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**THE
AUTONOMOUS VEHICLE
REGULATORY ENVIRONMENT**

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Table of Contents

Section 01 – Introductions

Section 02 – Foundational Concepts

Section 03 – Federal Legislative Initiatives

Section 04 – State Legislative and Regulatory Activity

SECTION 01

INTRODUCTIONS



SECTION 02

FOUNDATIONAL CONCEPTS



The Promise of Autonomous Vehicles

- Safety
 - “94% of serious crashes are due to Human Error” – National Highway Transportation Safety Administration
- Economic and societal benefits
- Access, mobility and quality of life
- Environmental and urban planning benefits

Some of the Players

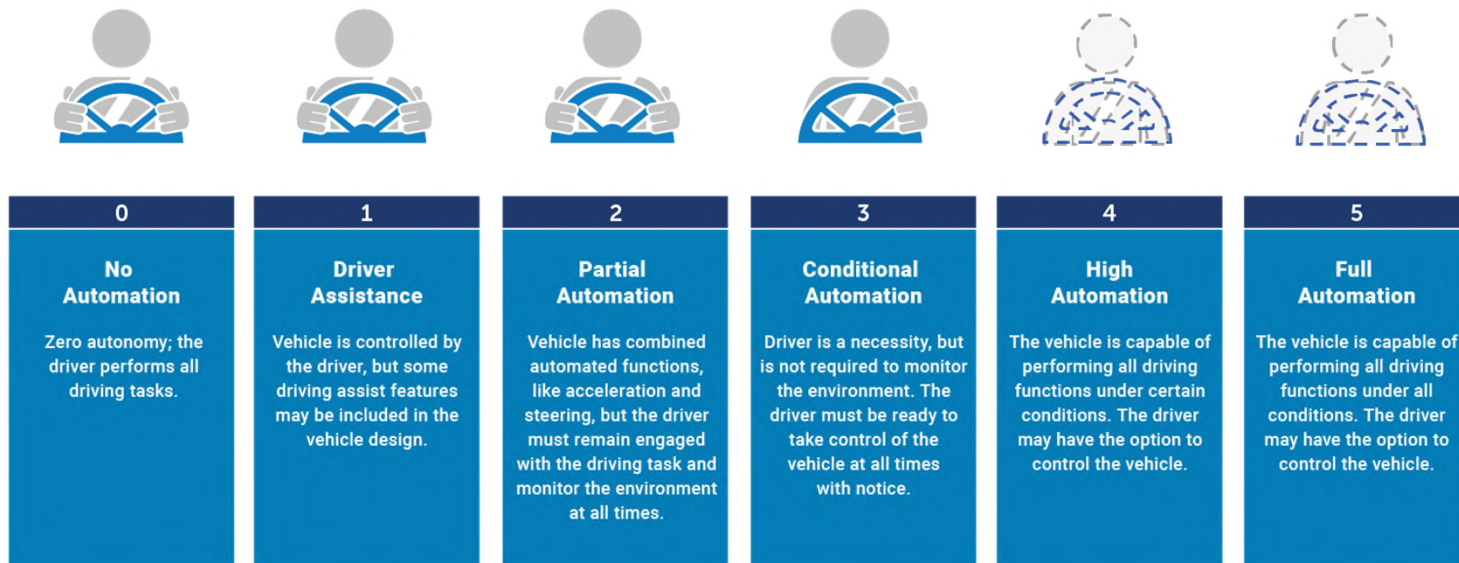


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Foundational Concept – Levels of Automation

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation



Foundational Concept – NHTSA Elements of AV Safety

- System Safety
- Operational Design Domain
- Object and Event Detection and Response
- Fallback (Minimal Risk Condition)
- Validation Methods
- Human Machine Interface
- Vehicle Cybersecurity
- Crashworthiness
- Post-Crash ADS Behavior
- Data Recording

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Foundational Concepts – Elements of AV Safety

- **Operational Design Domain.** Defines where (such as what roadway types and speeds) and when (under what conditions, such as day/night, weather limits, etc.) an AV is designed to operate.
- **Minimal Risk Condition.** A minimal risk condition will vary according to the type and extent of a given failure, but may include automatically bringing the vehicle to a safe stop, preferably outside of an active lane of traffic.

