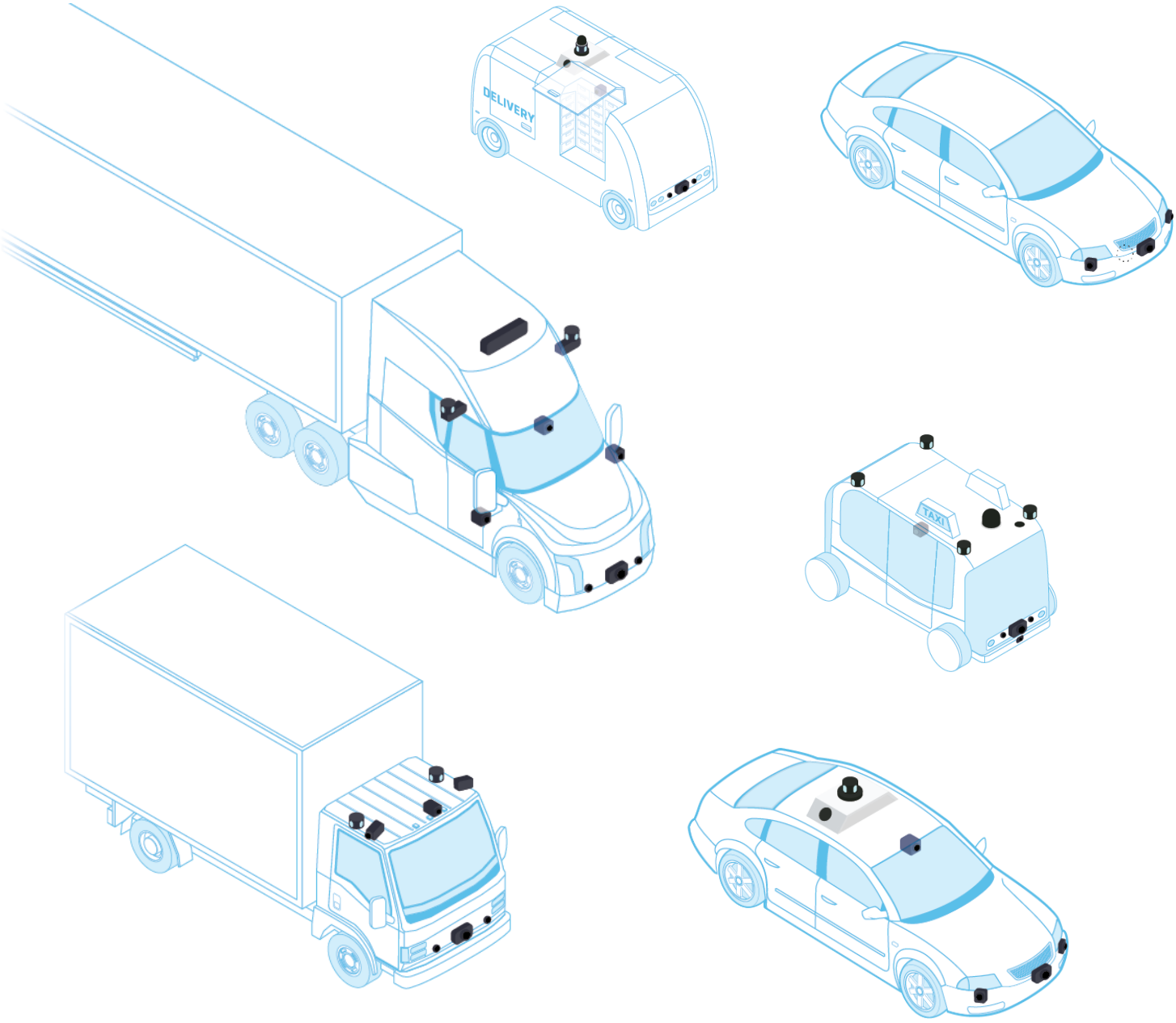
Texas Automated Vehicle Recognition Guide

for First Responders



February 2025

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Disclaimer

This guide reflects information about automated vehicles and automated vehicle operators in Texas as of the date of publication. Because information provided in this guide is subject to change, please refer to existing or future applicable recognition guides, first responder/law enforcement interaction plans, and information made available by the operators that preempt the contents of this guide.

Revisions

TxDOT will revise this guide as needed. TxDOT welcomes recommendations on how to improve this guide. Provide recommendations for improving this document to RTIMAIN@txdot.gov.

February 2025

Introduction and Overview

Purpose

This document provides Texas first responders with essential information on automated vehicles (AVs) currently testing or operating within the state. It includes detailed photographs and descriptions of key components for each AV model, enabling responders to quickly identify vehicles and determine their level of autonomy, where applicable. By enhancing responders' understanding of AV technology, this guide supports safe and effective incident management involving autonomous vehicles.

The vehicle recognition guide is divided into five main sections, organized by the class and purpose of the autonomous vehicle:

- Autonomous Passenger Vehicles
- Autonomous Passenger Vehicles Without a Driver's Compartment
- Autonomous Commercial Motor Vehicles (Box Trucks and Tractor-Trailer Configurations)
- Autonomous Delivery Service Vehicles
- Autonomous Delivery Service Robots

How to Use This Guide

About the Operator

Each operator's page will include an "About the Operator" section. The information in this section will include key details about the operator: where they operate; weather or not they are currently using a safety driver; and other information that may be relevant for first responders becoming familiar with the vehicle.

Identification

Each operator's page will include an "Identification" section. The information in this section will include unique visual features that can be used to identify each vehicle.

Confirmation of Automation Status

Each operator's page will include a "Confirmation of Automation Status" section. The information in this section provides instructions on identifying when autonomy is disengaged in each vehicle, if such details are available. It is important to note that the automation status can be confirmed by contacting the appropriate operator. See the Texas Automated Vehicle Operator Contact Sheet for contact information. This section will state "unknown" if the information is not publicly available or if operators have not shared their interaction plans with the project team.

Document Location

The information that may be found is vehicle registration, proof of insurance, contact information, vehicle owner information, trailer identification, shipping papers, bill of lading, international fuel tax agreement (IFTA), permits, preferred tow companies, law enforcement and first responder interaction plans, emergency response information, and vehicle schematics.

Weblink(s)

The “Weblink(s)” section on each operator’s page directs users to the operator’s homepage and, if available, their online first responder resource webpage. When using this guide online, clicking the provided link will open the operator’s webpage. For paper copies, entering the URL into the search bar will provide access to the webpage. If no link or URL is provided, users should search for the operator’s name followed by “AV” in their browser. Once on the operator’s webpage, search for the safety or first responder tab to access first responder resources, if available.

Information Quality

The information obtained for this guide was provided by online public sources, interaction plans, or directly by the operators. All operators were asked to review their respective information for accuracy and up-to-date information, though, not all operators completed the review. All operator specific images were provided directly by the operators. For vehicle pages without images, images were not provided by their respective operators.

Notes on Abbreviations and Terminology

Many references refer to autonomous vehicles (AVs) or connected autonomous vehicles (CAVs). The Texas Transportation Code uses the phrase automated vehicles. This document may use autonomous vehicles and automated vehicles interchangeably. The abbreviation AV in this guide represents automated or autonomous vehicles.

NOTE: While AV or CAV and the phrase autonomous vehicles may refer to any level of autonomy, under Texas law, only SAE International (SAE) Level 3 to 5 automation capable vehicles meet the definition used in the Texas Transportation Code for automated vehicles. When required, the proper terminology will appear in place of the abbreviation.

Abbreviations and Acronyms

Appendix A identifies abbreviations and acronyms.

