



AI IN AUTONOMOUS CARS

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Abstract-

In this paper will cover the transformation of normal cars into the autonomous or Driverless car, problems related with it, objectives, requirements and the expected result of this step. In this paper will compare the standards and give the important comparison between conventional and driverless cars. This AI based car will cause a huge change in human's life, we will study and examine the various impacts on society, legal and ethical challenges, and importantly environmental constraints. We will also study on the previous similar technologies and take a look the way researchers are working to make this technology even better in the future.

Keywords: AI car, self-driving, Simulation test, autonomous cars, autopilot car.

Introduction

As the World is moving, scientists and researchers are working to make the human life in more comfortable. People around the World are now more excited about the launch of autonomous cars. The strong point of this car is its ability to recognize its environment using the modern form of AI, and take decisions without the help of any driver. In other word you can say, these cars are equipped with special sensors, processors and database which is responsible for the operation of this car and doesn't require any driver. It navigates itself following up to the destination point ask by users. It is the big invention in the field of robotics, which is contributing a lot to make this planet safer

place. On a technical basis, this car is designed based on the different areas of engineering which includes electrical, mechanical, computer sciences etc. when the Mercedes Benz has launched the first vision guided car in 1980 after this invention it has started a huge focus on the areas of GPS system, radar etc. And now the research is going on to introduce the World with the driverless car which could be much safer, well organized and reliable for the users. Road accidents are one of the major cause of death, according to report given by Deshpande nearly 3000 people died daily because of road accidents, among which half of them are not in the car itself, other than that it has also been reported that if some safety measures are not taken it can be grow up to 2.4 million a year which will be the 5th largest cause of death in the World. This number can be reduced by introducing autonomous cars into action which are far more reliable than humans. It will also reduce the traffic congestion, as the efficiency of autonomous car more reliable than human, in a way of keeping very small gaps between vehicles, and its outstanding management of speed and time.

Literature Review

According to Rouf, Ali, and Hussain (2018) explained AI, which is a discipline of the computer system responsible for analysing various visual-inputs, such as facial, object, and gesture recognition. Hence AI is used in all autonomous vehicles.

According to Sun, Bebis, and Miller (2004) defined activities such as detecting the distance of an object by measuring the travel time of a signal

emitted by the sensors and reflected by the object, it includes lasers, LIDAR. Research depicts that these sensors have a low spatial resolution, slow scanning speed, and interference among sensors at the heavy traffic. Sun et al., suggested that sensors need to be improved by using the neural network and fuzzy logic technology to enhance the performance of sensors.[1] Naranjo, González, Reviejo, García, and De Pedro (2003) stated that fuzzy control deals with the input and output variables, here the knowledge of any mathematical model of the processes involved is not at all required. The relationship between input and output variables is expressed in sentences that represent or mimic human thinking and approximation, the variables, specifically the output variables, are normalized and their values can be applied to low-level controllers easily. These lowlevel controllers act directly upon the physical actuators. These are discussed in detail in this paper.[2]

Goerick, Noll, and Werner (1996) described the feature of car detection and tracking, CARTRACK system, it is a specialized monocular visual sensor system for detecting, tracking, and measuring rear or front views of automobiles in image sequences taken from the viewpoint of a car. The system consists of pre-processing, classification, or detection modules. Here, this classification and detection task is performed by means of Artificial Neural Network (ANN). The main functions of ANNs are detection, identification, classification, localization, and prediction of object movement. The speed of the Artificial Neural Network is gained by the pre-processing method as well as the integral treatment of image regions. Goerick et al. (1996) explained the different pre-processing methods, where grey-scale images are pre-processed by a method called as Local Orientation Coding (LOC). The image features obtained are bit strings, each representing a binary code for the directional grey-level variation in the pixel's neighbourhood. Grey level variations are the illumination conditions that vary, object tilting, occlusions, differently resolved structures depending on the distance of the object which will be under consideration, noise and perturbations induced by the recording and processing equipment, different viewpoints and also the type of cars, that is cars that differ in shape, size, and colour.

