Autonomous Vehicles

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Abstract

Autonomous vehicles can sense their environment and operate without the need for human intervention. It is not necessary for a human passenger to take control of the vehicle at any time, nor does a human passenger have to be present at all times in the vehicle. Recently, autonomous vehicles have created a great deal of controversy. Ultimately, the main ethical conflict surrounding autonomous vehicles is between the interests of the passengers (arriving quickly, cheaply, and safely at their destination) and those of the community as a whole (keeping roads safe for everyone). The purpose of this essay is to provide a definition, history, and benefits and drawbacks of autonomous vehicles.

1 Introduction

Our intelligence and desire to advance and revolutionize the world around us distinguish humans from all other life forms on Earth. Throughout history, our ancestors have worked tirelessly to renovate and build the world we are familiar with today.r with today. In the course of time, technological advancements are becoming more and more rapid and more groundbreaking than ever. Autonomous vehicles are one of those advancement of modern technology.

The true meaning of the word automobile, is a car that drives itself. As old as Leonardo Da Vinci, people dreamed of such technologies that could be operated without human assistance. In the mid-1900s, the self-driving car would become a reality, despite Da Vinci being way beyond his years. Even though these early models were mostly unsuccessful, they led even more people to latch onto this concept and dedicate great time and resources to perfecting it.

An autonomous vehicle is one that can drive itself from one place to another without the assistance of a driver. After being the subject of discussion for public figures, media and academic researchers, self-driving cars have received both positive and negative feedback regarding its functionality and its ethical use. Programs will be used to receive data from the environment, roads, signs, and other vehicles when performing so that a simple calculation can be made to ensure better traffic control, increased safety, and a streamlined journey for the passenger. When compared to a human-driven car, this should prove to be more effective and efficient. However, due to numerous accidents caused by autonomous cars, concerns have been raised over the ethical use of self-driving cars [1]. It may have brought optimism to prospective investors and gadget devotees that self-driving cars are even being made. However, many fail to consider the limitations that these cars may face. For example, many of these self-driving cars are programmed to operate under certain conditions and with specified instructions, but if these conditions aren't met or if the self-driving car has more than one option for completing a task, it will choose one, question arise that how will they be able to make a valid decision [2].

2 History of Autonomous Vehicles

In the early days of self-driving cars, people saw them as a way that families could spend more time together while also traveling. Developed in 1925 by Francis Houdina, the self-driving car was the first of its kind. The car was radio controlled and drove through the streets of Britain without any human driving it. "In 1969, inventor John McCarthy described a computer-controlled car that used a

television camera to provide the same visual input as a human driver" (according to McCarthy). In an essay, he described using a computer keyboard to operate the car. He didn't actually build the car, but paved the way for other inventors to build on his idea. Dean Pomerleau, in the early 1990s, made the connection between how neutral networks could input pictures from the road and output steering controls. Pomerleau teamed up with Todd Jochem in 1995 to create a self-driving minivan based on his theory. Although the pair had to control the brakes and speed, the car covered an impressive 2,797 miles between Pittsburgh, Pennsylvania and San Diego, California. Later, the journey was called "No Hands Across America". DARPA (the Defense Advanced Research Projects Agency) held a competition in 2002 offering a one-million dollar prize to anyone who could design and build an autonomous car that could cross 142 miles of the Mojave Desert. The competition took place in 2004 and none of the entries were able to meet the challenge. In fact, the most successful self-driving car only made it eight miles before exploding. This was a major setback for inventors who were trying to create a self-driving car. Despite this, more generations would continue to strive for the completion of this ultimate goal. However, parallel parking assistance was offered in Japan by a Toyota hybrid in the 19th century, even though fully autonomous cars had not yet been developed. Google embarked on its own secret mission to create a working autonomous vehicle in 2009. In only a few years, Google released information that its car had driven 300,000 miles under the control of a computer (not in a row) without having an accident.

Several major car companies began developing their own self-driving cars by 2013. In 2014, Google showed a prototype of a car without a steering wheel, gas pedal, or brake pedal; it was a completely autonomous car. Since the end of last year, this car has logged over 2 million miles. Nissan set a launch date for their self-driving car: 2020. Companies like Tesla and Uber are also developing autonomous cars.

3 The ethical dilemma

3.1 Self-driving cars: why we need them

The self-driven cars are becoming more popular and more affordable in the near future, making them a more viable option for people. The development of autonomous vehicles would have many beneficial effects. For example, elderly people with impaired vision, slow reactions, dementia, etc., would be able to get around by themselves. In a self-driving car, they will not have to bother a family member or call a taxi to get to where they need to go. It can also benefit those around the world who suffer from blindness. Blind people are unable to operate a car, for obvious reasons, which compound their many disadvantages. Their lives could be improved greatly by this car and they could become more self-sufficient. This car may also make life easier for people with mental disabilities, such as people with Down syndrome. Most people with this disease aren't able to drive, but they can get around on their own. Drunk driving is a huge epidemic in the United States. Using the self-driving car would significantly reduce the risk of injury or death for intoxicated people and the people around them. There is another problem that is on the rise in America: people sleeping at the wheel. It is a fact that 30 percent of Americans (40,6 million people) are sleep deprived. The result is that 40.6 million people could be on the road while half asleep, putting millions in danger. A driverless car would allow people to doze off or take a nap during the ride home. Autonomous cars would prevent many of the dangers that human drivers face and cause.