Levels of Vehicle Autonomy

A vehicle's level of autonomy relates to its capacity to operate and navigate with limited or no human intervention. SAE created an evolving framework consisting of five distinct levels of autonomy. These levels, outlined in SAE J3016 *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles* (2021) and reproduced below, represent a hierarchical advancement in automation based on the extent to which the motor vehicle can independently perform driving tasks. However, under Texas law, only vehicles with automation capabilities classified at Levels 3 through 5 meet the definition of autonomous vehicles within the Texas Transportation Code. Table 1 provides examples of common features at each autonomy level, along with their designations and codes as used on the Texas CR-3 *Texas Peace Officer's Crash Report Form*. Law enforcement and first responders should familiarize themselves with these classifications to accurately assess and report autonomous vehicle involvement in incidents.

Table 1. SAE International Levels of Driving Autonomy and Corresponding TXDOT CR-3 Codes

SAE Levels of Autonomy	SAE Level Examples	Texas CR-3 Code
SAE Level 0 No Automation	• Automatic Braking • Blind Spot Warning • Lane Departure Warning	**0** No Automation
SAE Level 1 Driver Assistance	• Lane Centering **OR** • Adaptive Cruise Control	**1** Driver Assistance
SAE Level 2 Partial Automation	• Lane Centering **AND** • Adaptive Cruise Control	**2** Partial Assistance
SAE Level 3 Conditional Automation	• Traffic Jam Chauffer • Automated driving in limited conditions	**3** Conditional Automation
SAE Level 4 High Automation	• Local Driverless Taxi Service • May Not Possess Traditional Driving Operation Features (Wheels or Pedals) • Automated driving in limited conditions	**4** High Automation
SAE Level 5 Full Automation	• Vehicle Can Drive Anywhere in All conditions	**5** Full Automation
		6 Automation Level Unknown
		99 Unknown (Use when Autonomous Unit Engaged Status [Box 8] is Unknown)

NOTE: SAE levels of autonomy may be referred to as an "L" in industry documents (e.g., SAE Level 4 as L4).

SAE Level 1-3

Vehicles manufactured between 2010 and 2016 may include advanced driver assistance systems (ADAS) at SAE Level 1 and 2. Vehicles manufactured after 2016 include such capabilities more often. Such features include adaptative cruise control and lane keeping assistance. SAE Level 3 vehicles only recently entered the U.S. market, which may include more advanced self-driving features that function in more limited circumstances. SAE Level 1-3 vehicles generally appear similar to other vehicles on the road and employ less visible sensors and cameras than those at higher levels of automation. Drivers must be in control or ready to take control of an SAE Level 1-3 vehicle at all times. Under the Texas Transportation code, such vehicles are not classified as fully automated vehicles.

SAE Level 4-5

SAE Levels 4 and 5 automated vehicles do not require a driver ready to take control, and operate using automated driving systems (ADS). Current SAE Level 4 vehicles on Texas roadways include passenger vehicles operating as ride-hailing services, commercial motor vehicles (trucks and tractor-trailers), and delivery robots operating in the roadway. There are no SAE Level 4 vehicles currently available for consumer purchase and such vehicles remain in development, operated by the companies developing them. Such vehicles may or may not include a safety driver, and those operating driverless may be monitored remotely by the AV operator. Many SAE Level 4 vehicles have more prominent external components that make them distinguishable from other vehicles. Presently, no SAE Level 5 vehicles exist.

Figure 1 provides a diagram of an SAE Level 1-3 passenger vehicle with key components and features labeled.

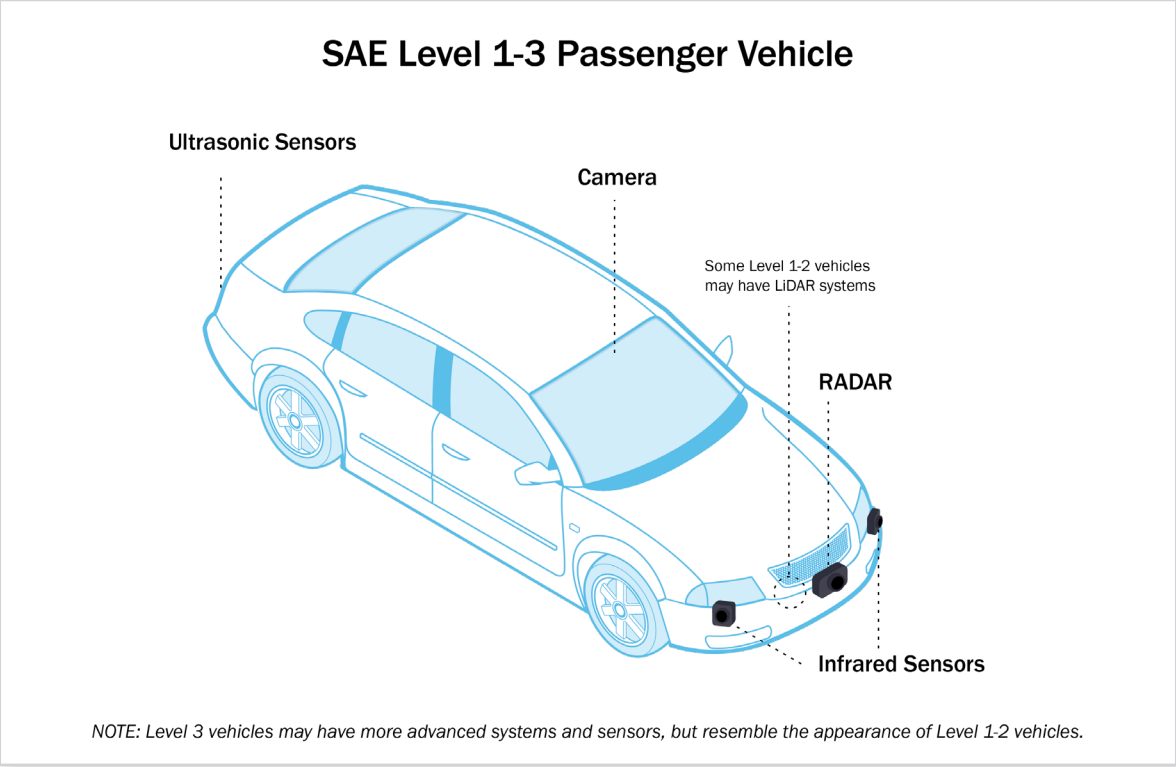

Figure 1. Diagram of an SAE Level 1-3 Passenger Vehicle

Evolving AV World

Automated Driving System technology is constantly changing and evolving, along with vehicle types, operators, and testing/operating locations. As a result, new operators are constantly entering the market or bringing their operations to Texas. Similarly, operators can quickly cease operations or leave Texas.

Operators No Longer in Texas

Some operators ceased AV operations in Texas while the project team conducted this project, which included Coco, Cruise, and Refraction AI. Cruise, a former automated passenger vehicle fleet operating in Houston, Austin, and Dallas, is the most recent and notable. Additional operators may have ceased operations since the publication of this guide.

Operators Potentially Coming to Texas

Operators that may bring AV operations to Texas include Mozee and Beep. Motional is actively mapping in Austin, but it has not announced its testing operations. Additional operators may be interested in starting operations in Texas.

Additional Resources Mentioned in the Guide

First Responder Interaction Plans (FRIPs)/Law Enforcement Interaction Plans (LEIPs)

This guide provides instructions on identifying when autonomy is disengaged in each vehicle, if such details are available. Additional guidance on disengaging each vehicle's autonomous operations and interacting with each AV model can be found in their respective FRIP/LEIP, if available from the AV developer. While not currently mandatory for AV operators in Texas, several operators proactively develop and share these interaction plans with first responders.

