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How Autonomous Cars Reduces Driver Error in Accidents on the Road

Humans have learned to adapt to traveling long distances. In the past century, humans have successfully tackled the struggles of travelling through the invention of the car. Now the new problem that needs to be discussed is how to make cars autonomous. Cars may have made it more convenient to travel to places, but driver error is causing far too many car-related deaths. By removing the driver completely and replacing them with an AI controlled car, the roads will be a much safer place for everyone. It takes a person an average of 1.5 seconds to react to the surroundings in front of them, while an automated car can sense and react to *all* its surroundings within a tenth of a second. Companies such as Tesla and Waymo are already working towards replacing the human driver by introducing "Tesla's autopilot" and Waymo's self-driving cars that are actively used in California. As cars switch to being fully automated, new societal and ethical problems are created.

People are wary that Self-driving cars will force a new way of life with technology that they do not fully understand. For self-driving cars to be implemented as a part of society, it must be suitable for all types of people and environments. This is the most important challenge to overcome as consumers will not buy AI cars if they do not understand it's significance. The likelihood of adopting of AI cars will observe various characteristics such as age, gender, ethnicity, employment status, and education level.

Companies have already invested billions of dollars into developing AI cars. Waymo has invested $1.1 billion dollars on AI cars with most of that money going towards simulations, real-world training, and testing. With the rapid development of self-driving cars, these companies must know how to appeal to their audiences. People who had jobs that involved a lot of driving, such as truckers and travelling salesmen, were more comfortable with self-driving cars than people who were unemployed, retired, or farmers. Interestingly, 61.5% of US drivers would not ride in automated vehicles (Menon et al.). In other words, more than half of drivers in the United States do not trust in automated vehicles. This shows that automated cars must do much more than just appeal to their already existing audience. Automated cars barely have an audience because it targets such a specific type of customer. So, they must create their own audience. Research also shows that households with children showed a higher interest in Automated cars because of its usefulness for parents. People who lived in urban areas saw Automated cars as more beneficial for them than people who lived in suburban areas. By understanding the circumstance and environments of different households, companies will be able to market their product to be more than just a "self-driving car." Take regular non-autonomous cars for example. They all have similar engines and the same mechanics, but the "feel" of a Toyota is comparably different from a Lincoln. It all comes down to how the product is marketed. So, the question that AI car companies should be asking is what they want their autonomous cars to be known for.

Companies should advertise automated cars in way that appeals to this existing audience because they must be sold on the idea that it is highly beneficial to them. The most likely early adopters of automated cars are young males that are highly educated with a large household, living in heavily populated neighborhoods (Golbabei). Knowing that that is their audience, Automated cars should be marketed as a family friendly car that supports the hustle and bustle of

the busy city worker. But it is important to note that by appealing to the majority audience, it is excluding a specific audience that is not a part of that culture. For companies to attract the farmers, unemployed, and the retired, they must show that the autonomous is cheap, efficient and fun to get to places. Even if companies were able to get these messages about self-driving cars across to customers, the most important characteristic about automatic cars that they must emphasize should be that they are safe. After all, the main characteristic that makes automated cars better than regular cars is that they should theoretically be safer on the road.

Until autonomous vehicles are on the road, user error will be to blame for all car related accidents. Humans sometimes make irresponsible decisions, and those decisions affect the people around them. According to a report from the NHTSA (National Highway Traffic Safety Administration), 42,915 people died from motor vehicle accidents in 2021 ("Motor Vehicle Traffic Fatalities and Fatality Rates, 1899-2020."). This was an increase of 10.5% from the previous year with 2020 having a total of 38,824 deaths. Estimates also show that 2021 had a total of 1.33 fatalities per 100 million VMT (Vehicle miles driven). Contrastingly, there were 13,253 people that died to motor vehicle accidents in 1921 with a fatality rate of 24.08 deaths per 100 million VMT. It is important to note that the Ford Model T car became very popular in the 1920s. Data shows that cars have been significantly improving since it became a part normal part of people's lives. The biggest problem with cars now is that people are still behind the wheel. It sounds strange, but user error is still a very big problem. According to an article from the NHTSA, 11,654 people died from drunk driving incidents in 2020. Almost a third of all motor vehicle accidents in 2020 was due to drunk driving. This reason is exactly why the public should adopt automated cars. The self-driving car's main purpose is to deliver people to places safer

than a human. While it is true that self-driving cars still need to be tested to guarantee its safety, new technology is continuously being applied to optimize its safety.

One of the main problems with removing the human driver is the lack of human communication on the road. Pedestrians need to see the driver of the car because eye-contact is essential in deciding whether to cross a busy road. Drivers can allow pedestrians to cross by looking at them and giving them a nod or permitting them to pass by simply not looking at them. A research study regarding pedestrian-driver communication by Matus Sucha, et al (2017) at Palacky University in Olomouc showed that 84% of pedestrians look for eye contact with the driver. Similarly, Rasouli et al. (2017) concluded that drivers looked at pedestrians 90% of the time and glanced 10% of the time to communicate with pedestrians. By observing what is critical for pedestrians when deciding at a crossing, results for when lack/absence of communication between the driver and pedestrian become more effective.

Communication between the driver and pedestrian helps both people know what to do on the road. New technology has been developed to help autonomous cars communicate as efficiently as drivers. Azra Habibovic, et al. that replaces the driver with AVIP (Automated Vehicle Interaction Principle) signals as a form of communication. The purpose of AVIP signals is not to tell pedestrians what they should do, but to show what the autonomous vehicle intends to do. Automated vehicles have a small interface that can communicate what it intends to do to pedestrians. This is all to promote a general understanding of the autonomous vehicle. Azra Habibovic, et al. emphasizes that “Robot interaction where it is shown that revealing intentionality of robots makes them more predictable and generally more appealing to humans”. Azra Habibovic, et al. concluded that pedestrians do indeed need some form of communication

with autonomous vehicles and AVIP signals were presented as one form of technology that can help fill the gap between pedestrian-driver communication.

The public is afraid of how drastically automated vehicles will change their lives. They are also afraid of what they do not understand. It is safe to say that that fear is coming from a misinformed assumption. Companies all over the world are investing all their money into developing automated vehicles. Automated cars will be one of the most carefully developed technologies of modern day. The car has gone through several impactful improvements, but now it is time for full automation to be its next step forward.