



Australian Government

Department of Infrastructure,  
Transport, Regional Development,  
Communications and the Arts



# What is an automated vehicle?

This paper **explains** background information

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## Overview

This paper covers the concepts of automated vehicles and Automated Driving Systems (ADS), and how these differ from Advanced Driver Assistance Systems (ADAS).

## Key points

An automated vehicle is a vehicle that has an ADS.

An ADS is the hardware and software that is collectively capable of performing the entire dynamic driving task. When an ADS is engaged, a vehicle user does not need to control the vehicle or monitor the driving environment.

ADAS features support drivers. The driver must be in control of the vehicle when ADAS features are engaged. Vehicles with ADAS are already available and in use on Australian roads.

Automated vehicles are not commercially available in Australia, but have been forecast to become available from 2026.

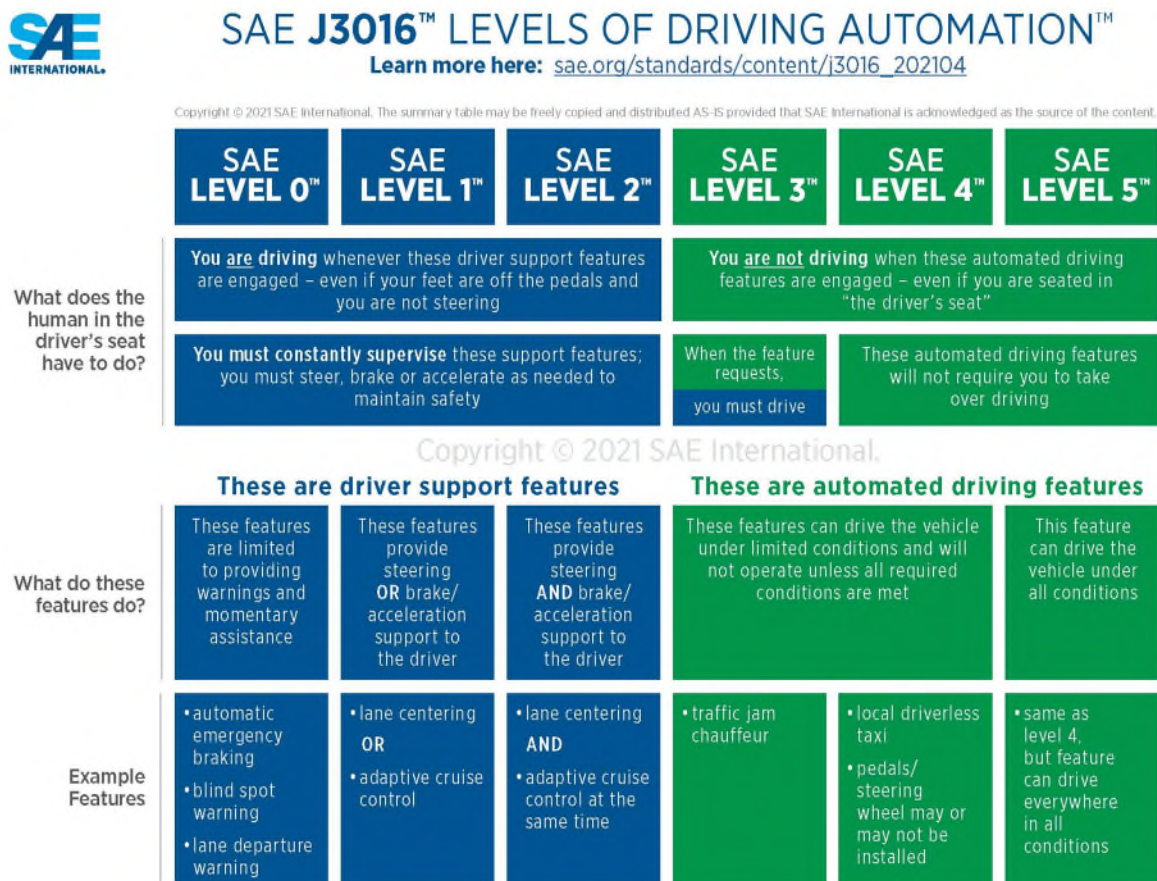
# What is an automated vehicle?

An automated vehicle is a vehicle that has an ADS. When the ADS is engaged, the vehicle can drive for extended periods without anyone in the vehicle needing to use the manual controls or monitor the road. There are many different names commonly used for automated vehicles, including self-driving vehicles, autonomous vehicles, driverless vehicles and robotaxis.

