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A Study on Self Driving Cars

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ABSTRACT

There's some boom in Auto driving car attentiveness during last 10 years [1]. This is the most modern and cutting-edge skill in the car business, and it was successfully developed by TESLA despite having been discussed and worked on for a long time [13]. An Autonomous car recognizes its environment and can drive through traffic and other obstacles with little or no human involvement.

This sort of device has the potential to revolutionize mobility for those with disabilities and allow blind people to walk freely. This sort of vehicle improves the overall safety, security, and productivity of the motor transportation industry, and human errors may be removed while the drive is optimized.

We propose an autonomous car prototype that combines disparate technologies such as a road lane detection algorithm, a disparity map algorithm to determine the distance between the car and other vehicles, and anomaly detection using the Support Vector Machine classification algorithm, which performed well on our data set [7]. Autonomous vehicles are getting closer to becoming approved, but they aren't yet safe enough to be utilized in real life due to a lack of safety.

Keywords: Autonomous car, Cutting-edge technology, Prototype, Lane detection algorithm.

I. INTRODUCTION

Autonomous Cars, often known as Autonomous cars or driverless cars, are an exciting new technology. Vehicles that can drive themselves from one area to another without the intervention of a person are known as Autonomous Automobiles.

Self-driving cars have received both favourable and negative feedback on its operation and ethical usage after being debated by a number of public personalities, media sources, and academic experts [11].

In order to [2] improve traffic regulations, increase passenger safety, and simplify travel, programming will be utilized to collect statistics from the environment, routes, roads, signs, and other cars when performing a simple calculation.

This should be more efficient and beneficial than a human-driven vehicle. Meanwhile, as the general public becomes more aware of the countless incidents

caused by self-driving cars, ethical questions about their use have grown.

Figure 1: Technology in self-driving cars

The development of Autonomous automobiles may have generated hope in potential investors and technology enthusiasts, but many fail to consider the various limits that these vehicles may confront. Many of these Autonomous cars, for example, are built to operate under specified conditions and with precise instructions; but, how will they be able to make a valid judgement if these criteria are not fulfilled or if more than one solution for a job is available?

They are autonomous cars that perceive their environment using a variety of technologies such as radar, object recognition, and navigation systems. Amongst the most common causes of fatal accidents is driver error. The attention of drivers is diverted to mobile phones, gadgets, and audio systems. As a result, if the drivers are not paying attention, Autonomous cars equipped with self-parking and pre-safe technologies can take charge.

Though some argue that Autonomous vehicles are not as safe as human-driven cars, they are safer with fewer errors and faster reflexes since there is no human involvement, only the car's software, which decreases traffic and road rage and promotes safety. They may also have a variety of financial benefits. In the 1990s, the early attempts to build vehicles focused on constructing radio-equipped highways that could communicate with the cars that drove on them. These circuits were buried in the 400-foot road to create an opportunity for Autonomous vehicle manufacturers.

Despite the fact that these test drives yielded excellent results and that the cars can navigate on specific routes, the automobiles created to move using radio signals were not truly autonomous. Because they couldn't react to their environment on their own, they had to rely on commands and signals.

VaMoRs is an unmanned vehicle with two cameras, sensors, and an onboard computer that was created in 1987. This vehicle was capable of recognizing and reacting to other vehicles, traffic signs, and road conditions independently.

In 1988, a group of engineers led by Ernst Dickmanns unveiled the first self-driving Mercedes. This car covered 994 miles and reached a top speed of 112 miles per hour. Only 5% of the journey was completed without the use of human aid. The most well-known manufacturers of autonomous vehicles today are Google and Tesla Motors.

Google's self-driving cars rely on a combination of Google's street view maps, sensors, and cameras strategically positioned throughout the vehicles. The acronym "Self-Driving Coalition for Safer Streets" means "Self-Driving Coalition for Safer Streets.". All of these characteristics make self-driving vehicles safer than human-driven vehicles.

II. LITERATURE SURVEY

A lot of efforts have been made to bring some differences between conventional automobiles and self-driving cars. So far, it may be found in all the data acquired by examining various facets of this specific sector.

It appears that self-driving vehicles are far harmless than human driven cars, but more study is needed to establish this.

This is owing to advances in deep learning, where deep neural networks are trained to execute tasks that would normally need human interaction. CNNs are important in the field of Computer Vision because they employ models to find patterns and characteristics in pictures.

