Influence of artificial intelligence in automotive industry

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Abstract. The purpose of this research is to identify the influence and advantages of artificial intelligence in the automotive industry. This research uses descriptive research method where data is obtained from existing facts. The results of this research explain how important driverless cars technology is in the application of artificial intelligence in the automotive industry, and how the advantages and disadvantages of driverless cars technology are applied nowadays. The results of the research were obtained because of the increase of human needs in the era of technology industry 4.0, so some companies developed driverless cars technology. This research was conducted to discuss the influence of artificial intelligence in the automotive industry by applying driverless cars technology.

1. Introduction

Technological progress is the era that occurred at this time, there are various things that require every aspect of human life as a consumer of consumer technology. Thus, human needs for the 4.0 industrial era are categorized as quite high because of the facilities of automation and data exchange in manufacturing technology. Areas that are used as part of artificial intelligence as an effort to reduce risk with artificial intelligence (Artificial Intelligence, AI) [1]. In its development, the technology must be able to process and issue every information and components that spread in every action between autonomous robots and humans [2].

Based on research conducted by Invesco (Financial Services), since the 1950s an artificial intelligence that has begun to be developed as a sub-subject of computer science that uses complex data and the development of scientists. Within a few years, there has been the ability for computers to predict results and allow computers to take action [3]. As many as 75% of car users are still hesitant to use driverless cars technology [4], but not a few who want to use driverless car technology in their cars because of the assistant parking and cyber security features [5]. Driverless cars operate differently from cars driven by humans; driverless cars will not be able to generate traffic reports and be more responsive due to sensor features and other features [6]. Traffic accidents that cause 1.24 million people to die every year in the world can be minimized by the presence of driverless car technology and can save fuel as much as 10% of the total fuel in cars [7]. Autonomous vehicles will dominate the future, even though currently autonomous producers cannot study them. This has encouraged autonomous producers to continue to innovate [8]. Not only developed countries are developing driverless cars technology, but currently developing countries have also begun to develop these technologies even though they are still in the form of simulations [9].
Soegoto explains in his book that information technology has changed the face of the world from the real world to the cyber world [10]. The purpose of this research is to explain the influence and advantages of artificial intelligence in the automotive industry so that it knows how the development and benefits of driverless cars technology. This research uses descriptive research method where data is obtained from existing facts, where facts are obtained from previous research and data about the development of driverless cars.

2. Method
This research uses descriptive research methods that can describe a fact or event based on facts and related to artificial intelligence in the automotive industry. The descriptive research method uses previous research concerned with artificial intelligence development in the automotive industry in order to produce an analysis of how artificial intelligence influences the automotive industry in the industrial era 4.0. In this study conducted interviews with respondents to strengthen the results of this interview in January. To ask the influence of artificial intelligence and benefit of user especially the driver if use the driverless car.

3. Results and discussion
Today we are entering industry 4.0, Artificial Intelligence has developed and can give the computer the ability to predict results based on input data; this is called "Deep Learning" where this technology allows computers to make their own decisions to be executed by other components quickly. This technology combines algorithms with artificial neural networks that allow computers to understand complex and abstract concepts. The incorporation of technology components in the industrial era 4.0 can produce an autonomous car that can navigate the highway with a decided scenario. Artificial Intelligence has been applied to Driverless Cars today with application of crash-avoidance systems and intelligent parking assist.

When an autonomous car is activated, the passenger must put some information such as destination information that will be related to the decision making by the computer automatically. Also, information from autonomous cars such as radar sensors, camera-distance from nearby objects such as curbs, road markings, traffic signals and pedestrian sensors will also affect the speed of the car. This is a visual illustration of driverless cars (Figure 1):

![Figure 1. Driverless cars illustration.](source: Invesco. For illustrative purposes only.)

