**Information technologies - Autonomous vehicles**

**What does it do?**

An autonomous vehicle or driverless car is where a human driver is not needed to monitor the surrounding environment nor required to carry out any driving tasks or provide input (Australia & New Zealand Driverless Vehicle Initiative; SAE International 2014; Parliamentary Library & Information Service 2017).

To understand how close humans are to having driverless cars, we need to understand the level of automation. The Society of Automotive Engineering (SAE) International has a standard (J3016) in which six levels of automated driving are detailed. Level 0 (no automation) means a car has no functionality to drive by itself and the human driver has to monitor the driving environment (Australia & New Zealand Driverless Vehicle Initiative; Parliamentary Library & Information Service 2017; SAE International 2014). Level 5 (full automation) is where the car can drive itself, by carrying out driving functions, such as accelerating and breaking, and continuously monitor the driving environment, so a human driver is not required (Australia & New Zealand Driverless Vehicle Initiative; Parliamentary Library & Information Service 2017; SAE International 2014).

Currently, vehicles are currently at Level 3 of the SAE International J3016 standard (Australia & New Zealand Driverless Vehicle Initiative; Parliamentary Library & Information Service 2017; SAE International 2014). Level 3 cars are those where some driving functions are automated in particular environments and examples include cruise control, alerts to the driver when cars or other objects are too close, and automatic emergency braking (MIT Technology Review Insights 2019; Parliamentary Library & Information Service 2017). Progress to Level 4, where are car achieves automated driving and minimal human action only under some conditions is under development (MIT Technology Review Insights 2019; Parliamentary Library & Information Service 2017; SAE International 2014). It is predicted that Level 4 cars will be available by 2025 (Parliamentary Library & Information Service 2017).

Replacing the monitoring of the surrounding environment by humans when driving is one of the biggest roadblocks for why Level 5 cars have not yet been developed (Parliamentary Library & Information Service 2017). Cars can already travel from one location to another without a human driver, however, this cannot be done if a safe manner where there is no harm to human passengers (Parliamentary Library & Information Service 2017).

To replace human monitoring, the car has to be fitted with technology that observes the surrounding environment and then understands what action has to be taken next (Davies 2018; Thompson 2016). For example, if there is a pedestrian ahead on the road, the driverless car needs to identify it, and understand the situation requires either braking or swerving to avoid an accident.

The technology for the car to sense what is happening around it involves sensors, cameras, radars and lidars (Davies 2018; MIT Technology Review Insights 2019; Parliamentary Library & Information Service 2017; Thompson 2016). The data from the sensors, cameras, radars and lidars are fed into a computer system, where images of the surrounding environment are created, however, these images have no meaning, until machine learning is applied and the car can identify what it is seeing (Davies 2018; Thompson 2016). GPS technology, and networking infrastructure also need to applied, as the car should be able to determine where it is, and be able to connect to sources of other useful information, such as speed limits and traffic conditions (Davies 2018; MIT Technology Review Insights 2019). The driverless car should also be able to connect to other driverless cars on the road, so they can signal and communicate to each other (MIT Technology Review Insights 2019).

**What is the likely impact?**

The automotive and technology industry are likely to see an increase in jobs and growth, while employees who drive vehicles are most likely to experience unemployment as their skills will no longer be necessary (Accenture Digital 2014; Parliamentary Library & Information Service 2017). Related to this are employees who investigate crashes, repair cars and monitor roads - they may also lose work as it is predicted that autonomous vehicles will prevent thousands of deaths and road accidents (Accenture Digital 2014: Parliamentary Library & Information Service 2017). Paramedics in the emergency services industry would be also affected with less work, and the possibility of self-driving ambulances (Accenture Digital 2014; Parliamentary Library & Information Service 2017).

At the moment, in Australia, owning a car or having access to a car is considered necessary because of the way our cities have been planned – it assumes car is the primary means of transport (Parliamentary Library & Information Service 2017). However, researchers predict that the widespread use of driverless cars could result in a change to this mindset, and a future where carpooling/use of cars as another form as public transport could result (Accenture Digital 2014; Parliamentary Library & Information Service 2017). This could also change the way cities are planned; data collected from driverless cars could provide valuable insight (Accenture Digital 2014).

Carpooling or the use of driverless cars as another form of public transport would also mean less cars on the road, which would be good for the environment, and the driverless cars themselves may be created to use alternate forms of fuel (Accenture Digital 2014; Parliamentary Library & Information Service 2017). If driverless cars could be designed to be lighter in weight, drive with less distance between cars (freeing up road space), and in an efficient manner (not idling in traffic) then less fuel would be used (Accenture Digital 2014; (MIT Technology Review Insights 2019).

**How will this affect you?**

I catch public transport to commute to work, but to reach the train station, I still use a car. If carpooling and ridesharing becomes widespread, I could commute to the train station with other people in my local area. I could also do the same to commute to other places; however, there may be a waiting time, like public transport, and this would feel like I have lost some independence to be mobile when I want.

For others, having an autonomous vehicle may grant independence. Relatives and friends who cannot drive for a variety reasons (for example, disability, chronic health conditions, driving anxiety etc) often have to rely on public transport or friends and family. A completely autonomous vehicle that is self-owned would allow them greater mobility - to travel without relying on other people. It would also be safer. Driverless cars would also allow for greater mobility for those that are vision impaired.

If autonomous vehicles do become widespread, then younger family members or their children may no longer need driving licences. Years into the future, getting your Learner permit (“L’s”), your Probationary licence (“P’s”), full licence and first car may not be as an important rite of passage as it is today. Furthermore, it is also interesting to think what level of knowledge a driver would need, and what a driving test (if they still exist) would look like in a future where the majority, if not all, vehicles are autonomous.

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