In 2009, Google launched its self-driving car project, which included employees who had been working on the technology for years. The Google automobile will be on the road for testing by 2012. With the passage of time, the car has evolved and is now equipped with several sensors, radars, lasers, a Global Positioning System (GPS), highly detailed maps, and a variety of other features to safely drive and navigate itself without the need for human intervention. The automobile can not only drive itself, but also park and drive on motorways. Cameras are utilized to locate and recognize things, which are subsequently analyzed by the car's computer [3]. Google unveiled a fresh idea for their self-driving automobile in May 2014, which had no steering wheel or pedals and unveiled a fully functioning prototype in December of that year that they planned to test in 2015.

These self-driving cars are safe as long as their sensors and software are up to date.

III. VARIOUS STAGES OF SELF DRIVING CARS

During 1925, a man called Francis Houdina developed a radio-controlled automobile that could be driven down the street with no one in the driver's seat, laying the framework for self-driving cars. General Motors debuted the first self-driving vehicle model at the 1939 World's Fair. It was a magnetized metallic point embedded in the road that pushed a radio-controlled electromagnetic field-directed electric vehicle. In 1958, this model became a reality.

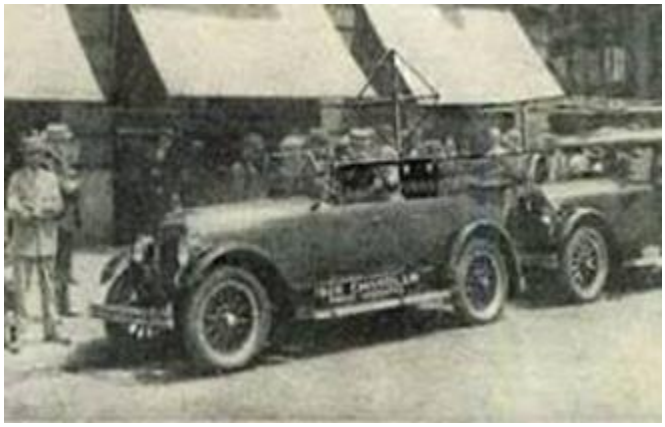

Figure 2: First radio-controlled car without driver

Norman Bel Geddes' self-driving vehicle for General Motors was finally completed in 1958, more than two decades after the concept was initially displayed at the New York World's Fair. It was steered by a technology that adjusted the electromagnetic fields in the spikes to maintain the car in its allotted lane via magnetized metal spikes implanted in the road.

The Tsukuba Mechanical Engineering Lab improved GM's self-driving automobile in 1977 by utilizing cameras connected to a computer to drive it across the road at 20 mph using image data processing. Daimler and Mercedes-Benz, two of Germany's major vehicle manufacturers, worked on the VaMoRs idea ten years later.

The VaMoRs was a Mercedes-Benz van with cameras and other sensors that interacted with an onboard computer.

The computer on board is capable of driving the car on its own. This technology was a significant advancement over Japan's autonomous vehicle, since it could go at 56 mph on any road or highway without colliding with other vehicles or obstructions.

This notion was sparked by a $1 million prize offered by DARPA in 2002 to any researcher who could construct an autonomous car capable of travelling more than 142 miles.

Unfortunately, the goal was not accomplished, and the autonomous vehicle that travelled the farthest distance only made it 8 miles. In 2009, Google

launched Waymo, a project aimed at developing self-driving automobiles.

Figure 3: When auto pilot mode is activated

By 2017, Google had produced a self-driving vehicle prototype that had travelled over 2 million kilometers. Consumers are being trained to rely on automobile technology, such as sensors to avoid collisions and assist with parking, in order to trust self-driving cars. In January 2019, Musk claimed that Tesla would phase down autopilot and unveil its first-ever autonomous technology in 3–6 months.

Figure 4: Proto type of autonomous car technology

Tesla owners will be able to drive from Los Angeles to New York City without ever touching the steering wheel before the end of the year. That's a distance of nearly 3,000 kilometers! It will be fascinating to see if Musk follows through on his promise.

Tesla Motors isn't the only corporation making such promises to the globe; in fact, more than half of all automakers worldwide plan to build autonomous vehicles starting in 2020 and continuing into the future. As a result, in the coming years, we may witness a significant growth in transportation computerization.

IV. HIGHLIGHTS OF SELF DRIVING CARS

The use of assistive computer technology in automobiles, such as GPS, cameras, stability control systems, and assisted brakes, has been shown to improve passenger safety and driving quality.

The Navia has previously been used in Northern Australia. Self-driving car. The Navia has a peak speed of 12 miles per

It costs $250,000 and may be purchased commercially, albeit it can only be used in certain settings, such as resorts. The Navia is safe for its intended use in resorts because of its modest speed, which allows it to stop when unforeseen obstructions are encountered.

Figure 5: Shows how to change driving modes

Almost every country has a government agency responsible for lane security, driver licensing, and car registration. The Department of Motor Cars (DMV) is responsible for granting driver's licenses, registering vehicles, issuing registration plate numbers for traffic checks and police surveillance, as well as traffic and general road security for both motorists and pedestrians in the United States.

