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American Association of Motor Vehicle Administrators

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ELECTRONIC
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crashes
TECHNOLOGY

Strengthening Distracted Driving Education, Legislation, and Enforcement

With Focus on Distractions or Inattention Involving ADAS- and ADS-Equipped Vehicles

Edition 2

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DRIVER, LAW ENFORCEMENT, AND VEHICLE STANDING COMMITTEES
AUTOMATED VEHICLE SUBCOMMITTEE

Contents

Background

The National Highway Traffic Safety Administration (NHTSA) defines distracted driving as "any activity that diverts attention from driving." With the proliferation of personal electronic devices and in-vehicle technology in our society, many jurisdictions have enacted or pursued enhancements to distracted driving laws to reduce or eliminate crashes in which the proximate cause is distracted driving alone or in combination with other violations.

Every day, approximately nine people are killed and more than 1,000 are injured in crashes involving distracted driving. In 2021, there were 3,522 fatalities in distracted-related crashes, accounting for 8.2% of all road deaths (*Overview of Motor Vehicle Crashes in 2021*, NHTSA). The Governor's Highway Safety Association (GHSA) recommends states ban handheld cell phone use by all drivers. GHSA's policy and a table of state distracted driving laws can be found here.*

The purpose of this white paper is to provide guidance to jurisdictions on strengthening distracted driving education, legislation, and enforcement.

Although cell phone use is not the only reason for driver distraction, it poses a significant risk to roadway safety. Texting is especially concerning because it combines visual, manual, and cognitive functions. Sending or receiving a text takes a driver's eyes from the road for an average of 4.6 seconds; at 55 mph, this is the equivalent of driving the length of an entire football field.

* Governor's Highway Safety Association, Distracted Driving Laws Chart, 2023.

Definitions

ADS-equipped vehicle	A vehicle equipped with an Automated Driving System (ADS).
Automated Driver-Assistance System (ADAS)	A system designed to help drivers with certain driving tasks such as staying in the lane, parking, avoiding crashes, and reducing blind spots. An ADAS is generally designed to improve safety or reduce the workload on the driver. With respect to automation, some ADAS features could be considered SAE International Level 1 or Level 2, but many are Level 0 and may provide alerts to the driver with little or no automation.
Automated Driving System (ADS)	The hardware and software that are collectively capable of performing the entire dynamic driving task (DDT) on a sustained basis, regardless of whether it is limited to a specific operational design domain; this term is used specifically to describe a Level 3, 4, or 5 driving automation system.
Distracted driving	Occurs when a person engages in any activity not related to the DDT in a manner that interferes with the safe operation of such motor vehicle on any highway. Distracting tasks can affect drivers in different ways and can be categorized into the following types: ■ **Visual distraction:** Tasks that require the driver to look away from the roadway to visually obtain information ■ **Manual distraction:** Tasks that require the driver to take hand(s) off the steering wheel to manipulate a device or engage in some other distracting activity ■ **Cognitive distraction:** Tasks that are defined as the mental workload associated with a task that involves thinking about something other than the driving task
Driver	A user who performs in real time part or all the DDT and DDT fallback for a particular vehicle. Note: In a vehicle equipped with a driving automation system, a driver may in some vehicles assume or resume performance of part or all the DDT from the ADS during a given trip.

Dynamic driving task (DDT)	All the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints and including: 1. lateral vehicle motion control via steering (operational); 2. longitudinal vehicle motion control via acceleration and deceleration (operational); 3. monitoring the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical); 4. object and event response execution (operational and tactical); 5. maneuver planning (tactical); and 6. enhancing conspicuity via lighting, signaling, and gesturing, and so on (tactical).
Operational design domain (ODD)	The specific conditions under which a given driving automation system or feature is designed to function, including, but not limited to, driving modes. An ODD may include geographic, roadway, environmental, traffic, speed, and temporal limitations. Previously, the term "driving mode" was used; "ODD" is now the preferred term for many of these uses.
Personal electronic device	Any portable electronic device that is capable of wireless communication or electronic data retrieval and is not manufactured primarily for hands-free use in a motor vehicle. "Personal electronic device" includes, but is not limited to, a cell phone, tablet, laptop, two-way messaging device, or electronic game. "Personal electronic device" does not include two-way radio, citizens band radio, or amateur radio equipment.
SAE International levels of automation	Society of Automotive Engineers (SAE) International, which devises consensus standards for the engineering industry, established a six-tier classification system ranging from no vehicle automation to full vehicle automation: ■ Level 0 – No Driving Automation ■ Level 1 – Driver Assistance ■ Level 2 – Partial Driving Automation ■ Level 3 – Conditional Driving Automation ■ Level 4 – High Driving Automation ■ Level 5 – Full Driving Automation

