# **Autonomous Vehicles**

Autonomous vehicles are a new type of vehicle on the market. They are cars that are learning to drive without human assistance. So far, the autonomous vehicles are able to drive along highways and through some city streets, without needing a driver to be in control of the vehicle. They are also able to help predict and prevent traffic collisions by automatically braking and swerving the car into another lane if it believes it is a safe option. These features are also available when someone is in control of the car and has prevented many collisions when the driver wasn’t paying full attention to the road.

The way the self-driving aspect of the cars work is by using sensors and/or cameras scattered around the car to create a virtual map of its surroundings. This virtual map contains the approximate locations of other cars, pedestrians, traffic lights and road lines. Uber’s self-driving cars for example use 64 laser beams to help it map the surrounding area, while the comma.ai computer just requires a few cameras around the car to keep track of its surroundings. The cars also have a built in AI to help determine what actions to take under different circumstances. This includes lane merging, speed control, braking and collision avoidance. Most companies are developing the AI to react based off of preprogrammed rules and protocol it must follow, while a company like Comma.ai is using a neural network set-up on their AI to have it learn based of how human drivers react in situations and how they handle all the driving aspects listed above.

At the current point in time, we are at level three of autonomous driving. This means we can let the car completely take control, but the user still has to be paying attention to the road and able to take control at any moment. The car can steer, accelerate, brake, change lanes and can attempt to prevent crashes. Car companies are predicting that by 2020 we will have fully autonomous self-driving cars on highways, and they will be ready for urban driving by 2025. This means that no human will be required to sit in the car while it drives from point A to point B.

The biggest contribution to the progress and performance of self-driving cars is the AI that dictates what actions it is taking. At the current rate AI is developing and improving it is no surprise that self-driving cars have quickly become a usable technology and are constantly improving at great speeds. The development of sensors and cameras also contribute to the improvement by allowing the AI to accurately map the area to help in its decision making.

The potential impact of this technology is safer roads for drivers and pedestrians. Studies show that 94% of all traffic collisions are caused by human error, be it by not paying attention or making poor judgment call while driving. If we were to remove the human element and used computers that can consistently make optimal decisions and not lose focus on driving, the rate at which traffic collisions occur should drop dramatically. This can also make public transport cheaper and more consistently on time.

It will also have a large impact on traffic and will decrease the chance of a traffic jam as all the cars would be able to communicate with each other to have the most streamlined journey possible. The main factor in a traffic jam is the fact the humans can’t coordinate their driving perfectly with each other and will always make an error. An experiment done in Japan by Yuki Sugiyama showed that if a group of drivers were tasked with driving around in a circle at the same speed, a traffic jam would always occur. With self-driving cars the human aspect would be removed causing less chance of traffic problems.

This can also open new sources of passive income for people who own a self-driving car though. Tesla intends to introduce a feature into their cars to allow them to act like an uber without a human driver required. This will allow people to have their car go out and be a taxi for people while the owner can sit at home or work while producing that passive income.

The biggest drawback though is people in driving jobs in society could likely lose their jobs to the self-driving vehicles. This could be buses, truck drivers and taxis. The human element could be removed from these and be purely run by AI. This could have both a positive and negative affect. Public transport would be more consistent with its arrival and departure times and be less likely to be in a collision. The negative is a whole job industry will be lost. It could also be less safe for bus commuters as there will be no authority figure to intervene if people act up.

This could affect my life my providing cheaper and more reliable forms of public transport. This will be extremely useful as I have lived in Melbourne before and understand how vital excellent public transport is there. This will help me reach my destinations on time without much worry of any delays. It will also ensure the streets are safer and that there is a lower risk of being involved in any kind of car accident which is very common in highly populated areas.

This technology could also help people in my family who struggle to drive, it could become a way for them to get around when they can’t drive themselves. It would also provide a safer way to driving with people in the car. This is because the distractions won’t be a risk anymore as the car will be doing the driving for you.

The downside to all this though is that if it has the potential the human driving could not be allowed anymore in the future which could take away from the joys of driving yourself around. I find it fun to go onto road trips but there is potential that it could be dangerous for human driving in the future.

Overall the introduction of autonomous vehicles could bring a lot of positive effects into our society, but it will come with many drawbacks that will greatly affect a lot of people lives.

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# Yuki Sugiyama - Traffic Jam without bottleneck - experimental evidence

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