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Policy Brief: How Does Texas Law Change the Legal Landscape for Automated Vehicles?

With the advent of automated vehicle technologies, we are entering a period of transition and uncertainty that involves harmonizing the laws that we have on the books with new issues raised by the technology. Until the 85th Texas Legislature (2017), Texas law did not recognize automated vehicles (AVs), neither for testing nor for operation on Texas roads. Although this law addresses a number of issues that can help to create a legal foundation for the operation of automated vehicles in Texas, several other legal ambiguities remain. This brief identifies and discusses a number of those issues as they apply to automated vehicles.

Introduction

With the advent of automated vehicle technologies, we are entering a period of transition and uncertainty that involves harmonizing the laws that we have on the books with new issues raised by the technology. Automobiles are already being produced and sold with automated features that provide assistance to drivers such as lane departure warning systems that alert drivers who are drifting outside their lane, and adaptive cruise control that maintains a vehicle's speed and the following distance between a vehicle and the car ahead of it. What is new are vehicles equipped with enough automation to function without a driver present in the car at all.

Until the 85th Texas Legislature (2017), Texas law did not recognize automated vehicles (AVs), neither for testing nor for operation on Texas roads. However, during that session, Texas passed a law that began to address potential legal issues. The bill passed as Senate Bill 2205, and it added Subchapter J to Section 545 of the Transportation Code (hereinafter "SB 2205").

Major elements of Senate Bill 2205 include:

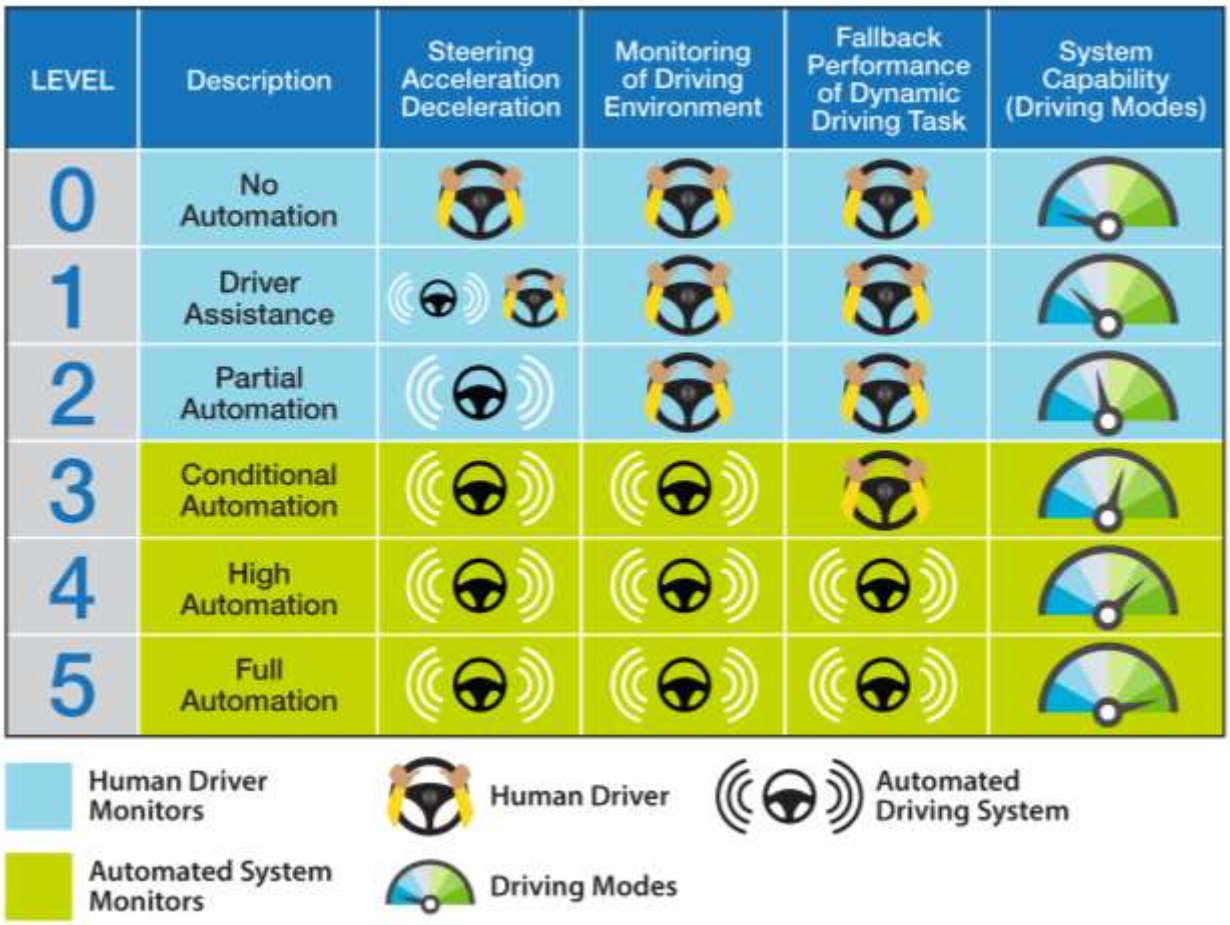
- Explicit allowance for the operation of an automated motor vehicle on Texas roads, regardless of whether or not a licensed human operator is physically present in the vehicle.
- Defined terms related to automated vehicles, such as "automated driving system," "entire driving task," "automated motor vehicle," and "human operator."
- Exclusive governance assigned to the Department of Public Safety and explicit preemption of other political subdivisions or agencies from regulating the operation of automated motor vehicles (*1*).