Rathod (2013) defined an autonomous vehicle as a passenger vehicle that drives by itself without any

human intervention. This vehicle is known as an autopilot, driverless car, auto-drive car, or automated guided vehicle.[3].

Objective

The objective of this Review paper is to study the Research paper and review on their ideas and innovation as how much is their efficient and how can the product created by them be developed even more. Also, the perspective of the people as what they want form product. The objective of autonomous car is to optimize the driving comfort and travel-duration, while always keeping within the safety limits. Human drivers analyze and try to handle the traffic situation choosing their actions not only based on current information but also based on past experience.

Advantage and Disadvantages

Advantages:

1. Decreased the quantity of accidents AI based Autonomous cars prevent errors happening from human because the system controls the vehicle. It leaves no opportunity for distraction, not similar to humans who are at risk of interruptions. It also uses complicated algorithms that determine the right stopping distance from one vehicle to another. Therefore, lessening the probabilities of accidents.

2. Lessens traffic jams The self-driving cars speed up traffic in part by **keeping a buffer between themselves and the cars in front of them**, forcing them to brake less often. Giving the algorithm control over traffic lights in a Manhattan-style traffic grid increased the number of cars passing through by 7%.

3. Stress-free parking

Autonomous cars drop you off at your destination and directly park to a detected vacant parking spot. This reduce the wasting of your time and gas trying to find a vacant one.

4. Time-saving vehicle As the system takes over the control, the motive force features a spare time to continue work or spend now catching up with their loved-ones without the having the fear about road safety.

5. Accessibility to transportation

Senior citizens and disabled personnel are having difficulty driving. Autonomous vehicles assist them towards safe and accessible transportation.

Disadvantages:

1. High upfront cost The technology will likely come with a high cost for companies to get started. While platooning increases capacity, it also means purchasing the platoon.

New technology is not cheap, but the ability to move four times as much and run trucks 24/7 does offer plenty of unique possibilities that could pay dividends in the future.

2. More infrastructure With more autonomous vehicles on the road more infrastructure will be required according to autonomous vehicles. New roads and new rules for traffic may need to be implemented, such as a highway lane for self-driving vehicles only.

3. Lost jobs

Many drivers may lose their jobs due to autonomous vehicle technology.

At first, this may not be a big deal as the shortage of drivers could be filled in with automatic cars. However, autonomous vehicle technology has the ability to transform the industry, which could mean a huge reduction in driving jobs.

4. Security

One of the biggest disadvantages of autonomous vehicle technology is security concerns. If a vehicle is hacked, it could become very dangerous. Even with someone inside the vehicle supervising, there's a real threat of a hacker gaining control of the vehicle and overriding controls.

Analysis & Findings

After studying this AI technology in cars, it is clear that there are two sides to this technology in human life. For some people's perspective, this technology may be good, and for some people's perspective, it may not. After reviewing some papers, I can say that the paper research by Sun, Bebis, and Miller (2004) is best as in this paper many latest sensors and radar are used in cars to make it autonomous.

Limitation & Future Scope

The current generation of self-driving cars may be a transitional phase. The car is "autonomous" within the sense that it relies on its own onboard system - cameras, sensors, software, etc. If the roads are covered with a feet of snow, the car will lack reference points like lines on the road, curbs, and maybe even traffic signs.

The next generation of autonomous cars are "networked" cars. They'll not (only) depend on their onboard sensors, but also on road-site sensors. Signals from the sensors will be picked up by the car all told weather. The sensors will communicate with a central control system that monitors traffic and directs vehicles to the optimum route.

Conclusion

In this paper we analyse the expansion of autonomous cars of AI technology and what quite components and technologies are accustomed to develop an autonomous car and basic details about all components. Also, we've got learned benefits and problem statement of a few self-driving cars. The dream of making artificial devices that reach or outperform human intelligence is many centuries old. The event of intelligent agents is making that dream come true for the researchers and yet as for the industry.

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