Texas Automated Vehicle Operator Contact Sheet

The Texas Automated Vehicle Operator Contact Sheet, provided to first responders separate from this guide, provides emergency hotline numbers and non-emergency contact details for AV operators in Texas. This list is not exhaustive, as some operators did not supply contact information. The contact sheet may help first responders access relevant operator information when needed.

Automated Passenger Vehicles

Automated passenger vehicles can operate autonomously, navigating and driving without human intervention. Equipped with advanced technologies, these vehicles can perform driving tasks within designated areas, eliminating the need for a human driver. In Texas, all operational automated vehicles are SAE Level 4, meaning they can operate independently within specific, predefined conditions. AV developers and operating firms operate these vehicles and oversee their deployment and maintenance.

These vehicles often operate as driverless taxi services, providing an alternative to traditional rideshare options. Passengers can hail these taxis via a smartphone app, similar to existing rideshare services, but the vehicle operates autonomously, relying on advanced sensors, cameras, and mapping technology to navigate and avoid obstacles, though some may still employ safety drivers during testing.

Figure 2 provides a diagram of an SAE Level 4-5 automated passenger vehicle with key components and features labeled. Notable features of these vehicles include:

- **Front and Top-Mounted Cameras:** Frequently used inexpensive technology, however, complex algorithms are necessary to interpret the image data collected
- **Front and Side-Mounted InfraRed Sensors:** Allow for the detection of lane markings, pedestrians, and bicycles that are hard for other sensors to detect in low lighting and certain environmental conditions
- **Front-Mounted Radio Detecting and Ranging (RADAR):** A sensor that uses radio waves to determine the distance between obstacles and the sensor
- **Global Positioning Systems (GPS):** Locate the vehicle by using satellites to triangulate its position. Although GPS has improved since the 2000s, it is only accurate within several meters
- **Light Detection and Ranging (LiDAR):** A 360-degree sensor that uses light beams to determine the distance between obstacles and the sensor
- **Ultrasonic Sensors:** Provide short distance data that are typically used in parking assistance systems and backup warning systems

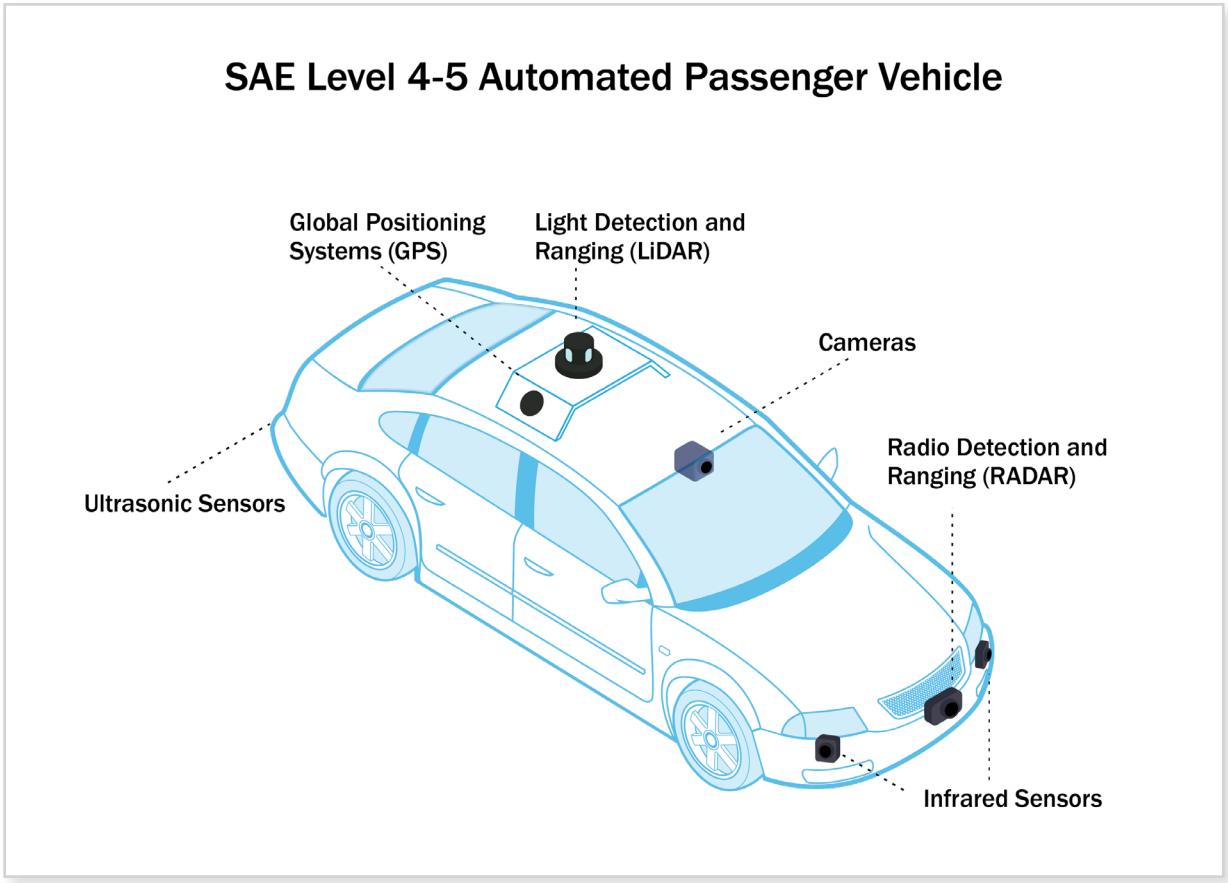

Figure 2. Diagram of an SAE Level 4-5 Automated Passenger Vehicle

AV Ride

About the Operator

AV Ride is testing autonomous vehicles in Austin. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Not Available.

Document Location

Not available.

Weblink

https://www.avride.ai/

Identification

AV Ride automated passenger vehicles can be visually identified by:

- **Purple and Black Accents and Branding:** AV Ride vehicles are white and feature purple and black accents on the sides of the vehicle. They also display black branding on the passenger doors of the vehicle.
- **Vehicle Make and Model:** Not Available.

No Photos Provided.

May Mobility

About the Operator

May Mobility operates a fleet of autonomous vehicles, including a disability-accessible model, in the downtown Arlington area. These vehicles are available at no charge to University of Texas at Arlington students and staff, while members of the public can access the service for a small fee. May Mobility currently only offers services during the work week.

Confirmation of Automation Status

Not Available.

Document Location

Not available.

Weblink

https://maymobility.com/

Identification

May Mobility automated passenger vehicles can be visually identified by:

- **Blue and Green Accents and Branding:** May Mobility vehicles are white and prominently feature blue and green accents, with the hood typically being green and the rear section blue. These colors are used in the company's branding, which is visible on the passenger doors and other parts of the vehicle.
- **Vehicle Make and Model:** May Mobility's fleet consists of modified Toyota Siennas and modified Polaris Gems, an electric vehicle.

No Photos Provided.

Nuro

About the Operator

Nuro is testing autonomous vehicles in Houston. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

The Nuro autonomous Prius will come to a stop, the safety operator will disable the autonomous mode, put the vehicle in park, and activate the hazard lights. First responders should call the emergency hotline to confirm with a remote operations specialist whether a vehicle in in autonomous mode.

Document Location

Physical documents can be provided to law enforcement by the safety operator. Electronic documentation can be provided to law enforcement upon request using Nuro's Emergency Hotline.