SECTION 03

FEDERAL LEGISLATIVE INITIATIVES



Autonomous Vehicles – Legislative Initiatives

“Safely Ensuring Lives Future Deployment and Research in Vehicle Evolution Act”
(SELF DRIVE Act – H.R. 3388)

Legislative Action

July 25, 2017 – Introduced by Rep. Robert Latta (R-OH)

September 5, 2017 – Reported by House Energy and Commerce Committee (54 – 0 vote)

September 6, 2017 – Passed the House of Representatives (voice vote)

September 7, 2017 – Received in the Senate and referred to the Committee on Commerce, Science and Transportation

Autonomous Vehicles – Legislative Initiatives

“Highly Automated Vehicle”

H.R. 3388 defines a “highly automated vehicle” as:

- A motor vehicle, other than a commercial motor vehicle, that is equipped with an automated driving system.

“Automated Driving System”

H.R. 3388 defines an “automated driving system” as

- The hardware and software of a vehicle that are collectively capable of performing the entire dynamic driving task on a sustained basis, regardless of whether such system is limited to a specific operational design domain.

Autonomous Vehicles – Legislative Initiatives

H.R. 3388 – Purpose

“The purpose of this Act (H.R. 3388) is to memorialize the Federal role in ensuring the safety of highly automated vehicles as it relates to design, construction, and performance, by encouraging the testing and deployment of such vehicles.”

“No State or political subdivision of a State may maintain, enforce, prescribe, or continue in effect any law or regulation regarding the design, construction, or performance of highly automated vehicles, automated driving systems, or components of automated driving systems unless such law or regulation is identical to a standard prescribed under this chapter.” (Federal preemption)

Autonomous Vehicles – Legislative Initiatives

H.R. 3388 – Purpose

“Nothing in this subsection (Act) may be construed to prohibit a State or a political subdivision of a State from maintaining, enforcing, prescribing, or continuing in effect any law or regulation regarding, registration, licensing, driving education and training, insurance, law enforcement, crash investigations, safety and emissions inspections, congestion management of vehicles on the street within a State or political subdivision of a State, or traffic.” (State role)

“Unless the law or regulation is an unreasonable restriction on the design, construction, or performance of highly automated vehicles, automated driving systems, or components of automated driving systems.” (Federal preemption)

Autonomous Vehicles – Legislative Initiatives

H.R. 3388

National Highway Traffic Safety Administration (NHTSA) Responsibilities

- Issue a final rule (24 months after the date of enactment) requiring the submission of safety assessment certifications regarding how safety is being addressed by each entity developing a highly automated vehicle or an automated driving system. As part of that rule, NHTSA must identify which “entities” are required to submit such certifications.
- Submit to Congress a rulemaking and “safety priority plan” (12 months after the date of enactment) to accommodate the development and deployment of highly automated vehicles and to ensure their safety and security. As part of that plan, NHTSA must identify elements that may require performance standards including human machine interface, sensors, and actuators, and consider process and procedure standards for software and cybersecurity.

Autonomous Vehicles – Legislative Initiatives

H.R. 3388

Highly Automated Vehicle Advisory Council

Membership – Shall include a diverse group representative of business, academia and independent researchers, State and local authorities, safety and consumer advocates, engineers, labor organizations, environmental experts, a NHTSA representative and other members determined to be appropriate by the Secretary of Transportation.

Responsibilities – Mobility access for the disabled community and senior citizens, labor and employment issues, environmental impacts, consumer privacy, cybersecurity, and cabin safety.

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Autonomous Vehicles – Legislative Initiatives

“American Vision for Safer Transportation through Advancement of Revolutionary Technologies Act”

(AV START Act – S. 1885)

Legislative Action

September 28, 2017 – Introduced by Sen. John Thune (R-SD)

November 28, 2017 – Reported by Senate Commerce, Science and Transportation Committee

Autonomous Vehicles – Legislative Initiatives

S. 1885 – Key Provisions

- Federal Preemption. “No state or political subdivision of a State may adopt, maintain, or enforce any law, rule, or standard regulating the design, construction, or performance of a highly automated vehicle or automated driving system.”
- State Role. “Nothing in this Act may be construed to prohibit a State or political subdivision of a State from maintaining, enforcing, prescribing, or continuing in effect any law or regulation regarding the sale, distribution, repair or service of highly automated vehicles, automated driving systems or components of automated driving systems by a dealer, manufacturer, or distributor.”