Strengthening Distracted Driving Education, Legislation, and Enforcement

(with focus on distractions or inattention involving ADAS and ADS-equipped vehicles)

The impact of distractions on driving is determined not just by the type of distraction but also by the frequency and duration of the distraction. Because drivers often have a choice regarding when and how often to multitask when driving, their exposure to risk is typically within their control. Additional distracting vehicle technologies such as infotainment displays requires an emphasis on this aspect of distracted driving education as Advanced Driver Assistance System (ADAS)–equipped vehicles continue to evolve and proliferate the market. According to research from the AAA Foundation for Traffic Safety, the more drivers use ADAS, the more likely they are to distract themselves with things such as email and entertainment. Distracted driving is a problem even without ADAS, but these technologies could make it worse.

This paper, although focused on "distracted driving," includes examples of driver inattention caused by driver overreliance on ADAS technologies.

Distracted driving law violations can lead to serious implications for Commercial Driver License (CDL) holders who are subject to federal and state rules of the road statutes. Violation of certain state distracted driving laws is also a violation of 49 CFR 392.2 (applicable driving rules): "Every commercial motor vehicle must be operated in accordance with the laws, ordinances, and regulations of the jurisdiction in which it is being operated." If a CDL holder is cited for a violation such as distracted driving, the state driver licensing authority is notified, it is recorded as a violation of 49 CFR 383 (Commercial Driver's License Standards, Requirements and Penalties), and it may result in disqualification of the driver's CDL.

The International Association of Chiefs of Police (IACP), in partnership with the NHTSA, published the *Distracted Driving Toolkit* in October 2019. This toolkit was created to provide law enforcement agencies with tools to improve distracted driving education and enforcement. At the heart of any effective distracted driving enforcement strategy is strong distracted driving legislation. Although most jurisdictions have enacted laws prohibiting texting while driving, more comprehensive and enforceable distracted driving laws are needed, and existing laws should be strengthened based on the recommendations set forth by the American Association of Motor Vehicle Administrators (AAMVA), GHSA, IACP, and NHTSA.

Although several manufacturers make ADAS technology available, the following three examples are used because of the driver's distraction (or inattention) and the substantial media coverage the events received because they involved emergency response vehicles.

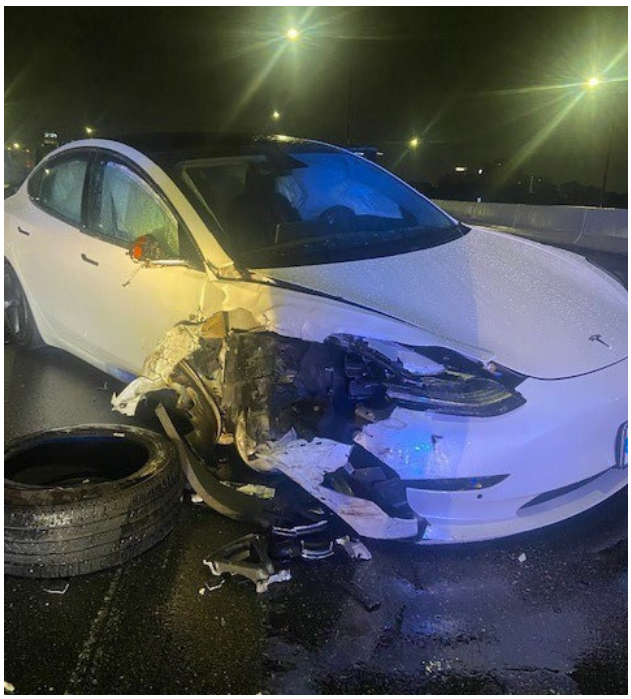
The first example of distraction in a vehicle equipped with ADAS is a January 22, 2018, rear-end crash between a car operating with ADAS and a stationary fire truck blocking the high-occupancy vehicle lane on I-405 in Culver City, California. According to the resulting National Transportation Safety Board (NTSB) investigation, the proximate cause of the crash was "inattention and overreliance on the vehicle's advanced driver assistance system and the Tesla's Autopilot design, which permitted the driver to disengage from the driving task" (Figure 1).

Figure 1: NTSB Report #HWY18FH004. Tesla crash into fire truck. (Photo by California Highway Patrol.)

The second example occurred on July 14, 2020, when a Tesla operating with "autopilot" engaged rear ended an Arizona state trooper's vehicle and caused a chain reaction crash (Figure 2). The patrol vehicle was pulled over on the side of the highway while a sergeant was helping at the scene of an earlier crash. The Tesla struck the patrol vehicle with such force that it pushed it into an ambulance also parked at the scene. It is believed the Tesla's operator may have been asleep when the crash occurred.

Figure 2: Tesla crash while autopilot engaged. (Photo by Arizona Highway Patrol.)

