 2016. If the rewards for getting it right outweigh the associated risks, how can technologists and policymakers minimize those risks? National safety guidelines and state laws should
incorporate the lessons learned from real world testing. Preventing all future accidents may prove impossible, but they can provide feedback on what policies work best and which do not.

*Christian Rome Lansang provided research for this blog post.*
EMERGING TECH

6 self-driving car crashes that tapped the brakes on the autonomous revolution

Our list of self-driving accidents, including the 'avoidable' Arizona Uber crash

SHARE

According to statistical data, you're almost certainly safer in a car driven by a computer than one driven by a human. Self-driving vehicles have the opportunity to bring multiple benefits — from safer driving experiences to less congestion in our cities.

With that said, autonomous cars won't mean the end of road traffic accidents. Crashes can occur as the result of both human error and technical fault. While this list isn't supposed to be comprehensive, these are the most significant crashes in self-driving (and semi-self-driving) car history. Hopefully, the right lessons can be learned from them.

GOOGLE LEXUS SUV, JULY 2015
Google revealed that one of its self-driving cars had been involved in the first crash to injure a human. The incident involved one of Google's self-driving Lexus SUV vehicles being rear-ended in Mountain View, CA, during testing. Three Google employees who were on board at the time suffered minor whiplash. The driver of the other vehicle reported neck and back pain.

This wasn't the first accident involving one of Google's self-driving cars, but it was the first one which could be classified as serious (or, in this case, semi-serious.) The common factor in all the crashes up to this point was human error on the part of other drivers. Mountain View police responded to the incident, but did not file an accident report.
TESLA MODEL S, JANUARY 2016

The world’s first apparent death in a semi-autonomous car took place in early 2016. Less widely covered than subsequent instances, it occurred in China, just three months after Tesla’s autopilot feature was introduced to the Chinese market.

This semi-autonomous feature is designed to offer an advanced driver assistance system (ADAS), although it still requires drivers to be attentive. The incident involved a Tesla Model S sedan — supposedly in autopilot mode — which crashed into the back of a cleaning vehicle while driving in clear weather, resulting in the death of its 23-year-old driver Gao Yaning. No attempt at braking was made.

“The autopilot program’s slow response failed to accurately gauge the road conditions ahead and provide instructions,” claimed a lawsuit filed against Tesla. Tesla said that it was unable to confirm whether autopilot
was engaged at the time, since the damage caused by the collision left the car “physically incapable of transmitting log data to our servers.”

A police investigation found that Yaning had failed “to drive safely in accordance with [autopilot] operation rules” (read: paying full attention to the road), while also blaming the street sweeping vehicle’s “incomplete safety facilities.”

**GOOGLE LEXUS SUV, FEBRUARY 2016**

One of Google’s self-driving Lexus SUV cars was involved in a non-fatal crash with a bus on Silicon Valley’s El Camino Real road. This was the 18th accident involving a Google autonomous vehicle, but is significant because it was the first time that the Google vehicle is apparently at fault.
The incident occurred while Google's car is merging back into traffic after stopping to avoid an obstacle. It stuck the side of the bus while doing so. The SUV suffered superficial damage to one wheel, its side-mounted sensors and bodywork.

“We clearly bear some responsibility, because if our car hadn't moved there wouldn't have been a collision,” Google said in a statement. “From now on, our cars will more deeply understand that buses (and other large vehicles) are less likely to yield to us than other types of vehicles, and we hope to handle situations like this more gracefully in the future.”

TESLA MODEL S, MAY 2016

The first U.S. death involving a semi-autonomous car occurred when 40-year-old Ohio resident Joshua Brown's Model S Tesla was in autopilot mode on the highway.
Unfortunately, the car’s sensors failed to recognize a white 18-wheel truck and trailer crossing the highway against the bright sky background. As a result, the Model S drove full speed under the trailer, which impacted the car’s windshield.

“Autopilot is getting better all the time, but it is not perfect and still requires the driver to remain alert,” Tesla said in a statement, while also noting that it was “beyond saddened” by Brown’s death.

**UBER SELF-DRIVING VOLVO, MARCH 2018**

An autonomous car killed 49-year-old Arizona resident Elaine Herzberg in what is believed to be the first fatal U.S. crash involving a pedestrian and self-driving vehicle. The incident took place at night when Herzberg was
crossing the road with her bicycle outside of a sanctioned crosswalk, and has since been deemed “entirely avoidable.”