Weblink

https://www.nuro.ai/ and
https://www.nuro.ai/first-responders

Identification

Nuro P2 automated passenger vehicles can be visually identified by:

- **Black Branding:** Nuro vehicles are white and feature minimal black branding, typically on the sides of the vehicle.
- **Tall Sensor Mount:** Nuro vehicles have a tall sensor mount with thin legs on the roof of the vehicle, which is easily spotted.
- **Vehicle Make and Model:** Nuro is testing their software, the Nuro Driver ™ - their AI platform that uses automotive-grade hardware and AI powered software to enable autonomous driving, on a fleet of modified Toyota Prius.

Figure 3. Side Profile of Nuro P2 Automated Passenger Vehicle

Figure 4. Front Profile of Nuro P2 Automated Passenger Vehicle

Figure 5. Rear Profile of Nuro P2 Automated Passenger Vehicle

Volkswagen ADMT

About the Operator

Volkswagen ADMT (Autonomous Driving and Mobility Testing) is testing autonomous vehicles in downtown Austin. Currently, these tests are conducted with a safety driver in the vehicle, and the company is not offering rides to the public but is focused on refining its autonomous driving system technology.

Confirmation of Automation Status

Currently unavailable. Volkswagen passenger vehicles will have a safety driver present to take control of the vehicle.

Document Location

Physical documents and first responder information are located in the glove box.

Weblink

https://www.volkswagengroupofamerica.com/en-us/ADMT

Identification

Volkswagen automated passenger vehicles can be visually identified by:

- **Yellow Honeycomb Design:** Volkswagen ADMT vehicles are black with a distinctive yellow honeycomb pattern on the rear and sides.
- **Lack of Sensor Array:** Unlike some other autonomous vehicles, the ID. Buzz testing vehicles do not have an exposed, obvious sensor array. Instead, the sensors and technologies that power the autonomous driving system are contained in a slight black notch on the top of the vehicle that resembles a roof rack.
- **Vehicle Make and Model:** Volkswagen ADMT's fleet consists of modified Volkswagen ID Buzzes, an electric vehicle.

No Photos Provided.

Waymo

About the Operator

Waymo is testing autonomous vehicles in downtown Austin. Currently, these tests are conducted with a safety driver in the vehicle, and the rides are available exclusively to users of the Waymo One app. However, in early 2025, Waymo plans to expand its services through a partnership with Uber, offering fully autonomous rides to customers without a driver in the vehicle.

Confirmation of Automation Status

The vehicle will exit autonomous status and will not move if any of the following four conditions are true: an airbag is deployed within the vehicle, a door is open, the vehicle is parked, or the parking brake is applied.

Document Location

Physical documents are located in a container affixed to the front driver-side and passenger-side sun visors.

Weblinks

https://waymo.com/ and
https://waymo.com/firstresponders/

Identification

Waymo automated passenger vehicles can be visually identified by:

- **Cone-Shaped Sensor Array:** Waymo vehicles' automated driving systems are empowered by a distinctive cone-shaped sensor array mounted on top of the vehicle. Unlike other automated passenger vehicles, this array features a unique design, with sensors and cameras set in the conical shape, making it easily distinguishable. It also features a blue-green Waymo logo, "W", on the sides of the sensor array.
- **White Coloration:** Waymo vehicles are typically white and feature minimal branding, with only a small, subtle grey Waymo logo on the rear doors.
- **Vehicle Make and Model:** Waymo's fleet consists of modified Jaguar I-PACEs, an electric vehicle.

No Photos Provided.

Zoox

About the Operator

Zoox is testing autonomous vehicles in Austin. Currently, these tests conducted with a safety driver in the vehicle. However, Zoox is working towards fully autonomous operations with no human driver inside the vehicle sometime in the near future. Additionally, Zoox is piloting automated passenger vehicles without a driver's component in other states, so they may bring those operations to Texas in the future.

Confirmation of Automation Status

Not available.

Document Location

Physical documents are located in a booklet affixed to the vehicle window, which is viewable from the vehicle doors.

Weblink

https://zoox.com/

Identification

Zoox automated passenger vehicles can be visually identified by:

- **Roof Rack Sensor Array:** Zoox vehicles operate using a roof rack embedded sensor array, which is easily identifiable by the presence of cameras and sensors positioned on each of the four corners of the vehicle's body.
- **Neon Coloration:** Zoox's vehicles are white with a neon blue and green neon paint pattern on the rear and sides.
- **Vehicle Make and Model:** Zoox is testing their software on a fleet of modified Toyota Siennas. Their software is intended for a custom-built fleet of automated passenger vehicles without a driver's component.

No Photos Provided.

Automated Passenger Vehicles without a Driver's Compartment

Automated passenger vehicles without a driver's compartment, also known as "robotaxis," represent a significant shift in automotive design and public transportation. Unlike traditional automotive vehicles, including earlier automated vehicle models, these fully automated passenger vehicles and taxis are designed without a driver's seat, steering wheel, or manual controls. Built on advanced AI algorithms, these vehicles can autonomously navigate complex urban environments without any human intervention in the driving operation.

Currently, these vehicles remain in the conceptual phase rather than being fully operational. Although a few prototypes and pilot programs exist, widespread deployment of driverless passenger vehicles without manual controls is still under development. Significant challenges—such as safety regulations, infrastructure adaptation, and public acceptance—require ongoing testing and refinement of the software before these vehicles become commonplace on public roads. Nonetheless, several companies operating in Texas are actively developing and testing fully autonomous vehicles.

At the time of publication, there are currently no automated passenger vehicles without a driver's compartment operating in Texas.

Figure 6 provides a diagram of an SAE Level 4-5 automated passenger vehicle without a driver's compartment with key components and features labeled.