Although this law addresses a number of issues that can help to create a legal foundation for the operation of automated vehicles in Texas, several other legal ambiguities remain. This brief identifies and discusses a number of those issues as they apply to automated vehicles, including:

- The legality of automated vehicles themselves.
- Whether operators must be present or human.
- Whether the AV can be considered an operator.
- To what extent preemption clauses can override existing authority.
- Whether human-centric road rules are barriers to AV deployment.
- Who owns the data that AVs collect or transmit.
- Whether Texas privacy laws protect driver information.
- Who is responsible if something goes wrong.

How Are Automated Vehicles Defined?

In January 2014, the Society of Automotive Engineers (SAE) published definitions for the full range of levels of automation in on-road motor vehicles, providing the automated vehicle community with a common language with which to discuss automated vehicles (*2*). (See Figure 1.) This taxonomy categorized automation into five levels. Level 0, not counted among the five, describes vehicles with no automation. The following description of the SAE's automated vehicle classification is taken from a report published by the Texas A&M Transportation Institute, *Revolutionizing our Roadways: Implications of Automated Vehicle Crash Scenarios*, by Mohammed Poorsartep.



Source: Mohammed Poorsartep *(3)*

Figure 1. SAE Levels of Automation

As shown in Figure 1, for Level 1 and 2 vehicles, the human driver is responsible for "monitoring of driving environment" and must also be immediately available to perform certain tasks if prompted or in case of a system failure. However, a Level 2 AV, unlike a Level 1 AV, is capable of performing lateral and longitudinal maneuvers (i.e., steering and braking/accelerating). For example, a Level 2 system could be traffic jam assist [an automated vehicle function], which can keep the vehicle within a lane and a driver-specified distance from the vehicle in front of it, while the driver monitors the environment and is readily available to take over the driving task if required to do so.

Similar to Level 2 systems, Level 3-5 systems also perform the lateral and longitudinal maneuvers. However, unlike Level 2, Level 3-5 systems are given the task of monitoring the driving environment. Level 4 and 5 systems not only monitor the environment but are also responsible for performing all aspects of the driving task, whether the human is available to intervene upon request or not. This means that if conditions are present, Level 4 and 5 vehicles can operate without a human even inside the vehicle (*3*).

The National Highway Traffic Safety Administration (NHTSA) released its policy document on automated vehicles in Fall 2016, entitled *Federal Automated Vehicles Policy*. In 2017, NHTSA released a new version of the document. In it NHTSA describes SAE Level 3-5 vehicles as Automated Driving Systems (ADS), and uses that term throughout its policy document to describe SAE Level 3-5 vehicles (*4*).

In SB 2205, Texas law also provides defined terms and clarification related to automated vehicles. These include:

- The "automated driving system" is hardware and software that, when engaged, are collectively capable of performing all aspects of an entire driving task and any fallback maneuvers necessary to respond to system failure, all without the intervention or supervision by a human operator.
- An "automated motor vehicle" is defined as a vehicle in which an automated driving system is installed.
- The "entire driving task" is defined as any operational or tactical aspect of operating a vehicle.
- A "human operator" is a natural person in an automated vehicle who controls the entire dynamic driving task.
- The automated driving system is considered to be licensed to operate the vehicle as long as the automated driving system is engaged (*1*).