The Uber test driver was not looking at the road in the moments leading up to the collision, and according to a recently released police report, was watching Hulu until 0.5 seconds before the crash. “Our hearts go out to the victim’s family,” the company said in a statement. “We are fully cooperating with local authorities in their investigation of this incident.” Uber temporarily suspended autonomous road testing in the aftermath of the accident.

TESLA MODEL X, MARCH 2018

Less than a week after the Uber self-driving car crash, another semi-autonomous vehicle fatality took place — once again involving a Tesla vehicle. On this occasion, a Tesla Model X on autopilot crashed in
Mountain View, killing the 38-year-old driver, Apple software engineer Wei Huang.

According to Tesla, Huang received “several visual and one audible hands-on warning earlier in the drive, and the driver’s hands were not detected on the wheel for six seconds prior to the collision.” However, no intervention was taken and the car collided with the concrete divider in the road.

*Updated on June 22 to add news that the Uber crash was deemed entirely avoidable, and that the driver was watching Hulu.*

**Editors' Recommendations**

- Deadly Uber crash was ‘entirely avoidable’ had the driver not been watching Hulu
- Tesla says driver ignored warnings from Autopilot in fatal California crash
- Tesla crashes into parked police car in California; driver says Autopilot was on
- Waymo self-driving cars are now covering 25,000 miles a day
- Can’t we all just drive along? The not-so-universal language of autonomous cars

**DON'T MISS**

Going, going, gone! A rare Ferrari 250 GTO sells for more than $48 million

**UP NEXT**

How to buy a Wi-Fi router
Volkswagen will spend $4 billion to connect its cars to the Internet of Things

As part of an effort to simplify the onboard systems of its cars, Volkswagen announced a $4 billion investment in a platform called vw.OS. The first cars running the platform, part of its I.D. electric car line, will appear in 2020.

Posted 3 days ago — By Ed Oswald
Autonomous Vehicles: Terrorist Threat or Security Opportunity?

The new Smart concept autonomous car Vision EQ fortwo model is presented during the Frankfurt Motor Show (IAA) in Frankfurt, Germany, September 12, 2017. Photo by Kai Pfaffenbach/Reuters

by James Black

Autonomous vehicles such as those being tested by Google or Tesla will be one of the most important and disruptive technologies for the future of how people move, work, and live. But terrorist groups are tracking these developments closely, too.

Finnish security firm F-Secure reports “concrete evidence” that ISIS is considering the use of self-driving cars in place of suicide bombers, or for ramming attacks such as those carried out as early as June 2007 in Glasgow, as well as more recently in Nice in July 2016, Berlin in December 2016, London in June 2017 and, just two months ago, in New York.
As trials of self-driving vehicles take place around the world, the FBI has identified this novel technology as “game-changing” for law enforcement, presenting both new threats and new opportunities in the fight against crime and terrorism. The FBI reports that driverless cars could revolutionize high-speed car chases, freeing up passengers in the pursued vehicles to conduct tasks that are impossible with their hands on the steering wheel and eyes on the road (e.g., shooting at pursuers or civilians)...

The remainder of this commentary is available on thecipherbrief.com.

James Black is a senior analyst in the Defence, Security and Infrastructure group at RAND Europe. He was previously involved in RAND Europe's Future Transport Scenarios study. The op-ed is based on analysis that originally appeared on the Observatory for a Connected Society.

This commentary originally appeared on The Cipher Brief on January 3, 2018. Commentary gives RAND researchers a platform to convey insights based on their professional expertise and often on their peer-reviewed research and analysis.

ABOUT

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Elon Musk Accuses Tesla Employee of Sabotage

By Neal E. Boudette

June 19, 2018

In scrambling to ramp up production of its Model 3 electric car, Tesla has run into trouble with robots and automated machinery, a need for more workers and a shortage of battery packs.

Now Tesla’s chief executive, Elon Musk, suspects his company might have a more unusual problem: sabotage.

In an email sent to employees late Sunday night, Mr. Musk said a disgruntled worker had broken into the company’s computer systems in an attempt to disrupt manufacturing.