## Levels of driving automation

The Society of Automotive Engineers (SAE) has developed a taxonomy (SAE J3016) that identifies six levels of driving automation. Levels range from no driving automation at level 0 to full driving automation at level 5. Figure 1 shows the differences between the levels.

Figure 1: SAE levels of automation



Source: SAE International (2021)

## What is an ADS?

An ADS is the combination of systems in a vehicle that enables it to drive for extended periods without human input. It is the combination of hardware and software that is collectively capable of performing the entire dynamic driving task. An automated vehicle will have an ADS with capabilities at levels 3, 4 or 5 of driving automation, as shown in Figure 1, above.

The hardware can include things a conventional vehicle may not have, such as sensors, cameras, lidar, computers and radar. It can also include things a conventional vehicle does have, such as steering and braking components.

The software is the programs and other operating information used by the computers that are part of the ADS. Software is used to process information from various sensors, predict movement paths of vehicles, evaluate options to respond to what is happening in the driving environment, then send instructions to vehicle controls like the steering, acceleration and braking systems.

## What is an ADAS?

While ADAS and ADS sound similar, they have very different capabilities and consequently, different roles for the driver. These are important to understand. An ADAS is a driver aid designed to assist the driver, but ADAS features do not perform the entire driving task. When ADAS features are being used, the driver remains fully responsible for driving, monitoring road conditions and intervening when needed. ADAS can provide driving automation at levels 0, 1, and 2.

There are different types of ADAS features. They can do things like:

- provide warnings to the driver, such as lane departure warning or blind spot warnings
- help with steering or braking in an emergency, such as advanced emergency braking and emergency lane keeping
- provide sustained control of the steering or acceleration and braking parts of driving, such as adaptive cruise control and lane keeping.

ADAS features are increasingly common in modern vehicles and it is important to understand their capabilities before use.

## Differences between an ADS and ADAS features

Figure 1 shows the differences between the SAE levels with ADAS features able to provide driving automation from level 0 to level 2, and ADS features able to provide driving automation from level 3 to level 5. Sometimes people find it difficult to distinguish between a level 2 ADAS that can control steering, acceleration and braking on a sustained basis, and a level 3 ADS that can perform the entire driving task some of the time, as they can seem to do the same thing. The key differences between the systems are set out below.

For an ADS feature with level 3 driving automation (also referred to as conditional automation):

- The ADS can do all of the driving functions, some of the time. This means it can control the movement of the vehicle, monitor the driving environment, interpret objects and events in the environment, and plan and execute responses to things happening in the driving environment.
- The person in the driver's seat, the fallback-ready user, does not need to monitor the road but must be ready to take over when requested by the ADS.
- When the vehicle encounters a situation it cannot manage, it will request that the person in the driver's seat takes over driving, allowing a transition period for the driver to safely take control of the vehicle.

For a vehicle with level 2 (ADAS) features:

- The ADAS provides combined steering, acceleration and braking assistance and control, but it is not performing all of the driving functions. The ADAS will have a limited ability to detect, interpret and react to objects and events in the driving environment.
- The driver still needs to watch the road; keep control of the vehicle, such as by keeping their hands on the steering wheel; and decide when to take over if needed and without warning from the vehicle.
- When the ADAS is engaged, the driver is still responsible for compliance with road traffic laws.

## When will automated vehicles be available?

Automated vehicles are not yet commercially available in Australia, however, there have been some small-scale trials of automated vehicles. In other countries there have been large scale trials of robotaxis, and some vehicles with level 3 driving automation features are commercially available.

Table 1 shows a range of forecasts for ADS vehicle deployment in Australia.

**Table 1: ADS vehicle deployment forecasts**

Source	Forecasts provided
Austrroads (2021) <i>Future vehicles forecasts update 2031</i>	Forecasts introduction of level 3 vehicles between 2024 and 2027 with between <1% and 5% of all new vehicles having this capability by 2031.
BITRE (2021) <i>Forecasting uptake of driver assistance technologies in Australia</i>	Forecasts introduction of level 4 and level 5 vehicles between 2026 and 2031 with 10% of all new vehicles having this capability by 2035 to 2040.

Based on the projections in Table 1, automated vehicles are predicted to begin entering the Australian market from 2026. However, since these projections were made in 2021 there have been further developments in the automated vehicle industry that could change when automated vehicles become available in Australia. We are interested in feedback from vehicle and automated vehicle technology industries on whether these forecasts are still suitable.