Are Automated Vehicles Themselves Legal?

If conventionally equipped to meet existing standards, AVs are probably legal. One set of legal challenges that automated vehicles face lies in the rules governing the performance-based standards for the vehicles themselves. These safety rules, the Federal Motor Vehicle Safety Standards (FMVSS) and Regulations, are administered by NHTSA for purposes of establishing safety performance requirements for motor vehicles or items of motor vehicle equipment. Currently, there are not any FMVSS for automated vehicles. SB 2205 allows operation of automated vehicles in the state so long as they comply with applicable federal rules, including NHTSA's requirements.

The purpose of these requirements is to protect the public from unreasonable risk of crashes resulting from the design, construction, or performance of motor vehicles. They are also meant to reduce the severity of crashes, aiming to decrease the injury and death rates in the event that crashes do occur (*5*).

These rules apply to new vehicles. Manufacturers, importers and distributors must certify to them at the site of manufacture where manufacturers produce and self-certify vehicles, in

compliance with NHTSA processes (*5*). Licensed dealers may then sell certified vehicles that can be registered to operate on Texas roadways.

A number of physical attributes that the FMVSS regulate are related to human operation of a vehicle. For example, the rules require that every car have a steering wheel, accelerator and brake pedals, as well as equipment designed for human control of speed and direction. These and other current requirements, however, may not be necessary for higher level AV operation.

Currently there are no FMVSS for automated vehicles. Instead, while ADSs are still in development, NHTSA's 2017 *Vehicle Performance Guidance for Automated Vehicles* provides 12 voluntary guidance points regarding safety assessment guidelines for entities involved in the testing and manufacturing of ADSs.

These are not FMVSS for automated vehicles. The voluntary guidance points encourage entities involved in the manufacturing and testing of ADSs to consider the following:

1. Operational Design Domain (ODD): Document and summarize the intended ODD or safe operating parameters, such as roadway types, weather, geographic areas, etc. for each ADS.
2. Object and Event Detection and Response (OEDR): Document OEDR capabilities, an ADS's recognition and response to both normal driving events and crash avoidance conditions, such as detecting stopped vehicles in the roadway, responding to road signs or traffic signals, or performing a merger onto a freeway.
3. Fall Back (Minimal Risk Condition): Document the process for returning an ADS to a "minimal risk condition" when a problem occurs or the ADS cannot operate safely.
4. Validation Methods: Develop testing methods through a combination of simulation, test-track driving, or on-road testing that will verify an ADS performs as expected during normal operation and in crash avoidance or fall back scenarios.
5. Data Recording and Sharing: Have a documented process for testing, validation, and collection of crash-related or correctly-detected (by the ADS) safety issue data. Data for fatalities, personal injuries, or damage to the vehicle making it unsafe to drive should be stored by the manufacturer for retrieval, as is current practice.
6. System Safety: Develop comprehensive system safety back-ups for possible system failure or malfunction, based on a robust, systems-engineering approach.
7. Vehicle Cybersecurity: Follow best practices established by industry standards on cybersecurity to minimize risks from cybersecurity threats and vulnerabilities, based on systems-engineering approach.
8. Human-Machine Interface: Consider how ADSs will interact or communicate with any human driver, other operators, or occupants of the ADS, and "external actors" like pedestrians, bicyclists, and other vehicles.
9. Crashworthiness: Consider incorporating information from the advanced sensing technologies needed for ADS operation into new occupant protection systems that provide enhanced protection to occupants of all ages and sizes.

10. Consumer Education and Training: Educate and train employees, distributors, dealers and consumers on ADS technology and how it differs from existing technology.
11. Post-Crash Behavior: Consider methods for assessing an ADS after it has been in a crash, and disable the automated features if sensors or other safety system components are damaged, until the vehicle is fixed.
12. Federal, State, and Local Laws: Document methods of compliance with federal, state, and local laws (*4*).

Currently, a vehicle still has to meet the federal safety standards, but can also be equipped with self-driving capabilities. For example, vehicles are still required to have a steering wheel, accelerator, and brake pedal. These components could operate under control of the automated system, however.