Figure 6: Shows how Autonomous cars detect surroundings using sensors

Even with the strictest traffic rules and regulations in place, about 6 million car accidents occur each year in the United States, injuring approximately 3 million people and killing more than 90 people on average.

This is where autonomous vehicles come in useful, as scientists anticipate that in the near future, they will dramatically reduce, if not eliminate, automotive accidents. Self-driving vehicles, according to engineers, will have a significant influence on our economy and throughput.

The Autonomous car would also allow entrepreneurs to produce things for an altogether new market, perhaps lowering unemployment and raising living standards. Because Autonomous vehicles can communicate with one another, they can determine the optimum route to take and lessen traffic jamming. This will be beneficial to the environment since fewer pollutants will be created.

The automobile would be more accessible to a broader audience, including non-drivers, those with disabilities, and others who are unable to drive for various reasons. Caregivers and even moms who rely on their vehicles for transportation may feel less stressed and anxious as a result. This might also save money by lowering the amount spent on public transit and taxis.

Autonomous vehicles have been in the works for quite some time. They've arrived and are on their way, which is great news. They will, without a doubt, increase the safety and reliability of our transportation networks. It'll only be a matter of time before we can all text while driving and leave the driving to the automobile.

V. CHALLENGES OF SELF DRIVING CARS

In 2011, Anthony Lewandowsky was found guilty of causing an accident while driving a self-driving car for Google. Following this, a number of Google executives raised worry that safety procedures were being disregarded while developing self-driving cars under Levandowski's oversight.

After officials indicated that more than a dozen incidents occurred during the development of Google's self-driving cars, the ethical use of self-driving cars was called into doubt. This isn't the first time a self-driving car has collided with another vehicle.

Figure 7: Accident of a self-driving car

A Tesla Model S was put into self-driving autopilot mode in Florida, and the passenger was killed when the car collided with a tractor trailer because it failed to stop in time when the trailer came in front of it. Because all self-driving cars are regulated and developed by the same system, a single weakness in the administration of the system might place the lives of many people in the hands of a hacker.

Because many major cities rely on parking to make money, driverless automobiles that eliminate the requirement for parking spots might deprive many

communities and businesses of a source of cash. If it becomes easy to break into the cars' code, the safety of passengers in these vehicles may be jeopardized, a risk that might put countless individuals in danger. When it comes to cyber security, many large corporations are always at conflict with hackers and/or terrorists.

Losses can be sustained in a variety of ways. People will no longer need taxi or Uber drivers since they will be transported to their location immediately after inputting their address.

As more technology and procedures have been automated, human connection has shrunk significantly, and the introduction of self-driving cars will only further limit our engagement with people. Loneliness, despair, and concern may occur as a result of this.

"Three out of four U.S. drivers would be 'Afraid' to ride in self-driving vehicles," according to a March 2016 Autom3obile Association poll. This shows how difficult and time-consuming the transition from human to robotic, pre-

AI is programmed drivers will be. As a result, technological advancements will not benefit everyone evenly.

However, the harmful consequences of this are not limited to that. When self-driving vehicles become a common mode of transportation for many people, the price at which they are made available will widen the economic gap between the rich and the poor, perpetuating economic inequality.

VI. FUTURE SCOPE OF SELF DRIVING CARS

As previously said, there are a number of potential issues and dilemmas that might occur as a result of the development of self-driving cars, but there are also solutions that can be used to lessen the severity of the situation. One fear with self-driving cars is that they will eventually supplant public transit.

If the government concentrates less on public transportation and instead pushes the use of autonomous vehicles, many routes will be blocked off, maximizing mobility for the rich while those with lower salaries struggle to get about. One possibility is to encourage the use of self-driving automobiles while keeping ethical and societal goals in mind.This will guarantee that the needs of the community are met. Another issue that some people may be concerned about is entrusting their lives to self-driving automobiles. Allowing frequent testing of autonomous cars to ensure that they are safe and efficient might be one answer.

The utilization+ of parking spots for self-driving cars would occupy a lot of land area, which is an environmental problem. During the rollout of self-driving automobiles, a dedicated lane for vehicles that can communicate themselves may be required.

Even though it may present problems with the existing scarcity of space, with the rise of technology, a much more effective way to use space may become obvious.

VII. CONCLUSION

Self-driving Car is the major upgradation in vehicle industry in future. Autonomous cars have been in development for quite some time. The good thing is that they've arrived and are on their way. Sure, they make our travelling safer and more efficient. Nature moves quicker than people. Automation can be of much greater assistance.

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