Autonomous Vehicles – Legislative Initiatives

- Highly Automated Vehicles Technical Committee. To provide a forum for stakeholders to discuss, prioritize, and make technical recommendations for highly automated vehicle and automated driving system safety. DOT will review the recommendations and begin a rulemaking proceeding on those recommendations.
- Working Group on Consumer Education. Identify recommended education and responsible marketing programs that may be voluntarily employed by industry to inform consumers, vehicle owners and operators, and other stakeholders about advanced driver assistance systems.
- Traffic Safety and Law Enforcement. DOT, in coordination with State and local transportation and highway safety entities, State and local law enforcement entities and other relevant parties, shall research the traffic safety implications of highly automated vehicles.

Automated Vehicles – Legislative Initiatives

S. 1885 – Key Provisions

- Highly Automated Vehicles Data Access Advisory Committee. To provide a forum for stakeholders to discuss and make policy recommendations to Congress with respect to the ownership of, control of, or access to, information or data that vehicles collect, generate, record or store in an electronic form that is retrieved from a highly automated vehicle or automated driving system.
- SAE International's J3016 Directive. S. 1885 incorporates the six levels of driving automation developed by the Society of Automotive Engineers (SAE).

SAE International Levels of Driving Automation

Categories 0, 1, and 2 – Human driver monitors the driving environment

Category 0 – No Automation

The full-time performance by the human driver of all aspects of the *dynamic driving task*,* even when enhanced by warning or intervention systems

Category 1 – Driver Assistance

The driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with expectation that the human driver perform all remaining aspects of the dynamic driving task.

SAE International Levels of Driving Automation

Category 2 – Partial Automation

The driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the *dynamic driving task*.

Categories 3, 4 and 5 – Automated driving system monitors the driving environment

Category 3 – Conditional Automation

The driving mode-specific performance by an automated driving system of all aspects of the *dynamic driving task* with the expectation that the human driver will respond appropriately to a *request to intervene*. **

SAE International Levels of Driving Automation

Category 4 – High Automation

The driving mode-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a human driver does not respond appropriately to a *request to intervene*.

Category 5 – Full Automation

The full-time performance by an automated driving system of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a human driver.

SAE International Levels of Driving Automation

Dynamic driving task

Includes the operational (steering, braking, accelerating, monitoring the vehicle and roadway) and tactical (responding to events, determining when to change lanes, turn, use signals, etc) aspects of the driving task, but not the strategic (determining destinations and waypoints) aspect of the driving task.

Request to intervene

Is notification by the automatic driving system to a human driver that s/he should promptly begin or resume performance of the dynamic driving task.

DEPARTMENT OF TRANSPORTATION AUTOMATED DRIVING SYSTEMS 2.0

Voluntary Guidance

National Highway Traffic Safety Administration

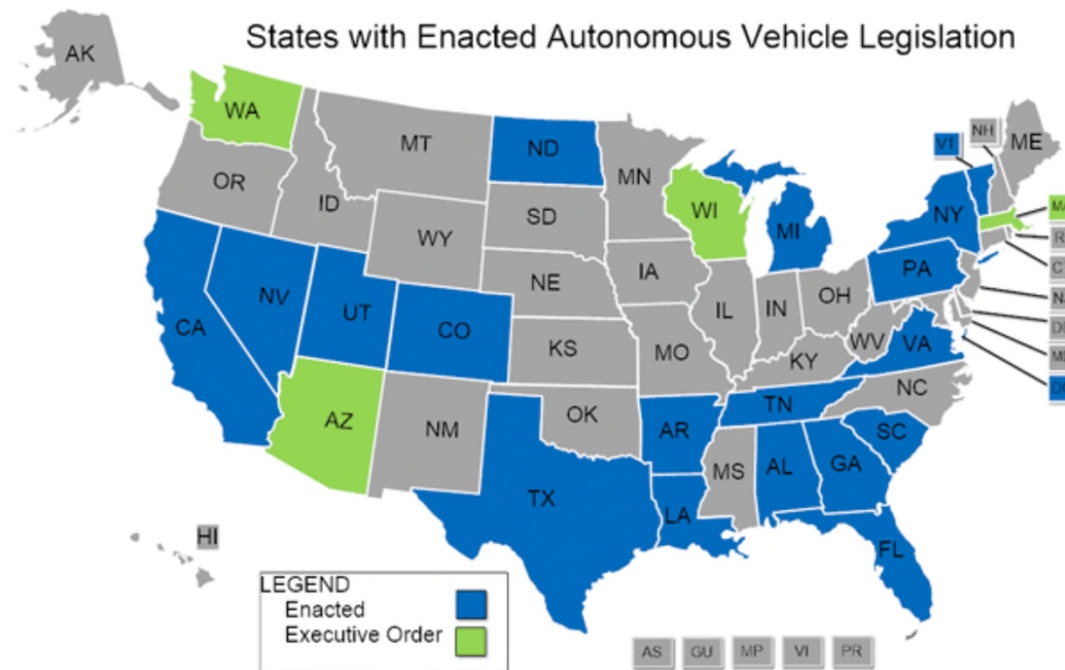
- The Voluntary Guidance contains 12 priority safety design elements which were selected based on research conducted by the Transportation Research Board, universities, and NHTSA.
- The Voluntary Guidance encourages “entities” to disclose Voluntary Safety Self-Assessments demonstrating their varied approaches to achieving safety in the testing and deployment of automated driving systems.