Congress has also begun to create federal legislation for automated vehicles and continues to do so as of this writing. Recently introduced legislation addresses federal preemption of state laws, AV vehicle safety requirements, cybersecurity protection, privacy plans, provision of instruction to consumers, and other matters. (*6*).

Must an Operator of an Automated Vehicle be a Licensed Human?

AVs must still be controlled by a licensed operator, but that operator is no longer required to be human. Prior to the 2017 85th Regular Session of the Texas Legislature, several sections of Texas law suggested that a vehicle might legally be operated by someone or something other than a natural person. Section 541.001 of the Texas Transportation Code defines operator as "a person who drives or has physical control of a vehicle" and states that a person is "an individual, firm, partnership, association, or corporation." An operator might therefore be a human being or a corporate entity. Before the most recent Session, however, all operators were required to be licensed in Texas. To obtain a driver's license under current Texas law, a person must provide information that can only, at this point, be sourced from humans: fingerprints, a photograph of the applicant, the applicant's signature, name and place and date of birth, and sex. Thus until the passage of SB 2205, it was not clear how a nonhuman would become a licensed operator (*7, 8, 9*).

Senate Bill 2205 clarifies these issues with regard to automated vehicles. The bill, which exclusively governs automated vehicles, provides two options for meeting state licensing requirements. One defines "human operator" as "a natural person in an automated vehicle who controls the entire dynamic driving task." Under current law, this human operator would be subject to the previously discussed human-centric requirements for obtaining a driver's license. The second option for meeting state licensing requirements defines the automated driving system itself as the licensed operator as long as the automated driving system is engaged. The bill confirms that under those circumstances, no licensed human operator is required to operate the vehicle. It should be noted that there are no licensing or registration requirements for the automated driving system (*1*).

Must an Operator be Physically Present When Operating an Automated Vehicle?

Another question raised by the notion of a driverless car is whether the entity in control of the vehicle must be present in the vehicle while operating it. In other words, is it legal for a vehicle to be remotely controlled or to control itself? The answer is yes. Before SB 2205 was passed, existing Texas law seemed to have assumed that a human operator would be physically present in the vehicle while operating it. For example, Sec. 545.404. states that "an operator may not leave a vehicle unattended" without performing a number of tasks related to the safe departure from a vehicle such as stopping the engine, locking the ignition, removing the key from the ignition, and so on (*10*).

The passage of SB 2205 dispenses with any question that might arise regarding the presence of a human operator in an automated vehicle. SB 2205 specifies that an automated motor vehicle may operate in the state "regardless of whether a human operator is physically present in the vehicle." Depending on the capabilities of the automated vehicle in question, this provision may not actually be inconsistent with the implications of previously existing section 545.404 discussed above. If an automated vehicle can perform the required duties of an operator as expressed in Section 545.404, then the new law may, in practice, be redundant. However SB 2205 dispenses with any need to apply the older section of the code to automated vehicles and clarifies any ambiguity, explicitly allowing for remote control of an automated vehicle (*1*).

To What Extent Can SB 2205's AV Preemption Clause Override Existing Authority?

This matter is not yet determined. SB 2205 is clear in giving only the State the power to legislate, and the Texas Department of Public Safety the power to regulate, automated vehicles. The bill explicitly prohibits any other state agency or political subdivision of the state from enacting any form of regulation governing automated vehicles (*1*).

It is unclear exactly how this preemption clause will affect existing state law. It appears that there is at least one apparent conflict. The conflict would occur if there was a vehicle that was both an automated vehicle and a neighborhood electric vehicle (NEV). NEVs are governed by the Texas Transportation Code, Title 7, Subtitle C, Chapter 551, Subchapter D (hereinafter, the "NEV Statute"). The NEV Statute is meant to govern the use of small, low–speed electric vehicles on public roads in Texas (*11*).

A conflict between SB 2205 and the NEV Statute may arise because the NEV statute clearly states that counties and municipalities may prohibit the operation of NEVs on streets or highways, and that TXDOT may prohibit the operation of NEVs on highways, for purposes of public safety. These provisions present a potential conflict in the event there is a Texas vehicle that is an automated NEV. The reason is that although the NEV statute allows certain government entities to regulate NEVs, SB 2205 expressly prohibits political subdivisions or any

state agency other than the Department of Public Safety from regulating the use of automated vehicles (*1*). Since both statutes would apply to an automated NEV, there is an apparent conflict.

