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2019 China Self-driving Truck Report

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Abstract

The research subject of this research project is self-driving truck. The reason why we study this topic is that we realize that 2020 is the starting point of automation revolution. With the practical application of artificial intelligence, big data and 5G network, any industry will experience tremendous changes, so we want to choose a subdivision field - self driving truck- to analyze it's impacts on the industry. This paper expounds the development of China's logistics industry from four aspects and how the self-driving truck will be used in the logistics industry. We believe that self-driving trucks are an unstoppable trend in the future, which provides more convenience for the development of China's logistics industry.

Keywords

Self-driving Truck; Logistics Industry; Improvement of Self-driving Tech; 5G Applications.

1. The Introduction of China Logistics Industry and Traditional Truck Driver

The development of China's logistics industry mainly goes through four stages, starting from the earliest relatively independent pure storage and transportation. Due to the dispersion of microeconomic subjects, in this stage, the industry as a whole is extremely dispersed, the scale is generally small, the competition is fierce, and the profit is meager. With the development of electronic information technology and the transformation and upgrading of big data in China, the industrial structure in China has begun to take shape. This application is also reflected in the logistics industry. The logistics industry has gradually changed from disordered and often lost items, to the present "emergence of express cabinets", which has gradually become an orderly situation.

With the gradual development of many companies in recent years, it has a strong competitiveness. From a market perspective, many of the best existing companies in the industry have gone public. Therefore, it is more important to look at the future development of the industry from the perspective of the existing companies to find potential companies with breakthroughs in the future.

1.1 Insurance of truck driver

64% of truck drivers in China do not have commercial insurance.

1.2 Driving behavior and fuel consumption

The best truckers driving behavior can save 30 liters of fuel per thousand kilometers, data shows that if each truck drives 300 kilometers a day, 3,285 liters can be saved in a year, and power generation can pass through Beijing in 12 and a half years.

1.3 Mortality of truck driver

The data showed that less than 13 percent of freight vehicles in the motor vehicle market caused 30.5 percent of traffic accidents and 48.23 percent of deaths.

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2. The Introduction of Current China Self-Driving Trucks Market

2.1 Main technology of self-driving truck

2.1.1 Identification technology

The most common of these is the camera, which has been adopted by almost all developers without dispute. It is closest to the human eye and can see colored signs and objects, read typefaces and distinguish traffic lights. But there are many disadvantages, such as severe loss of vision at night or in bad weather, and poor ability to see at a distance.

2.1.2 Decision-making technology

The car sees its surroundings through its eyes, and then uses that information to make an understanding and analysis of what to do next.

2.1.3 Positioning technology

At present, the technology of autonomous driving is basically derived from robots. Autonomous driving can be seen as a wheeled robot with a comfortable sofa. Localization and path planning is a problem in robot system. Without localization, path planning is impossible. Centimeter-level real-time positioning is one of the biggest challenges in autonomous driving. For robot systems, localization mainly relies on SLAM and Prior Map cross-comparison. SLAM is an acronym for Simultaneous Localization and Mapping, which means “Simultaneous Localization and Mapping”. It uses sensors to transmit information and draw maps. Applications for SLAM include robotics, virtual reality, and augmented reality.

Nowadays, in addition to the mainstream GPS or GNSS(Global Navigation Satellite System) positioning methods, there are also ways to achieve positioning such as laying electromagnetic guide lines on roads. At present, the biggest problem of high-precision GPS positioning is the impact of geographical factors such as mountains and tunnels on the accuracy. Although the IMU(inertial measurement unit) can be used to calculate the accuracy, if the GPS signal is lost for a long time, the accumulated error will be relatively large.[1]

2.2 Market

China will be the most promising market for driverless cars.

2.2.1 Arterial transportation:

Cross-provincial, regional (city) transport is generally trunk transport, goods are usually directly from one transit center to another transit center. In the aortic scenario, the route of heavy trucks is fixed and most of them travel on highways.

2.2.2 Port transportation:

The port scenario resembles a logistics park. The environment is relatively closed, the traffic rules are clear, and the vehicle speed is low. It is much easier to drive without people than arterial transport.

(Public information)

3. Problems Encountered by Self-Driving Truck At Present

Autopilot in the 20th century has been decades of history, the beginning of the 21st century has shown a near practical trend. However, the immaturity of technology has caused some problems.

3.1 Map Drawing

Cartographic technology, map enhancement technology and auto coordinate automatic positioning technology are the prerequisites of automatic driving. The accuracy of geographic information and vehicle positioning is very important in all kinds of driving control forms. In addition to visual perception and decision making, drivers can drive without maps, mainly because they are familiar with the general pattern of road design.

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In the short term, autopilot can focus on developing highly automated technologies within a limited geographic area, and creating and maintaining enhanced map information in an appropriate manner. At the same time, enhanced infrastructure, such as smart roads, will be synchronized with further reducing collision risk through road and traffic monitoring.

3.2 Sensor

The driverless car uses sensors to transmit data and create a 3D image of the road.

3.3 Lidar

Automated cars are based on sensors that measure distances, transmit data and create 3D maps in real time. Let the car operate The car knows when to start and stop. The main challenge for autonomous cars is to reduce noise from the weather. Like human eyes, sunlight, snow and sleet can also destroy the vision of a lidar device. George, George and Siemens are trying to solve this problem. [2]

Optimization of formation mode and Improvement of self-driving tech

4. Future Development

1) Without mass production, the price cannot go down. There are four factors for mass production. The most important ones are technology, market, ecology and cost. At present, we are still in the incubation period of unmanned driving products, which is also called the period of social acceptance and market innovation. What citizens are most concerned about when it comes to driverless vehicles is not so much automatic as safety. We should not only pay attention to automation, but also to safety in production. The government should implement the Chinese standard of safety level of unmanned driving.

2) China’s self-driving car industry has huge potential, as China currently has a huge market. In addition to the well-known traditional auto parts, the supply of a range of products and services. With the promotion and coverage of 5G applications, the Internet will also provide a variety of third-party services for the auto industry.

5. Conclusion

With the promotion and coverage of 5G applications, the arrival of more suitable self-driving cars has been promoted. In the future, self-driving cars and new energy vehicles will be a trend. The development of the two is not contradictory, and can even go hand in hand. Because the two are in line with the current concept of social development, there is no need to choose.

References

[1] Bing, J. I. (2002, November). Distribution and Logistics Development in China: The Revolution has Begun. Thermo Fisher. Retrieved from http://www.Researchgate.net/publication/228692739-Distribution-and-Logistics-Development-in-China-The-Revolution-has-Begun.

[2] Choudhary, M. (2019, November 1). How GNSS works? Geospatial World. https://www.geospatialworld.net/blogs/how-gnss-works/

[3] Rosique, F. (2019, February 5). A Systematic Review of Perception System and Simulators for Autonomous Vehicles. Research. MDPI. https://www.mdpi.com/1424-8220/19/3/648.

[4] Ma, W.; Cao, X.; Li, J. Impact of Logistics Development Level on International Trade in China. A Provincial Analysis. Sustainability 2021, 13, 2107. https://doi.org/ 10.3390/su13042107.

[5] Fang, X. China 2019 Logistics Insight Report. https://cpb-us e1.wpmucdn.com/wordpressua.uark.edu/dist/3/559/files/2020/02/2019_CHINESE_CHINA-LOGISTICS_WEB_VERSION.pdf