SECTION 03

STATE LEGISLATIVE AND REGULATORY ACTIVITY



State Legislative and Regulatory Activity

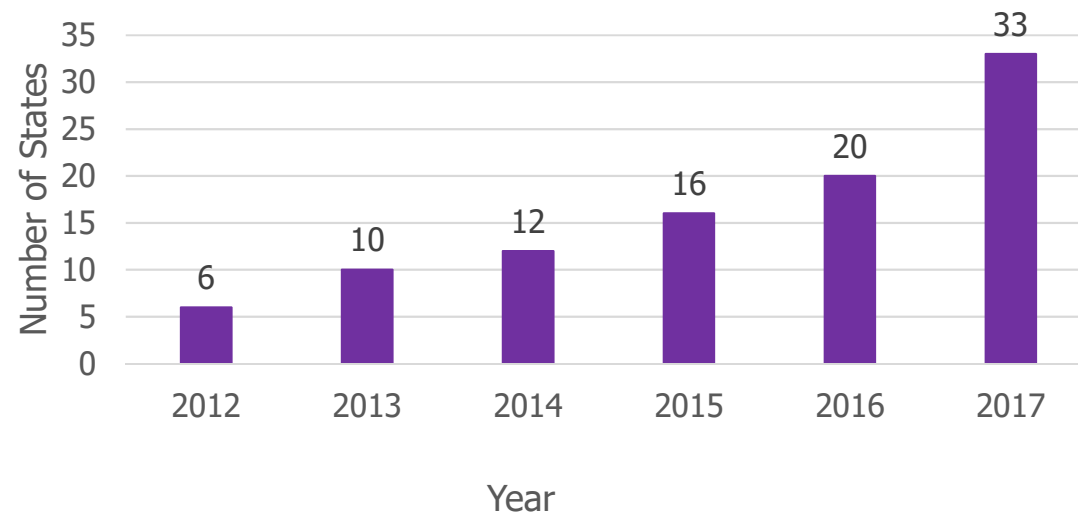


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State Legislative and Regulatory Activity

- Nevada led the way in 2011.
- Pace of legislative activity is accelerating

States Introducing Legislation



Arizona

- Advertises light touch regulatory approach
 - “Where self-driving cars go to learn” – *New York Times*
- Executive Order 2015-9
 - Directed agencies to “undertake any necessary steps to support the testing and operation of self-driving vehicles on public roads within Arizona.”
- Executive Order 2018-04 removed requirement that safety driver be present
- Multiple pilots underway in Phoenix; 600+ vehicles testing on public roads since 2016

Deep Dive: California

1. Statutory Framework (Senate Bill 1292)
2. Regulatory framework
 - California Department of Motor Vehicles
 - AV safety; testing & operations
 - California Public Utilities Commission
 - Use of AVs for passenger transportation services

California Legislation

SB 1298 (Padilla, 2012)

- **Adds Division 16.6 (§ 38750 et seq.) to the California Vehicle Code**
- **Authorized AV testing on public roads, with safety driver present**
- **Required DMV to adopt regulations to address:**
 - Requirements related to insurance
 - Application and permitting process for drivered and driverless AVs
 - Testing, equipment and performance standards

California Legislation

SB 1298 (Padilla, 2012)

- Notable legislative findings:
 - AVs “offer significant potential safety, mobility, and commercial benefits for individuals and businesses in the state and elsewhere.”
 - The state “which presently does not prohibit or specifically regulate the operation of autonomous vehicles, desires to encourage the current and future development, testing, and operation of autonomous vehicles....”
 - The state “seeks to avoid interrupting these activities while at the same time creating appropriate rules intended to ensure that the testing and operation of autonomous vehicles in the state are conducted in a safe manner.”