This is one example of an apparent conflict between the SB 2205 preemption clause and existing law. There is a possibility that more conflicts could become apparent as the law continues to be applied to automated vehicles.

Are Automated Vehicles Able to Comply with Texas' Statutory Rules of the Road?

There are a number of rules that address safe driving, emergency situations, temporary situations, driving in the presence of specific vehicles, and the like that require human judgment and what might seem limited to a human ability to perceive and understand those situations. At present there has been no public demonstration of an AV that can comply with these laws.

For example, existing law requires an operator of a vehicle to stop when approaching a school bus from either direction when the bus is picking up or dropping off students. The bus driver indicates that these activities are occurring with a visual or auditory signal that could be in the form of a flashing light, a hand motion, or other form of communication. Also, these rules are slightly different depending on what type of roadway the bus and other vehicle are driving on (*12*).

Existing law also requires that a vehicle not drive in the path of an emergency vehicle responding to an emergency call, or follow the vehicle at a distance closer than 500 ft (*13*).

In order to comply with these laws as written today, AVs will have to be able to recognize these differences in road type and condition, to understand different forms of signalization, and to comply with the implied instructions (*7*).

Additionally, there are rules of the road currently in place that assign certain duties to operators of vehicles. Questions around these statutes arise in the event the operator is remotely operating the vehicle, therefore not present in the vehicle, or if vehicle itself is ever considered the operator. One such statute requires that an operator render aid to anyone that is injured due to an accident that their vehicle is involved in (*14*). Such a requirement may not be possible if the operator of the vehicle is located remotely.

Perhaps such an obstacle can be overcome in the future through new advancements in automated technology. Alternatively, lawmakers may need to restructure statutes to conform to AV capabilities. However, if AVs are not able to follow these rules, these rules will remain a barrier to AV operation (*8*).

Will Texas Law Protect the Private Information that Automated Vehicles Will Collect?

It is likely that some private information collected by AVs wil be protected under Texas law. Though exactly what data is or might be collected and transmitted by connected cars is not yet clear (*15*), SB 2205 clarifies that in order for an AV to legally operate in Texas, it must be equipped with a "recording device" that meets the definition in Texas Transportation Code 547.615 and whose purpose is to record information that can be retrieved from the vehicle after an accident (*1*). It is likely that automated vehicles could collect far more data than such a recording device does, however. Some research shows that traveler information such as trip origin and destination, traveler personal data, vehicle service information, vehicle occupancy, and vehicle miles traveled will be gathered and transmitted (*16*). This type of personal information may fall into a protected category called Personally Identifying Information (PII). PII is defined in several places in Texas law. Additionally, the definitions of PII are often vague, and what constitutes PII in one scenario may not in another. The most encompassing definition comes from the Texas Business and Commerce Code, which defines it as data that "alone or in conjunction with other information identifies an individual" (*17*). A vehicle's location and trip origin/destination data may be considered PII if it reveals information sufficient to identify an individual.

Texas has data privacy laws specific to the state's handling of someone's name address, financial and medical data (*15*). There are also Texas statutes related to PII that address tolling-related data and crash records data, collected by event data recorders (EDRs) (*18*, *19*). EDRs record vehicle information immediately before, during, and after a crash occurs, recording information such as vehicle speed, use of accelerator and brake pedals, and whether vehicle seatbelts were engaged. The purpose of EDRs is to record data that can be used for crash investigations, providing a better understanding of the circumstances of crashes so that safer vehicles can be designed (*19*). EDRs are not legally required, although many vehicles are now manufactured with EDRs. While EDR information alone is not personal information, EDR data combined with data from other technologies could be used to personally identify an individual (*16*).

Texas laws protect citizens from third-party access to personal information contained by EDRs by generally prohibiting access to EDR information by either governmental or private parties except in very narrow circumstances (*20*). Some of the data AVs will likely record could be the same as or similar to the data recorded by EDRs, so current Texas law should protect personal data collected by AVs if that data is sufficiently similar to data collected by EDRs. However, apart from crash data collected by EDRs installed in cars, there are no laws that specifically address data collected by the car itself. This may mean that other data collected by automated vehicles, that could identify individuals but that are not identified as PII by state law, may not currently be protected.