The third example occurred on August 28, 2021, when a Tesla rear ended a Florida state trooper's vehicle, causing a chain reaction crash. The patrol vehicle was stopped in the roadway, with emergency lights activated, behind a blocking disabled vehicle. The Tesla struck the Florida Highway Patrol vehicle rotated and then struck the disabled vehicle (Figure 3).



Figures 3 (top) and 4 (bottom): FHP patrol vehicle and the Tesla that struck it. (Photos by Florida Highway Patrol.)

See the definitions section for definitions of the six levels (0–5) of automation developed by SAE International. Distracted driving is of primary concern in vehicles with Level 0 to 3 automation because distracted driving should become a non-issue in Level 4 and 5 vehicles. However, Level 4 and 5 vehicles being "tested" on public roads have

operators who may be distracted or inattentive when they may need to assume control of the vehicle. Both ADAS- and ADS-equipped vehicles are addressed, as applicable, in the following guidelines.

ADAS-equipped vehicles = SAE Levels 0 to 3

ADS-equipped vehicles = SAE Levels 4 and 5

Guidelines for Testing ADS-Equipped Vehicles

When testing any ADS-equipped vehicle, the user is an active participant in the testing process; therefore, all distracting activities should be prohibited, both by jurisdictional law and by company policy enacted by companies testing ADS-equipped vehicles on public highways.

Recommendations for Manufacturers and Other Entities (MOE)

MOE 1. Manufacturers and other entities should minimize distractions in ADS-equipped vehicles.

MOE 2. Manufacturers and other entities should prohibit users from all added distracting activities when testing any ADS-equipped vehicle.

MOE 3. Manufacturers and other entities should incorporate technology to alert the "driver" when the ADS cannot maintain or complete the driving task and the "driver" needs to assume control of vehicle operation.

Guidelines for Deployed Vehicles

Deployed ADS-equipped vehicles (Level 4 or 5) will make "distracted driving" a non-issue because there will be no human "driver" responsible for conducting the dynamic driving task (DDT). However, in Level 1 to 3 vehicles, there must be a "driver" present who can conduct the DDT when the vehicle technology is not engaged or when it is incapable of doing so.

It is important to understand that, according to SAE International (J3016), in Level 0 to 2 vehicles:

> You *are* driving whenever these (ADAS) driver support features are engaged – even if your feet are off the pedals and you are not steering. And you must steer, brake, or accelerate as needed to maintain safety.

In **Level 4 and 5** vehicles:

> You *are not* driving when these automated driving features are engaged – even if you are seated in the "driver's seat." These automated driving features will not require you to take over driving.

However, a **Level 3** vehicle can function as a Level 4 or 5 vehicle. The exception is that a Level 3–equipped vehicle may request that the driver take over the DDT.

Put simply, Level 0 to 2 vehicles cannot recognize a situation it cannot handle. The driver must be cognitively engaged and recognize if a dangerous situation is evolving and decide to take over the DDT at the appropriate time. Conversely, a Level 3 vehicle, in which the system recognizes when a situation is evolving that it cannot handle, notifies the driver to take over. The system makes the decision, and the driver must be prepared to immediately react to the decision notification.

Manufacturers should design Level 1, 2, and 3 vehicles equipped with systems capable of conducting the DDT under certain conditions with a means of identifying when a vehicle does not require the driver to be in control of the DDT so an officer knows if use of a mobile electronic device or other distracting activity is legal at the time of observation.

Recommendations for Jurisdictions

1. Utilize the best available distracted driving educational materials in proactive public education efforts. One such source is the IACP Distracted Driving Toolkit.

2. Pursue legislation enacting a comprehensive distracted driving law (see model legislation after this section).

Recommendations for Manufacturers and Other Entities

MOE 4. Manufacturers and other entities should design ADS-equipped vehicles with a means of identifying when a vehicle is in automated mode to facilitate effective enforcement of distracted driving laws (i.e., so an officer knows if using a handheld device is legal at the time of observation).*

MOE 5. Manufacturers should incorporate technology that monitors the driver's awareness (monitoring eyes and/or hand placement, responsiveness, and whether the driver is seated in the proper location) with the vehicle prompting disengagement of activated self-driving mode if the driver is not paying sufficient attention to the DDT.

In 2018, there was a fatal crash involving a Tesla with Level 2 technology engaged. The crash occurred in Mountain View, California, and the California Highway Patrol assisted the NTSB with its subsequent investigation. In 2020, the NTSB published *Crash Between a Sport Utility Vehicle Operating with Partial Driving Automation and a Crash Attenuator, Mountain View, California, March 23, 2018*.† In this report, the NTSB made two recommendations to the NHTSA, consistent with MOE 5:

- For vehicles equipped with Level 2 automation, work with SAE International to develop performance standards for driver monitoring systems that will minimize driver disengagement, prevent automation complacency, and account for foreseeable misuse of the automation.
- After developing the performance standards for driver monitoring systems recommended in Safety Recommendation H-20-X, require all new passenger vehicles with Level 2 automation be equipped with a driver monitoring system meeting these standards.

