**RMIT** University – Introduction to Information Technology.

Assessment 2 – Team Project – IT Technologies.

A2-Group#10,

**Team Valour.**

**IT Technologies**

**Report originally created by Fletcher Petersen, s3886293.**

**Autonomous vehicles**

**What Are Autonomous Vehicles and What Do They Do?**

An autonomous vehicle, or self-driving car, is a vehicle that uses a variety of sensors to move through the environment safely with almost no human control. There are no full-autonomous vehicles on the market at the present time but there is a wide range of vehicles that can use autonomous features to make driving safer and easier on the user. Full-autonomous driving would involve a vehicle that can operate on its own in all types of weather and driving conditions without any human input or intervention. This would be considered level 5 autonomy. The levels are determined the Society of Automotive Engineers (SAE) International.

Level 2 would be considered state of the art as it is where you will find today’s autonomous vehicles, such as vehicles using Tesla’s AutoPilot system and Cadillac Super Cruise. This level of autonomy allows for a vehicle to use an array of cameras and sensors to keep the car at a certain speed and remain in the correct lane while remaining at a safe distance from other vehicles. Elon Musk, CEO of Tesla, stated while accepting the Axel Springer Award "I am extremely confident of achieving full autonomy and releasing it to the Tesla customer base next year" (Axel Springer SE, 2020). There is a ‘Full Self-Driving Beta system’ available to some Tesla owners, however this is not level 5 autonomy with user input still required. Musk also said he believes “10 years from now almost all cars will have full-autonomy.”

The technology involved in autonomous vehicles includes cameras, radar, lidar, ultrasonic sensors, GNSS, and more (Dawkins, T, 2021). Cameras can be used to send what they see to an AI-based program to determine what objects are around. This is great for daytime driving but will become less useful when visibility is low. Radar is used in most vehicles now to determine distance between the vehicle and approaching objects. This is necessary for autonomous vehicles to be able to stop when approaching an object or vehicle. Radar will usually use 2 frequencies, either 77GHz or 24GHz. 77Ghz is better for long-range sensing while 24Ghz is best for close range sensing. However, radar is not optimal for object detection. Lidar is a great sensor for autonomous vehicles as it emits a laser that reflects off the objects it hits and is received by a photodetector. This allows for a three-dimensional image of the environment to be processed, which is essential for the vehicle to determine the objects in its environment with the use of an AI algorithm. Ultrasonic sensors are what is currently used for parking sensors. This is useful for autonomous vehicles so they may park themselves, which is a feature used today by some higher-end vehicles.

**What Is the Likely Impact of Autonomous Vehicles?**

Impacts of autonomous vehicles may include changes to the economy, various industries, insurance, safety, and commuting (Ohio University, 2020). Autonomous vehicles remove the need for a person behind the wheel of the vehicle. This means there is a lot of potential job loss. In America, one in eight jobs have driving as an essential task for workers, there are more than 3 million professional truck drivers, and more than 10 million Americans hold Commercial Driver’s Licenses (CDL) of some kind (Zurschmeide, 2016). This could mean millions of people to lose their jobs, or have reduced responsibility, and therefore have considerable pay cuts. With the loss of jobs and pay there is potential for a recession, affecting the driver’s economy.

Another potential impact of autonomous vehicles in the insurance industry. Insurance company may have to ‘shift the core of their business model, focusing mainly on insuring car manufacturers from liabilities from technical failure of their AVs, as opposed to protecting private customers from risks associated with human error in accidents’ (Bertoncello and Wee, 2015, para. 8).

Autonomous vehicles will also change the way we think about commuting. The average daily commute time in 2017 was 66 minutes, increased from 49 minutes in 2002 (Ma, 2019). Autonomous vehicles will allow for commuters to spend that time relaxing or doing something else rather than focusing their attention on driving. Autonomous vehicles may also reduce the average commute time. If a fleet of autonomous vehicles communicates and works together it can improve traffic flow by at least 35% (ScienceDaily, 2019). Autonomous vehicles communicating with each other also improve safety when a human driver who was driving aggressively was added. The cars were able to give way to avoid the driver. This not only increases the commuting experience but also safety when the road is filled with autonomous vehicles, and human drivers.

**How Will This Affect You?**

Cars have changed significantly since the first car was patented in 1886. With the introduction of automatic transmission in 1939 which now sells many more units than manual versions, with some new models of cars not even making manual versions anymore. Now with autonomous vehicles I believe it will change the way people look at travelling completely. I currently own and drive a manual car and find it hard to picture not even being in control of the vehicle that is transporting me. I personally like driving, and being from a regional city, there is not as much public transport so driving is generally the best option. I think given time and as popularity of autonomous vehicles grows, and hopefully the price goes down, I will become more inclined to use autonomous vehicles as my mode of transport.

I also believe the older generations that will be even more used to being in control of what the vehicle does will struggle even more than myself to own and use an autonomous vehicle. I find that a significant amount of people from older generations struggle to trust new technology. So, something like a vehicle with complete control of the path it takes and the decisions that must be made is something that most people will struggle to come to terms with. When I asked my mum if she would be willing to buy and use an autonomous vehicle when they come out, she said “Not a chance. I would be too nervous not being in control. I didn’t even trust cruise control when it first came out”. Cruise control was invented before she was born, but I assume she means when it was popularised and when she first drove a vehicle with cruise control.

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