Unlike data collected by EDRs, cellphone location information may currently be accessed by law enforcement officers without the use of a warrant (*21*). However, the Supreme Court recently

decided to hear arguments in a case regarding whether or not a warrant is required by police to obtain a cell phone's location information from a cell phone provider (*22*). The Supreme Court's decision in this case could set a precedent for protection of location information stored by AV manufacturers and should be considered when making policy decisions.

Who Owns the Data that Automated Vehicles Will Collect, and that Some May Transmit?

Ownership of the data that AVs will collect is not yet clear. While SB 2205 addresses the governance of automated vehicles, it does not go into detail on how the data collected and sometimes transmitted by these vehicles will be regulated and protected. Automated vehicles that are also connected vehicles are able to communicate directly with other vehicles and with the surrounding infrastructure. This means that while connected vehicles will make many of the same detections using some of the same technologies as non-connected AVs, they will also be able to transmit data.

This data could include:

- Car-related data such as car type, tire pressure, brake status, wiper status.
- Infrastructure data such as roadway characteristics and conditions, weather conditions, and intersection status.
- System performance data such as traffic speed, volume, and incident status.
- Car occupant data such as trip origin and destination, and traveler personal data.

Currently there is no single regulatory authority to address connected car data. Self-regulatory practices amongst stakeholders are emerging that are not legally binding but are shaping perceptions of who owns this data. Currently, data ownership seems to be "in the eye of the beholder" as follows:

- Original equipment manufacturers (OEMs) consider owners or lessees of the vehicles to be the owners of connected car data, but consider themselves stewards of that data with rights to access and control that data that they secure through user agreements. In 2014, 19 OEMs created and signed onto privacy protection principles under the Alliance of Automobile Manufacturers and Association of Global Automakers, outlining how OEMs are to be stewards of vehicle data. The principles agreed upon are meant to give vehicle purchasers an idea of what and how data will be collected by the OEM.
- Data aggregators are private companies who gather, anonymize, and repackage connected car data. Their products are derived from source data that they may not own, and then transformed into new information products. Data aggregators consider themselves the owners of these new products.

- Infrastructure facility owner-operators (the owners and operators of connected infrastructure) are typically public agencies like departments of transportation. They consider themselves the owners of data collected by their sensors (*16*).

Does Texas Law Address Who Is Responsible if Something Goes Wrong?

Determining liability for crashes involving AVs is likely possible under existing Texas law. Automated vehicles might at first seem to raise new questions about liability in the case of a crash: Who caused the crash—the vehicle or the human driver? However it is likely that the existing tort theories of negligence and products liability will be sufficient in determining who is responsible (*8, 23*). These traditional theories may both apply to a given situation, but they are separate and distinct theories.

A claim of negligence can be brought against a party for an accident if that party failed to act with sufficient care, either in creating or operating a vehicle. Both individuals and corporate entities, such as manufacturers, can be liable under a negligence claim.

Traditionally, a claim of products liability may be brought against manufacturers and other corporate entities if a defect is found in a car's design, manufacture, or instruction to users (*24*). (It should be noted, however, that Texas statutory law only recognizes design defects (*25*). Issues of manufacture and instruction are addressed by the Common Law.) Whereas today, liability is assigned according to who was at fault, driver or manufacturer, some carmakers and legal experts foresee the blame for car accidents shifting almost entirely away from at-fault drivers to the manufacturers and other industry entities who will make and sell driverless cars because of the anticipated high levels of automation, rather than human driver control, under which most vehicles will operate (*26*).

Although some states have passed legislation relieving manufacturers of liability for third party modifications to AVs, there is currently no Texas state law directly addressing any aspect of liability with regard to AVs. This means that it will fall to the courts to decide a tort claim, operating within the traditional theories of liability: negligence and product liability (*8*).

Because SB 2205 does not shield the manufacturer from liability if a third party modifies the AV, it may be possible for a plaintiff to bring action against either the manufacturer or the third party modifier, depending on the situation. For example, if an AV is easily modified and the modification leads to an accident, the court may find the manufacturer to be the cause of the accident if the fact that the vehicle was so easily modifiable could itself be considered a design defect.

This potential outcome would not be possible in Florida, Michigan, Nevada, or Washington D.C., all states that have passed laws protecting the original manufacturer of a vehicle for any modification or addition made to the vehicle that results in the cause of action. In these states, any modification to an AV that results in an accident would place liability on the third party

modifier. However, these laws are all consistent in holding the original manufacturer liable if the defect that caused the accident was a result of the manufacturer's manufacturing or design (*27, 28, 29, 30*).