These are some of the technologies available in Driverless Cars:
3.1. Car navigation system
As long as the driver drives his car, the way to move from the original location to the destination is not too complicated. However, in driverless cars mode, the car must be able to automatically plan the road to the destination. For this purpose, an on board navigation system was used in driverless cars. In navigation systems in cars, geographic information systems and Global Positioning System (GPS) is used to receive information on the location of the longitude and latitude of the satellite. After receiving various information that has been processed and executed, the driverless cars will find out the location and destination information; the road route is also programmed and calculated by the path planning model in the car navigation system.

3.2. Location system
The main purpose of using the location system technology in driverless cars is to determine the location of the vehicle with the initial information is the location and destination. This information will be processed with the Global Positioning System. The location system is classified into the relative location, absolute location and hybrid location (the key technology) (Figure 2)

![Figure 2. Designing of location system technology.](image)

3.3. Vehicle control
Vehicle Control includes vehicle speed and direction control. Perceptions of the environment, vehicle status, driving targets, traffic rules and driving knowledge are the determining factors of vehicle speed and direction of vehicle calculations. Then, the vehicle control algorithm will do the right calculation and forward it to the vehicle control system with the final result of doing the instruction to control the direction, speed, light, and so on. (Figure 3)

![Figure 3. Designing of vehicle control.](image)
In the application of driverless cars, several levels of autonomous car categorization were specified as described below (Figure 4):

![Levels of autonomous car.](image)

Currently, all autonomous car brands around the world are making the latest innovations to distinguish autonomous car models made with other brands. Technology that continues to be developed such as driver-assistants in the form of accident avoidance and crash monitoring. With the existence of autonomous car innovations that continue to be developed will make consumers believe in driverless cars technology. After discussion of the development of Artificial Intelligence technology used in the automotive industry and producing Driverless Cars, these are the benefit of the existence of Driverless Cars for the community:

3.3.1. *Make transportation safer for everyone, not just for riders.* When Driverless Cars should have the potential to reduce the number of accidents, this is not a guaranteed result. The computer system that is applied must be free from hacking, testing and strict supervision because it is very important to ensure that Driverless Cars is a car that can protect passengers and people outside cars such as pedestrians and cyclists.

3.3.2. *Reducing vehicle pollution.* Transportation is the main source of global warming, to help countries reduce vehicle pollution so that the existence of Driverless Cars must be able to accelerate the reduction of emissions or fuel used.

3.3.3. *Integrating driverless vehicles with public transportation modes.* Congestion is a common thing in big cities; the cause of congestion is because many people use private vehicles. To reduce congestion, the use of public transportation should be maximized, and the application of Driverless Vehicles can also be used in large capacities transportation modes such as LRT and Rapid-Transit Buses to improve services and reduce mobility costs.

3.3.4. *Improve the equivalent transportation technology system.* Driverless Cars were originally applied to private vehicle users only, which makes a gap for users of public transportation. So that public support is very good for this technology, it must also be applied to public transportation so that the entire population can use Driverless Cars / Vehicles technology.
Janet Fleetwood said in her research that the autonomous car saved nearly 30,000 lives per year. Against the potential of the autonomous car. This will directly affect the long-term benefits of public health [11]. Besides the benefits of driverless cars technology for the public, there are also benefits for users of driverless cars technology the explanation below is obtained from personal data and references contained in this writing.

- Less traffic. By utilizing road route identification to minimize the distance between vehicles on the highway.
- Raising safety level. Without driverless cars technology, 1.2 million people in the world die from traffic accidents every year. With technology can reduce the accident rate by up to 90% in the US alone.
- Increase free time. By using an autonomous car, the time that should be used for driving can be used for other activities.
- Improve healthy life. Congestion can affect health, some of which cause increased blood pressure, depression and so on. With the existence of driverless cars that have less traffic function and can improve the health of its users.

4. Conclusion
Industry 4.0 is the demand of facilities needed by humans at this time, the existence of Artificial Intelligence technology which is expected to meet human needs with the automation technology in all areas of life support is no exception in the field of automotive/transportation. The application of Artificial Intelligence in the form of Driverless Cars is very useful because users can have more free time to do other things and Driverless Cars technology also provides better transportation services.

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