* This appears in *Jurisdictional Guidelines for the Safe Testing and Deployment of Vehicles Equipped with Automated Driving Systems* as MOE 19.

† NTSB/HAR-20/01. Washington, DC.

Benefits of Implementation

It is anticipated there will be a reduction (or elimination) in crashes caused by driver distraction in Level 4 and 5 ADS-equipped vehicles.

Note: Level 1, 2, and 3 ADAS-equipped vehicles are already helping to reduce crashes with available technologies such as blind-spot detection, adaptive cruise control, lane keeping, emergency braking, and pedestrian detection.

Challenges to Implementation

Many jurisdictions have laws prohibiting texting and driving, but fewer have comprehensive distracted driving laws, and some policymakers or legislative bodies may resist enhancing current laws by making them more encompassing or elevating them to a primary offense so offenders can be stopped by law enforcement without another violation being observed. However, many of these existing laws continue to allow some distracting activities (i.e., texting being the only distracting activity expressly prohibited).

Model Legislation

Dangerously distracted driving.

(1) (a) It is a crime to drive dangerously distracted.

(b) This section applies to Level 1, 2, and 3 vehicles* unless the Level 3 vehicle is equipped with a visual system capable of being observed by a law enforcement officer within [X] feet of the vehicle that indicates the vehicle's ADS is engaged.

(c) Enforcement of this crime may be accomplished as a primary enforcement action when a driver of a motor vehicle has been observed in violation of this section or the section on use of personal electronic devices, to the degree that the driver's activity is having an apparent adverse impact on the safe operation of the vehicle being operated on any highway. Causing or nearly causing a crash (with a vehicle, fixed object, or person) while using a personal electronic device constitutes prima facie evidence that the driver was dangerously distracted by the personal electronic device.

Using a personal electronic device while driving.

(1) A person who uses a personal electronic device while driving a motor vehicle on a public highway is guilty of the crime of using a personal electronic device while driving.

(2) Subsection (1) of this section does not apply to

(a) a driver who is using a personal electronic device to contact emergency services;

(b) the use of a system by a transit system employee for time-sensitive relay communication between the transit system employee and the transit system's dispatch services;

(c) an employee or contractor of a utility services provider acting within the scope of employment while responding to a utility emergency;

(d) an individual employed as a commercial motor vehicle driver who uses a personal electronic device within the scope of such individual's employment if such use is permitted under 49 USC 31136 as it existed on July 23, 2017; and

(e) a person operating an authorized emergency vehicle.

(3) the [state/province/territory] preempts the field of regulating the use of personal electronic devices in motor vehicles while driving, and this section supersedes any local laws, ordinances, orders, rules, or regulations enacted by any political subdivision or municipality to regulate the use of a personal electronic device by the operator of a motor vehicle.

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* If "automated driving system–equipped vehicles" are not defined in a jurisdiction's law, a definition may be required. AAMVA defines an ADS as the hardware and software that are collectively capable of performing the entire DDT on a sustained basis, regardless of whether it is limited to a specific ODD; this term is used specifically to describe Level 3, 4, or 5 driving automation systems.

(4) For purposes of this section,

(a) "Driving" means to operate a motor vehicle on a public highway, including while temporarily stationary because of traffic, a traffic control device, or other momentary delays. "Driving" does not include when the vehicle has pulled over to the side of, or off, an active roadway and has stopped in a location where it can safely remain stationary.

(b) "Personal electronic device" means any portable electronic device that is capable of wireless communication or electronic data retrieval and is not manufactured primarily for hands-free use in a motor vehicle. "Personal electronic device" includes, but is not limited to, a cell phone, tablet, laptop, two-way messaging device, or electronic game. "Personal electronic device" does not include two-way radio, citizens band radio, or amateur radio equipment.

(c) "Use" or "uses" includes but is not limited to

(i) holding a personal electronic device in either hand or both hands;

(ii) using a hand or finger to compose, send, read, view, access, browse, transmit, save, or retrieve email, text messages, instant messages, photographs, or other electronic data; however, this does not preclude the minimal use of a finger to activate, deactivate, or initiate a function of the device;

(iii) watching video on a personal electronic device, other than watching data related to navigation; or

(iv) broadcasting a video (Facebook Live, Instagram Live, and so on) unless the personal electronic device is used for the sole purpose of continuously recording or broadcasting video within or outside of the motor vehicle (dashcam) and the recording device does not require interaction from the driver while the vehicle is being driven.

OUR VISION

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