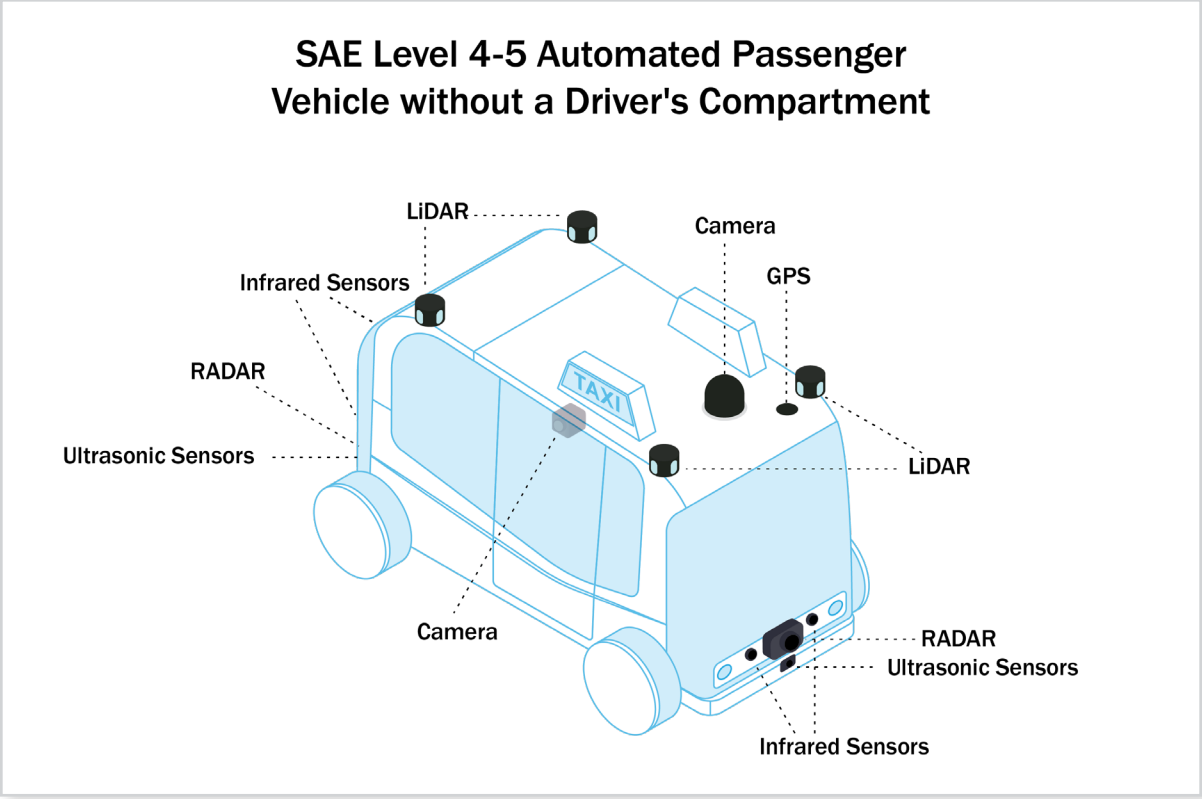

Figure 6. Diagram of an SAE Level 4-5 Automated Passenger Vehicle with No Driver's Compartment

Automated Commercial Motor Vehicles

Automated commercial motor vehicles (CMVs) are equipped with advanced systems that enable them to autonomously perform tasks such as cargo transportation within designated routes or areas. In Texas, all operational automated CMVs are classified as Level 4 or higher, meaning they can operate autonomously under specific, predefined conditions without the need for a human driver. These vehicles are primarily used for terminal-to-terminal freight transportation and rely on a combination of sensors, cameras, radar, and mapping technology to safely navigate highways and avoid obstacles.

Currently, automated CMVs rely on an AV operator's pre-mapping of specific routes and conditions. They are programmed to follow designated pathways, typically on highways or within controlled environments, where the necessary infrastructure—such as roadways, traffic signals, and potential obstacles—has been mapped. While these vehicles can make real-time decisions, such as slowing down or changing lanes when encountering obstacles, their dependence on pre-mapping remains a barrier to the broader deployment of fully autonomous CMVs.

There are two primary configurations of autonomous CMVs operating in Texas. The first, automated box trucks, are primarily being developed and deployed to meet business-to-business last-mile delivery needs. These automated CMVs are often modified or purpose-built Class 6 trucks designed for cargo transport along interurban and smaller delivery routes. The second, automated tractor-trailers, are typically larger vehicles used for long-haul freight transportation. These trucks operate along interstates and other cross-country routes, moving freight between shipping terminals, where it is then transferred to traditional human-operated vehicles for final delivery. Given the long-distance nature of their routes, automated tractor-trailers may cross state lines and encounter United States Customs and Border Patrol checkpoints. At these checkpoints, they must be able to navigate procedures designed for traditional trucks, which could involve stopping for inspection, providing documentation, and complying with directions issued by customs inspectors.

Figures 7 and 8 provide diagrams for the two configurations of automated CMVs with key components and features labeled. Notable features include:

- **Front and Top-Mounted Cameras:** Frequently used inexpensive technology, however, complex algorithms are necessary to interpret the image date collected
- **Front and Side-Mounted InfraRed Sensors:** Allow for the detection of lane markings, pedestrians, and bicycles that are hard for other sensors to detect in low lighting and certain environmental conditions
- **Front-Mounted Radio Detecting and Ranging (RADAR):** A sensor that uses radio waves to determine the distance between obstacles and the sensor
- **Global Positioning Systems (GPS):** Locate the vehicle by using satellites to triangulate its position. Although GPS has improved since the 2000s, it is only accurate within several meters
- **Light Detection and Ranging (LiDAR):** A 360-degree sensor that uses light beams to determine the distance between obstacles and the sensor

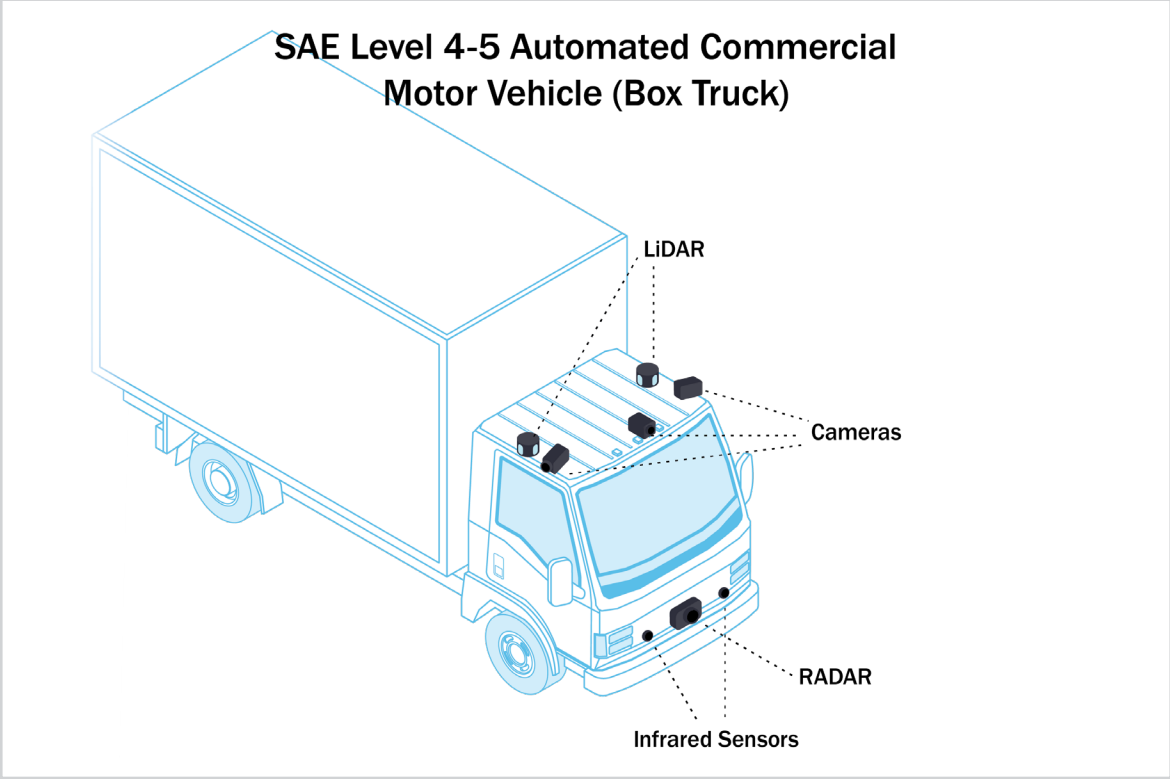

Figure 7. Diagram of an SAE Level 4-5 Automated Commercial Vehicle (Box Truck)