California Legislation

SB 1298 – Key Definitions (Cal. Veh. Code § 38750(a))

- “Autonomous Technology” means technology that has the capability to drive a vehicle without the active physical control or monitoring by a human operator.
- “Autonomous Vehicle” means a vehicle, equipped with autonomous tech., that has the capability to drive without active physical control or monitoring by a human operator.
- “Operator” means the person who is seated in the driver’s seat, or if there is no person in the driver’s seat, causes the autonomous tech. to engage.
- “Manufacturer” of autonomous tech. means the person that originally manufactures a vehicle and equips autonomous tech. on the vehicle or the person that modifies the vehicle by installing autonomous tech. to convert it to an AV.

California Legislation

SB 1298

- Immediately authorized AV testing on public roads, with a driver, provided that:
 - AV is operated solely by employees, contractors, or other persons designated by manufacturer;
 - Driver is seated in driver's seat and capable of taking control;
 - \$5 million of insurance, bond or self-insurance.

California Regulatory Framework

DMV implementation of SB 1298 - a long and winding road

Regulations regarding AV testing with driver (September 16, 2014)

Regulations governing driverless testing (February 26, 2018)

Regulations governing deployment/public use (February 26, 2018)

DMV can begin issuing driverless testing permits (April 2, 2018)

DMV can begin issuing deployment permits (April 2, 2018)

California Regulatory Framework

- **DMV Regulations (Cal. Code Regs., tit. 13 §§ 227 et seq.)**
 - Adopts SAE classification system: levels 3-5 qualify as AV
 - Authorizes public passenger transport in test vehicles, *without compensation*
 - Provides for separate permits for **testing** and **deployment** and **drivered** and **driverless**
 - Prohibits AV trucks (> 10,000 lbs) and motorcycles

California

- **DMV Regulations – Testing Phase (Drivered)**
 - Manufacturers only
 - Requires \$5 million in insurance, bond or self-insurance
 - Test driver requirements:
 - Must be employee, contractor, or designee of manufacturer
 - No DUI, not an at-fault driver, and no more than 1 point
 - Successful completion of test driver training program
 - Requires reporting of unanticipated disengagements of autonomous technology annually
 - Two year term
 - Manufacturers must identify specific test vehicles and describe technology

California Regulatory Framework

- **DMV Regulations – Testing Phase (Driverless)**
 - Certify as to SAE Level 4 or 5 and AV capabilities
 - Notify local authorities
 - Remote operator with two way communication link
 - Maintain training program with remote operators
 - Maintain means of communication with third parties in event of collision
 - Provide law enforcement interaction plan

California Regulatory Framework

- **DMV Regulations – Deployment (Cal. Code Regs, tit. 13, §§ 228)**
 - “Deployment” means the operation of an autonomous vehicle on public roads by members of the public OR for purposes of sale, lease, providing transportation services for a fee or otherwise making commercially available outside of a testing program.
 - Manufacturer must:
 - Describe ODD
 - Identify restricted conditions
 - Describe operations beyond ODD and transition to minimal risk condition
 - Self-certify as to autonomous technology data recorder, compliance with applicable law, annual updating of technology, cyber security standards, and general safety based on tests and validations.

California Regulatory Framework

- CPUC PD on AV Pilot Test Program for AV Passenger Services (April 6, 2018) would, if adopted:
 - Establish two “pilot programs” for manufacturers with DMV testing permits to provide passenger transportation services
 - Postpone consideration of commercial framework for deployment until Q1 2019

California Regulatory Framework

- CPUC PD on AV Pilot Test Program for AV Passenger Services
 - Elements of Pilot Test Programs:
 - Prohibits charging “monetary compensation”
 - Requires attestation as to AV operations of each vehicle for a minimum of 90 days with DMV permit
 - Prohibits fare-splitting
 - Limits to passengers 18 years and older
 - Requires reporting all passenger communications within 24 hours; *AND...*
 - Requires monthly public reporting of miles traveled, EV/ICE miles, deadhead miles, idling time, vehicle occupancy per trip, trips requested by disabled passengers fulfilled and declined.

QUESTIONS?



THANK YOU

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