Incorporating assistive computer technology into vehicles, such as GPS, cameras, stability control systems and assisted brakes, can improve the safety of passengers and the driving experience [5]. North Australia has already adapted the use of a self-driving car named the Navia [6]. Consumers can purchase the Navia for $250,000, but its use is limited to confined places, such as resorts. It travels at up to 12 miles per hour. The Navia is considered safe for its intended use within resorts due to its low speed, which allows it to stop when unexpected obstacles are encountered.

Researchers predict that self-driving cars can revolutionize our economy and the way we do business [6]. For Example, while the car is driving and arriving safely at the destination, passengers may be taking advantage of the time to do other activities, such as completing their work or relaxing.

Additionally, self-driving cars would enable innovators to produce products for a completely different market, thereby enhancing quality of life and reducing unemployment [6]. It would be more accessible to non-drivers, people with disabilities, or anyone who is unable to drive for whatever reason. Caretakers and even mothers who can use the vehicle as a means of transportation may experience less stress and anxiety. It could also reduce spending since fewer money will be spent on public transportation and taxi services. However, using self-driving cars may cause unexpected stress and fears, such as worrying whether their loved one has arrived at the designated location. On the other hand, autonomous cars are also anticipated to bring a variety of health benefits to society. Traffic jams have been shown to increase depression, anxiety, and blood pressure, as well as lower sleep quality and a decrease in cardiovascular fitness. In a traffic-free environment, these health drawbacks may decrease, allowing individuals to produce more and better quality work. Due to the self-driving vehicles' ability to communicate with each other, fewer traffic jams are likely because they can choose the best route and reduce congestion. It will benefit the environment by reducing pollution [7].

3.2 Potholes to come

Even though this invention has many advantages and the potential to make our lives easier, is it actually a safe method of transport? In theory, this technology should make roads safer, however, there have been numerous reports of crashes caused by it. In streets crowded with people, these cars drive like robots: perfectly and obediently. Many people aren't accustomed to cars that stop fully at a stop sign or that obey traffic laws 100 percent. This can result in accidents due to low speeds. In some cases, the driverless car stops too short at stop signs, often causing it to be rear-ended by another vehicle. According to reports, 43 autonomous cars have been involved in accidents in their short lifetime. So far, no fatalities or serious injuries have been reported from the accidents. Companies such as Google have addressed these mistakes and accidents and said they would modify their version to mimic human driving, but without the errors. Currently, many developers drive their self-driving cars with a driver on board just in case. TIn this way, injuries can be prevented.

A self-driving car operated by Google was said to have caused a crash in 2011 [5]. Following this, many Google executives raised concerns about whether safety measures were being ignored during the production of self-driving cars under Levandowski's guidance. There were more than a dozen accidents that occurred while the google self-driving cars were being produced, causing executives to question their ethical use [5]. The incident with the self-driving car is not the only one that has occurred. Tesla Model S crashed in Florida when it was put on self-driving autopilot mode and the passenger died when the car collided with a tractor trailer because it failed to stop in time when a trailer went in front of it [8]. In the event that someone were to hack into the programming of these cars, the safety of passengers could be compromised, which is a risk that could put many at risk. It is a constant battle between large companies and hackers and/or terrorists when it comes to cyber security. One leak in the systems control could put many lives in the hands of a hacker if self-driving cars are all under one system and programmed together. Large cities rely on parking as a source of revenue. Therefore, if autonomous vehicles replace these parking spaces, they could potentially destroy an important source of income for many cities and companies. Losing parking spaces isn't the only way income could be lost. Since individuals will only have to enter their destination and they will automatically be driven to the chosen location, the use of taxis and Uber drivers will become obsolete (p.17) [9]. As more technologies and systems become automated, human interaction has dramatically decreased, and the use of self-driving cars will only further decrease our interaction with others. Mental dilemmas like loneliness, depression, and anxiety may result. In a survey conducted by the Automobile Association in March 2016, it was found that "three out of four U.S. drivers feel 'Afraid' of self-driving cars" (Vivek Alex, p.141) [10]. The transition from human to robotic, programmed drivers will take time and trust and will not be easy. Nevertheless, not everyone may be able to benefit equally from technological advancements. Due to the increased reliance on technology, jobs will be lost indefinitely, leaving many unemployed (Vivek Alex, p.41) [10]. However, the negative effects of this don't end there. As self-driving cars become a mainstream transportation option, their price will increase income inequality between the rich and the poor, thus perpetuating the poverty cycle.

4 Conclusion

It has the potential to become something very exciting in the future. The autonomous car is clearly a very innovative invention. The technology is advancing at such a rapid pace that it is difficult to predict how long it will take. It may take years or it may take decades. There have been many improvements since the first prototype was made. However, this car still has a long way to go before it becomes an everyday part of life.

Self-driving cars will likely change the way we live as a nation and as a race, but it is unclear whether the results will be positive or negative in the long run. Once the self-driving cars become commonplace in society, a variety of structures will need to be innovated to adapt to the changes in the environment. Engineers will play a major role in testing, developing, and deploying the self-driving cars.

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