While these laws are favorable to manufacturers, clearing them from any liability in the event their vehicles are modified may dissuade manufacturers from producing vehicles with adequate protection against modifications that compromise safe vehicle performance. Currently, it is hard to say exactly what may constitute such a modification made to an AV, but examples might include a custom paint job that alters a sensor, or owner alterations to improve performance. However, an unknown bad actor maliciously hacking into a vehicle's computer could also constitute a safety-compromising modification. Because exactly what type of modifications would be considered unsafe is currently unknown, there is a high burden to protect against it. Currently, it is up to states to decide if the manufacturer has the responsibility to meet that burden by deciding whether or not to waive liability from the manufacturer in the event of a third-party modification.

Does Texas Law Require AVs to be Registered as AVs?

SB 2205 does not require automated vehicles at any level to be registered as such with the state of Texas (*1*). Therefore, any AV in Texas must be able to pass the inspection requirements of a non-AV in order to be registered. Requiring AVs to be registered as such could enable the state to track the number of automated vehicles operating on Texas roads, and to associate those vehicles, through their VIN or license plate numbers, with crashes or safety-related traffic incidents. This information could help the state to keep a record of safety statistics surrounding the new technology.

Although Texas does not, some states have begun requiring that AVs be registered as AVs. Georgia has an explicit statutory requirement on registering automated vehicles as such. Georgia's law states that if a vehicle is "fully autonomous," it must be identified as such during the registration of the vehicle (*31*). California is another state that requires the registration of AVs. California gives the Department of Motor Vehicles the authority of AV registration in the state (*32*), and the DMV has put regulations into place regarding the registration of AVs. The regulations state that, in addition to normal registration requirements, the person registering the AV must state that the vehicle will only be used for testing purposes and give a brief description of the automated technology on the vehicle (*33*).

Similarly, the Nevada DMV has also put regulations into place governing the registration of AVs. The regulations require that the manufacturer apply to be able to test their vehicles in the state (*34*). California and Nevada are the only states with regulations in place governing AVs.

State	To What Extent are AVs Explicitly Allowed?			Connected Vehicles	Other Legal Concerns			Type of Law	
	Limited Pilot Programs or Advisory Committees	Broad Piloting or Testing	Full Operation	Connected Braking Systems	Addreses Liability	Addresses Data Collection	Adresses Premption	Executive Order	Legislative Statute
AL	X								X
CT	X								X
LA	X								X
MA	X							X	
ND	X					X			X
PA	X								X
VT	X								X
WA	X							X	
WI	X							X	
AZ		X						X	
CA		X				X			X
MI		X		X	X	X			X
NY		X							X
UT		X							X
CO			X		X		X		X
FL			X		X				X
GA			X						X
NC			X	X			X		X
NV			X	X	X		X		X
TN			X	X		X	X		X
TX			X	X	X	X	X		X
DC			X		X				X
AR				X					X
SC				X					X

Figure 2. Comparison of State Automated Vehicle Laws, July 2017

How Does Texas Compare to Other States?

Pilot Programs and Advisory Committees

Some states have authorized limited pilot programs designed to be carried out in designated areas, and advisory committees tasked with tracking the program success and shaping evolving policy on automated vehicles. States such as Arizona, Massachusetts, Washington, and Wisconsin have not passed legislation but rather have issued executive orders (*35*). In Arizona, Governor Doug Ducey issued an executive order in late August 2015 directing various agencies to "undertake any necessary steps to support the testing and operation of self-driving vehicles on public roads within Arizona." He also ordered the enabling of pilot programs at selected universities and developed rules to be followed by the programs. The order established a Self-Driving Vehicle Oversight Committee within the governor's office, authorized to expand testing of automated vehicles (*36*). So far the committee has allowed a number of manufacturers to test

their automated vehicles on public roads throughout the state (*38*). Thus although the Governor's order authorized limited testing, in fact, through the oversight committee, the state now allows testing over a broader public area.