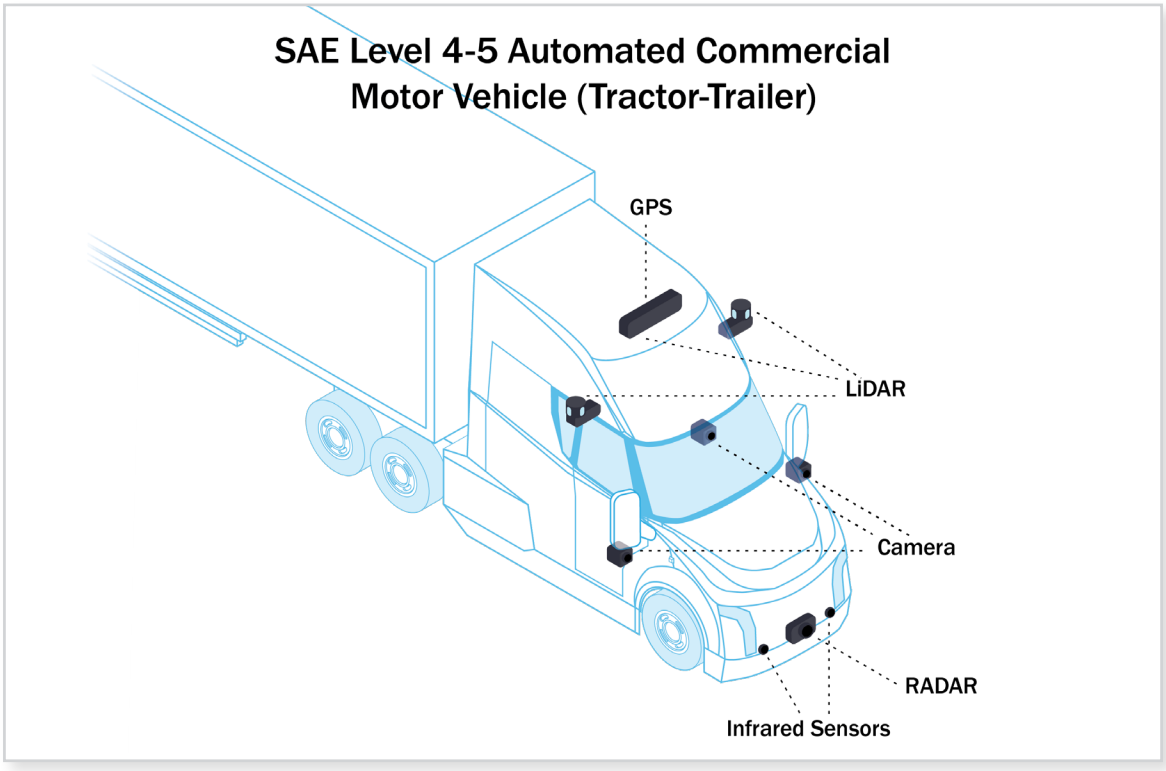

Figure 8. Diagram of an SAE Level 4-5 Automated Commercial Vehicle (Tractor-Trailer)

Aurora

About the Operator

Aurora is testing autonomous vehicles between Palmer and Houston, along IH-45, and Aledo and El Paso, along IH20 and IH-10. A fleet of Aurora vehicles also operates driverless on leased/private roads. Currently, testing on public roads includes a safety driver in the vehicle. Aurora announced their intent to have their first driverless trip in April 2025.

Confirmation of Automation Status

Currently unavailable. Aurora CMVs will have a safety driver present to take control of the vehicle.

Document Location

Weblink

https://aurora.tech/

Identification

Aurora automated commercial motor vehicles can be visually identified by:

- **Blue Coloration:** Aurora cabins are typically a deep blue with branding on the sides.
- **White Branding:** Aurora trucks feature white logos and branding, on the sides of the cabin.
- **Vehicle Class**: Aurora's current fleet consists of Volvo and Pacar class 8 CMVs integrated with Aurora's autonomous technology.

Figure 9. Side Profile of Aurora Peterbilt CMV

Figure 10. Front Profile of Aurora Peterbilt CMV

Bot Auto

About the Operator

Bot Auto is testing autonomous vehicles in the Houston area, with plans to expand testing within the Texas Triangle, including San Antonio and the DFW Metroplex. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Currently unavailable. Bot Auto CMVs will have a safety driver present to take control of the vehicle through 2025.

Document Location

Weblink

https://bot.auto/

Identification

Bot Auto automated commercial motor vehicles can be visually identified by:

- **Coloration:** Bot Auto cabins may be a variety of colors.
- **Minimal Branding:** Bot Auto trucks feature minimal branding on each side of the cabin.
- **Vehicle Class**: Bot Auto's current fleet consists of Freightliner Cascade class 8 CMVs integrated with Bot Auto's autonomous technology.

Figure 11. Angled Profile of Bot Auto International Motors CMV

Figure 12. Front Profile of Bot Auto International Motors CMV

Gatik

About the Operator

Gatik is testing autonomous vehicles in various locations across Texas, focusing on the use of automated box trucks for business-to-business freight transportation. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Gatik CMVs will have a Sensor Side Pod with a light that indicates the status of the vehicle's automated driving system.

Documents Location

Physical documents, including the Bill of Lading, are located in two secure lockboxes, accessible from either side of the cabin. The secure combination for the lockboxes is shared with first responder departments responsible for the jurisdictions in which Gatik has freight-only operations or by calling Gatik's First Responder Information Line. Electronic documents can be provided to first responders upon request using Gatik's First Responder Information Line.

Weblink

https://gatik.ai/

Identification

Gatik automated commercial motor vehicles can be visually identified by:

- **Purple Branding and Accents:** Gatik trucks have purple cabins with a large white sensor bar mounted on top. They also prominently feature purple branding and accents on all sides of the box truck.
- **Unique ID Number:** Each Gatik truck has a unique Gatik ID number found on the cabin, along with its required motor carrier number, and United States Department of Transportation number.
- **Rear Writing:** The words "Autonomous Delivery Truck" are written on the rear of the box.
- **Vehicle Class:** Gatik's current fleet consists of Isuzu Motors Limited class 6 and class 7 CMVs integrated with Gatik's autonomous technology.

Figure 13. Side Profile of Gatik Isuzu CMV

Legend for Figure 13:

1. Gatik Branding on Cabin and Box
2. Gatik Sensor Suite
3. Gatik Sensor Side Pod with ADS Indicator (2x)
4. Gatik Sensor Front Pod
5. US DOT and MC Numbers (2x)

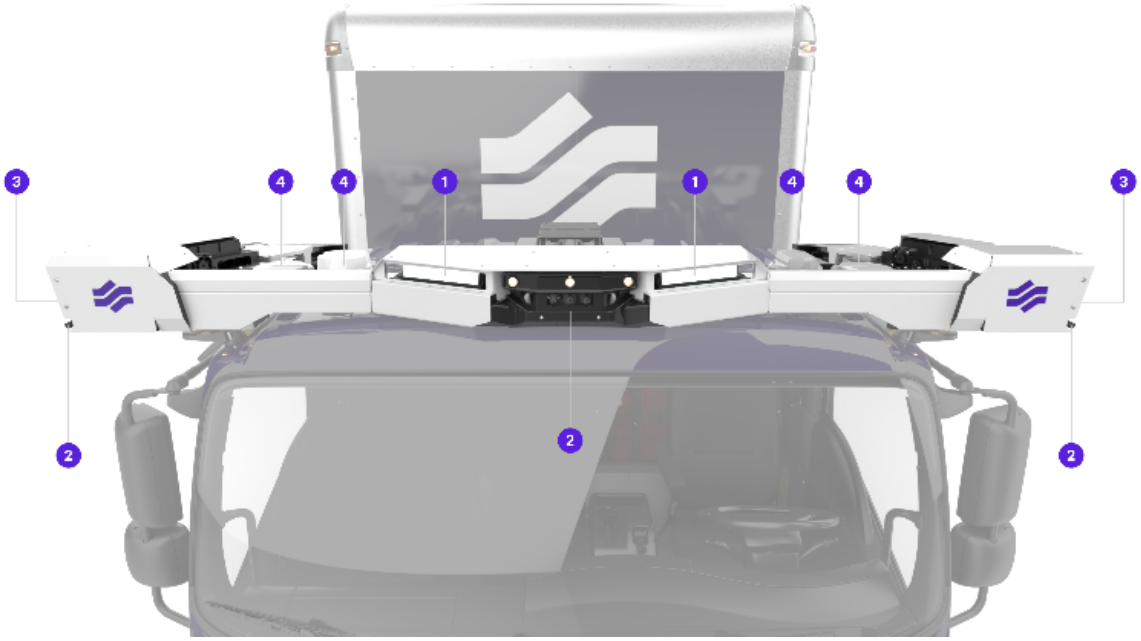

Figure 14. Front Profile of Gatik Mounted Sensor Panel

Legend for Figure 14:

1. LiDAR Sensors: LiDAR uses laser pulses to create a 3D image of the AVs surrounding environment.
2. Cameras: Cameras capture information about the AV's environment, including traffic signs, traffic lights, pedestrians, and road conditions, in real-time.
3. RADAR Sensors: Radar uses radio waves to measure the positions and trajectories of stationary and moving objects around the AV.
4. Antennas: Antennas are used to locate the vehicle and to communicate with FGatik infrastructure and Gatik Remote Supervisor.

Kodiak

About the Operator

Kodiak is testing autonomous vehicles between Houston, Dallas, Fort Worth, and the Permian Basin area. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Kodiak CMVs will have an external display that indicates the autonomy status of the vehicle and whether it is in a safe operating state.

Documents Location

Physical documents are located in a lockbox on the back of the passenger side of the cab. Electronic documents can be provided upon request using Kodiak's Driver Operations Center Line.

Weblink

https://kodiak.ai/

Identification

Kodiak automated commercial motor vehicles can be visually identified by:

- **Mirror Sensors:** Sensors may be attached to each side mirror or mounted above the windshield.
- **Red Coloration:** Kodiak cabins are typically red with white logos on each side of the cabin.
- **Trailer Branding:** The trailer attached to a Kodiak tractor may feature red accents and branding.
- **Vehicle Class**: Kodiak's current fleet consists of Kenworth T680 class 8 CMVs integrated with Kodiak's autonomous technology.

Figure 15. Angled Profile of Kodiak Kenworth CMV

Figure 16. Front Profile of Kodiak Kenworth CMV

Plus AI Inc.

About the Operator

Plus is an autonomous driving software company, and is testing autonomous vehicles between Dallas, Houston, and San Antonio. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Plus CMVs will have an ambered colored light visible on both sides of the cabin when the vehicle is engaged in autonomous mode.

Document Location

Not Available.

Weblink

https://plus.ai/

Identification

Plus automated commercial motor vehicles can be visually identified by:

- **White Coloration:** Plus cabins are typically white with Plus and International branding on each side of the cabin.
- **Orange Trailer Branding:** The trailer attached to the Plus tractor may have large orange accents and Plus and International branding.
- **Vehicle Class:** Plus AI's current fleet consists of TRATON GROUP and International class 8 CMVs integrated with Plus autonomous technology.

Figure 17. Angled Profile of Plus International CMV

Figure 18. Angled Profile of Plus International CMV Cabin

Stack

About the Operator

Stack is testing autonomous vehicles between El Paso and Dallas. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Stack CMVs will have a Stack Visual Autonomy Indicator located on the driver side. A solid white light indicates the truck is in manual driving mode; a blue light indicates the system is ready to engage computer control; a solid green light indicates the vehicle is under computer control; a solid red light indicates the safety driver disengagement is required; and no light indicates the SDS system is not powered on Stack CMVs will have a safety driver present to take control of the vehicle.

Document Location

Physical documents are located behind the passenger seat, inside a zippered folder. Electronic documents can be provided upon request using Stack's Mission Control Team Hotline.

Weblink

https://www.stackav.com/about

Identification

Stack automated commercial motor vehicles can be visually identified by:

- **Black or White Coloration:** Stack cabins are typically black or white with an asset number near the top, on both sides.
- **Vehicle Class**: Stack's current fleet consists of Peterbilt 579 class 8 CMVs integrated with Stack autonomous technology.

No Photos Provided.

Torc Robotics

About the Operator

Torc Robotics is an independent subsidiary of Daimler Truck North America. They are testing autonomous vehicles in Austin. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

- ***Older Model*** Torc CMVs will have interior indicator lights on the A-pillar of the driver's side and on the rear overhead compartment of the cabin to indicate the autonomy status of the vehicle. A green light indicates the ADS is engaged; a red light indicates the ADS is available, and the autonomy is disengaged when both lights are off.
- ***Newer Model*** Torc CMVs will have indicator lights on the dashboard below the emergency manual override button. A green light indicates the ADS is available but not engaged; a blue light indicates the ADS is engaged; and a red light indicates the ADS is not available [or off].

Document Location

Physical documents can be found in both the driver-side and passenger-side door packets.

Weblinks

https://torc.ai/ and
https://torc.ai/safety/first-responder-information/

Identification

Torc Robotics' automated commercial motor vehicles can be visually identified by:

- **Grey or Camo Coloration:** Torc cabins are typically grey or grey with a grey toned camo pattern on the front.
- **Red and White Branding:** Torc trucks feature red and white branding on the front hood and near both side doors of the cabin. A white "T" within a red circle is usually displayed on the front hood. There may be branding or logos on all visible sides of the trailer.
- **Trailer Branding**: The trailer attached to a Torc tractor may display "Torc" or "Torc Partner" branding on the sides.
- **Vehicle Class**: Torc's current fleet consists of Freightliner Cascadia class 8 CMVs integrated with Torc's autonomous technology.

Figure 19. Side Profile of Torc Freightliner CMV

Figure 20. Front Profile of Torc Freightliner CMV

Figure 21. Torc Component Callouts

Waabi

About the Operator

Waabi is testing autonomous vehicles between Houston and Dallas. Currently, these tests are conducted with a safety driver in the vehicle.

Confirmation of Automation Status

Not available.

Document Location

Not Available.

Weblink

https://waabi.ai/

Identification

Waabi automated commercial motor vehicles can be visually identified by:

- **Black Coloration:** Waabi cabins are typically black with branding on the sides.
- **White and Pink Branding:** Waabi trucks feature white and hot pink logos, branding, and accents on both doors and sides of the cabin.
- **Vehicle Class**: Waabi's current fleet consists of Peterbilt class 8 CMVs integrated with Waabi's autonomous technology.

Figure 22. Side Profile of Waabi Peterbilt CMV

Figure 23. Front Profile of Waabi Peterbilt CMV

Figure 24. Waabi Component Callouts

Automated Delivery Service Vehicles (Operating in the Roadway)

Automated delivery service vehicles and robots are designed to operate independently, managing deliveries without direct human intervention. These vehicles are primarily employed to deliver food, groceries, and other supplies within very limited operational design domains (ODDs), often limited to specific restaurants and stores. These vehicles drive on public roadways and typically operate at a maximum of 45 miles per hour, though many operate at much slower speeds. End users and customers can request these automated delivery service vehicles via smartphone apps.