“I was dismayed to learn this weekend about a Tesla employee who had conducted quite extensive and damaging sabotage to our operations,” he wrote. “This included making direct code changes to the Tesla Manufacturing Operating System under false usernames and exporting large amounts of highly sensitive Tesla data to unknown third parties.”

While it was not clear whether the operations in question were at its assembly plant in Fremont, Calif., its battery plant near Reno, Nev., or elsewhere, this new disruption comes as Tesla is racing to streamline operations on the assembly line that produces the Model 3. Mr. Musk is counting on the midsize Model 3 to drive revenue higher, stabilize Tesla’s finances and enable the company to begin generating profits.

He has said that Tesla will make money in the second half of the year if it is able to produce 5,000 or more Model 3s a week, a level that he predicted would be reached by the end of the month. At the company’s shareholder meeting this month, Mr. Musk said the company had increased its output to about 3,500 Model 3s a week, up from around 2,000 a week in early May.

Tesla seemingly has no shortage of customers ready to buy the car. It took $1,000 deposits from nearly 400,000 people even before it began making the Model 3 last summer. A large portion of those customers, however, were expecting to buy a basic version that is priced at $35,000 but has not yet gone into production. For now, the company is making versions that sell for $50,000 and more.
“What versions they are producing are almost as important as how many they are producing a
week,” said Rebecca Lindland, a senior analyst at Kelley Blue Book, an automotive research firm.
“They’ve been talking about a mainstream car that anybody can afford but what they’re making
are still luxury cars that most buyers can’t afford.”

Ms. Lindland said that she had sent a deposit for a base-price Model 3, but that she asked for a
refund earlier this year when she realized that only the higher-priced versions would be available.

The specter of industrial sabotage adds a strange chapter to the extraordinary, if relatively short,
history of Tesla. Defying critics, the company has proved that there is a viable market for electric
cars and that they can command premium prices. It has pioneered methods of upgrading cars
through software updates beamed over the air, the way iPhones can download operating systems.
Taking an approach never tried before, Mr. Musk also built a gigantic factory in Nevada to reduce
the costs of battery packs through vast scale.

At the same time, Tesla and its chief have experienced setbacks. At least three fatal accidents
have occurred in the United States involving Tesla vehicles that were operating with the
company’s Autopilot driver-assistance system engaged, drawing scrutiny from federal safety
officials and raising questions about the system's reliability. Mr. Musk also overestimated Tesla's ability to mass-produce the Model 3; he once expected the company to churn out several hundred thousand in 2018.

While Tesla's share price has made it more valuable than Ford and close behind General Motors, its shares were down almost 5 percent on Tuesday.

One constant since Tesla was founded in 2003: the company has lost money every year. Tesla has several times raised money from investors to develop its cars and put them into production, and some analysts are concerned because the company must begin paying back some debt later this year.

Earlier this year, Moody’s Investor Service cut Tesla's credit rating, noting that it could face a cash crunch if it failed to hit its Model 3 production targets. Just last week, Mr. Musk announced that Tesla was eliminating the jobs of about 3,500 people to cut costs.

In his email reporting sabotage, Mr. Musk seemed to stoke the notion that enemies of Tesla were working against it.

“As you know, there are a long list of organizations that want Tesla to die,” he wrote. “These include Wall Street short-sellers, who have already lost billions of dollars and stand to lose a lot more.” He also pointed to oil and gas companies, which, he said, “don't love the idea of Tesla advancing progress of solar power & electric cars.” Of rival automakers, he added that “if they’re willing to cheat so much about emissions, maybe they’re willing to cheat in other ways?”

The employee thought to have harmed Tesla's manufacturing system was not identified in the email, but Mr. Musk said the worker had admitted trying to damage the manufacturing system and was unhappy with the company after being passed over for a promotion.

The email was first reported by CNBC. A Tesla spokesman declined to discuss the content of Mr. Musk's emails.

In a separate email to employees on Monday, also reported by CNBC, Mr. Musk said a minor fire had broken out on the assembly line at its Fremont plant, halting production for several hours. He said it “could be just a random event” but added that it was “hard to explain” and urged employees to keep any eye out for any suspicious activity inside the company.

“This is when outside forces have the strongest motivation to stop us,” Mr. Musk wrote.