Broad Piloting or Testing

Some states, like California, Michigan, New York, and Utah, have taken a cautious and involved approach to regulating automated vehicles by passing legislation that allows for broad piloting or testing to take place. One state that went from allowing limited AV testing to more broad testing activity is California. California initially required automakers to register driverless test vehicles and to operate them with a human driver in the car (*32*). Recently, however, California began the process of relaxing its requirements, now allowing AVs to be tested without a driver in certain, specified circumstances. California Vehicle Code Section 38750 now defines "operator" of an autonomous vehicle as "the person who is seated in the driver's seat, or if there is no person in the driver's seat, causes the autonomous technology to engage" (*38*). While the permitting requirements for operating test vehicles are still fairly extensive, the most recent changes may nevertheless encourage California companies to remain in state rather than locate in states with less stringent regulations for AV testing and operation.

Arizona now permits broad testing on public roads as well since its oversight committee exercised its authority to allow it, as earlier described.

Full Operation

States such as Texas, Florida, Georgia, Nevada, Tennessee, Colorado, North Carolina, and Washington, D.C., explicitly allow full operation of AVs on any public roadway (*1*, *27, 31, 29, 39, 40, 41, 42, 30*).

Michigan has had legislation related to automated vehicles in place prior to the development of AVs because the automotive industry has been testing new vehicles and technologies on Michigan roads for decades. The most recent legislation in Michigan allows AVs to operate without a test driver, and defines many of the material aspects of AV operation almost identically to Texas's SB 2205 (*28*).

The state of Tennessee has also taken a low regulation approach to regulating automated vehicles and has developed a diverse set of rules for testing and developing AVs. In April 2015, Tennessee passed an AV bill, Senate Bill 598, preempting local control on streets and highways of vehicles equipped with "autonomous technology" (*39*). In 2016, Tennessee also passed Senate Bill 1561, which redefines "autonomous technology" (replacing that term with "autonomous system" and "autonomous vehicle"). The bill also distinguishes "No-operator-required autonomous vehicle" (NORAV) from "Operator-required autonomous vehicle" (ORAV). Additionally, the bill authorizes testing and operation of ORAVs by DPS-certified sellers. Finally, the bill establishes a mileage tax that divides funding between the general fund, the highway fund, counties, and municipalities (*40*).

Preemption

States like Nevada, North Carolina, Texas, Tennessee, and Colorado explicitly preempt regulation of AVs by any agency or governmental entity other than the one designated in the bill. However, compliance with existing traffic and federal laws is still required (*29, 42, 1, 39, 41*).

Connected Braking Systems

States like Texas, Arkansas, Nevada, North Carolina, Tennessee, and South Carolina allow operation of vehicles with electronically connected braking systems (*43, 44, 29, 45, 46, 47*). These laws allow vehicles of certain specification to travel with less space between them than what preexisting traffic laws allow.

Data Sharing

Some states recognize a need to collect data from AVs. Most states that have sought to regulate data collection do so for purposes of crash analysis when an accident occurs. Examples of States that have taken legislative action to address this issue include California, Michigan, North Dakota, Tennessee, and Texas (*48, 49, 50, 40, 1*). The data that the statutes call to collect is crash data commonly associated with EDRs.

Liability

As previously discussed, legislation in states like Florida, Michigan, Nevada, and Washington, D.C. has defined liability in situations where a third party modifies an AV. These jurisdictions have indicated that if the third-party modification leads to the accident, the third-party modifier is held liable, not the manufacturer. As discussed previously, this may relieve the manufacturer of a burden to design their vehicles so as to protect against easy modification (*27, 28, 29, 30*).

Conclusion

During the 85th Texas Legislature in 2017, Texas enacted a law related to automated vehicles. The bill, SB 2205, creates the legal framework for automated vehicle operation and testing in Texas. The bill allows operation of automated vehicles and defines related terms such as "automated driving system," "entire driving task," "automated motor vehicle," and "human operator." The bill allows for the operation of an automated motor vehicle on Texas roads regardless of whether or not a human operator is physically present in the vehicle. Also, the bill which exclusively governs automated vehicles, assigns governance to the Department of Public Safety and explicitly preempts other political subdivisions or agencies from regulating automated motor vehicles (*1*).

This law offers clarity in some very important areas, and effectively allows for the legal operation of AVs in Texas. However, these vehicles present a number of new legal and procedural questions still not covered by current law including questions of governance, data ownership, protection of data concerning individual privacy, and the ability of AVs to comply with human-centric Rules of the Road.

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