Figure 25 provides a diagram of an SAE Level 4-5automated delivery service vehicle with key components and features labeled. Notable features include:

- **Front and Top-Mounted Cameras:** Frequently used inexpensive technology, however, complex algorithms are necessary to interpret the image data collected
- **Cameras Inside the Storage Area:** Used to verify products and assist in customer service
- **Front and Rear-Mounted InfraRed Sensors:** Allow for the detection of lane markings, pedestrians, and bicycles that are hard for other sensors to detect in low lighting and certain environmental conditions
- **Front-Mounted Radio Detecting and Ranging (RADAR):** A sensor that uses radio waves to determine the distance between obstacles and the sensor
- **Global Positioning Systems (GPS):** Locate the vehicle by using satellites to triangulate its position. Although GPS has improved since the 2000s, it is only accurate within several meters
- **Light Detection and Ranging (LiDAR):** A 360-degree sensor that uses light beams to determine the distance between obstacles and the sensor
- **Ultrasonic Sensors:** Provide short distance data that are typically used in parking assistance systems and backup warning systems

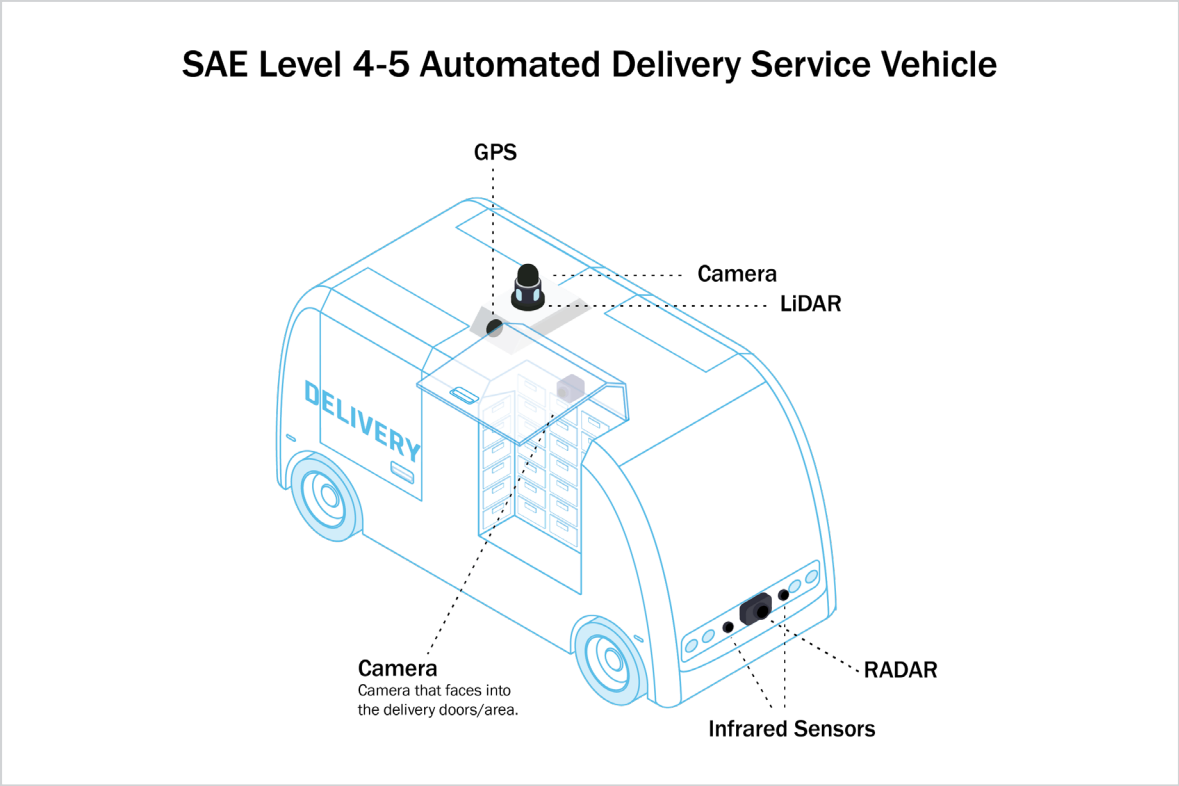

Figure 25. Diagram of an SAE Level 4-5 Automated Delivery Service Vehicle

Clevon

About the Operator

Clevon is operating autonomous delivery service vehicles in Dallas. The Clevon Robots are a zero-occupant vehicle.

Confirmation of Automation Status

Not available.

Document Location

Not Available.

Weblink

https://clevon.com

Identification

Clevon automated delivery service vehicles can be visually identified by:

- **Black Base and Logo:** Clevon delivery service vehicles have a black platform base. The Clevon logo can be found in between the front headlights of the vehicle.
- **Partnership Branding and Coloration:** Clevon delivery service vehicles are typically white. However, they may range in color and branding to accommodate a partnership.
- **Modular Design:** Clevon delivery service vehicles have a modular platform-based design which can accommodate various types, sizes, and shapes of cargo. Currently, most of fleet operates with a box on the platform designed for food and grocery deliveries.

Figure 26. Angled Profile of Clevon Automated Delivery Service Vehicle

Figure 27. Clevon Automated Delivery Service Vehicle with Grocery Platform

Figure 28. Clevon Automated Delivery Service Vehicle Keypad

Nuro

About the Operator

Nuro is operating autonomous delivery service vehicles in Houston. The Nuro Robots are a zero-occupant vehicle.

Confirmation of Automation Status

The Nuro Robot will come to a stop, disable the motor system, lock brakes, and activate its hazard lights to indicate that the autonomy has been disengaged.

Document Location

Physical documents are located behind the rear charge port door, by pressing gently on the door to open. Electronic documentation can be provided to law enforcement upon request using Nuro's emergency hotline

Weblinks

https://www.nuro.ai/ and
https://www.nuro.ai/first-responders

Identification

Nuro R3 automated delivery service vehicles can be visually identified by:

- **White Coloration:** Nuro delivery service vehicles are typically white with sensors and cameras around the vehicles. They may have black windows on the front and/or rear of the vehicles.
- **Black Accents and Branding:** Nuro delivery service vehicles feature the "Nuro" logo, black in color, around the vehicle.
- **Rear Triangle:** Nuro delivery service vehicles may have a florescent orange hazard triangle in the rear.
- **Bot ID:** Nuro delivery service vehicles have ID numbers on one side of the vehicle, towards the bottom, near a tire.

Figure 29. Front Profile of Nuro Automated Delivery Service Vehicle

Figure 30. Rear Profile of Nuro Automated Delivery Service Vehicle

Figure 31. Delivery Side Profile of Nuro Automated Delivery Service Vehicle

Figure 32. Long Side Profile of Nuro Automated Delivery Service Vehicle

Automated Delivery Service Robots

Automated delivery service robots are designed to operate autonomously, navigating deliveries without human intervention. The robots are intended to deliver food, groceries, and other supplies in very limited operational design domains (ODDs), and often from limited and specific restaurants and stores.

The robots differ from automated delivery service vehicles as they do not operate on roadways. They operate on sidewalks, pavements, and other dedicated pedestrian areas. They may cross roads when necessary. They also differ in speed. The robots are typically limited to four or five miles per hour to accommodate a shared space with pedestrians.

Currently, there are three known delivery service robot operators in Texas. These operations are in Austin, Dallas, Houston, San Antonio, and their surrounding areas. The following companies are operating delivery service robots in Texas:

- AVRide - https://www.avride.ai/
- Kiwibot - https://www.kiwibot.com/
- Starship - https://www.starship.xyz/

Appendix A: Abbreviations and Acronyms

ADAS	Advanced Driver Assistance System
ADS	Automated Driving System
ADMT	Autonomous Driving Mobility & Transport by Volkswagen
AV	Automated or Autonomous Vehicle
CAV	Connected Autonomous Vehicles
CMV	Commercial Motor Vehicle
FRIP	First Responder Interaction Plan
GPS	Global Positioning System
LEIP	Law Enforcement Interaction Plan
LiDAR	Light Detecting and Ranging
ODD	Operational Design Domain
RADAR	Radio Detecting and Ranging
SAE	SAE International