Thoughts on the Development of Intelligent Connected Vehicle Industry in China

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Keywords: Intelligent Networked Vehicle, ADAS, V2X, Countermeasures.

Abstract. Intelligent connected vehicle is an effective way to solve the problems of environmental pollution, traffic congestion and high incidence of accidents, which has been attached great importance by many governments and enterprises. Although the intelligent connected vehicle started late in China, in recent years, China's intelligent connected vehicle industry has risen rapidly. Many enterprises have launched intelligent network connected automobile products, which have made new breakthroughs in the field of ADAS and V2x technology, and have stood in the forefront of the world. However, the market competition in this field is fierce, and the technical threshold is getting higher and higher. This paper analyzes the restrictive factors in the development of related industries and puts forward some suggestions and corresponding countermeasures.

1. Introduction

If one day we can get on the car and input the destination, the car will automatically drive to the destination, during which the car will use a variety of on-board sensors to identify the road conditions, and constantly establish communication links with the surrounding cars and signal lights to ensure that the whole process is the safest, most comfortable and most efficient. Previously, this was just a scene in a science fiction movie, but now it has been gradually realized[1]. This is the intelligent connected vehicle. Intelligent connected vehicle is an organic combination of intelligent vehicle and Internet of vehicles technology. It uses advanced intelligent devices such as vehicle sensors, controllers, actuators, etc., and integrates modern high-speed communication technology and high-precision positioning technology to realize intelligent information exchange and sharing between vehicles and people, vehicles, roads and backstage, realize automatic driving, and finally liberate people from repetitive and boring labor[2].

2. Development Status of Foreign Intelligent Connected Vehicles

The world major developed countries attach great importance to the development of intelligent connected vehicle industry, and have launched national support policies to encourage the development of related industries. For example, the United States: formulating national strategies and regulations, supporting and guiding the development of industries. In 2016, the United States automated driving vehicle policy guide was released. Japan: it is early to carry out research on its, and effectively promote the implementation of its project through the government’s inter departmental collaborative operation. It is planned to launch driverless autopilot in the restricted area in 2020, and the market target of fully automatic driving vehicle will be formed by 2025. EU: through issuing a series of policies and measures, it formulates the roadmap for the development of automatic driving,
promotes the R&D and application of intelligent connected vehicles, guides the industrial development of intelligent connected vehicles in Member States, and supports the technological innovation and achievement transformation of intelligent connected vehicles[3].

3. Development Status of Intelligent Connected Vehicles in China

China is the world largest automobile production country and the first new car sales market. With the rapid growth of car ownership, intelligent connected vehicles and its industrialization are of great significance.

3.1. The Government Attaches Great Importance to the Development of Intelligent Connected Vehicles

In recent years, the state has issued a series of policies to encourage the development of intelligent Internet connected automobile industry, which has initially formed the top-level design of national industry. In 2015, it released "Made in China 2025" and a series of documents to promote smart cars to the height of national strategic level. In March 2016, the opinions on the development planning of the automobile industry during the 13th Five Year Plan period were issued. In June 2016, the work plan for innovation and development of Internet of vehicles was released. In October 2016, the "energy saving and new energy vehicle technology roadmap" was released. In December 2017, issued the "National Internet of vehicles industry standard system construction guide (Intelligent connected vehicles)". In January 2018, the "smart car innovation and development strategy" (Draft for comments) was released. In June 2018, the national standard system guide for Internet of vehicles industry was released. In December 2018, the action plan for the development of the Internet of vehicles (ICV) industry was released. In May 2019, the "key points for standardization of intelligent connected vehicles in 2019" was released[4].

Local governments have also responded positively and promulgated various preferential policies to attract enterprises related to intelligent network vehicle to gather, coordinate and develop. For example, Chengdu is promoting the construction of Sichuan test base of the "Sino German Cooperative Intelligent connected vehicles, Internet of vehicles standards and test pilot demonstration" project, and improving the test and evaluation system of intelligent connected vehicles. Guangzhou has issued "Guangzhou’s opinions on accelerating the transformation and upgrading of the automotive industry". It has increased support and promotion efforts in the key technologies such as complex structure, complex environmental awareness, intelligent decision control and so on.

3.2. Breakthroughs in Key Core Technologies of Intelligent Connected Vehicles

The mainstream development direction of intelligent connected vehicles is intelligent and networked. Intellectualization is based on advanced driving assistance technology (ADAS), which uses vehicle sensing sensor and navigator map data to carry out calculation and analysis, and realizes automobile intelligent driving function through automatic control system. Networking is based on the Internet of vehicles (V2X) system, which can realize the information exchange of vehicle human, vehicle, vehicle road and vehicle platform, realize the data collection of beyond visual range environment, improve the safety of vehicle driving and improve the efficiency of road traffic. In 2016, the society of automotive engineering of China formulated the analysis standard of intelligent networked vehicles, and divided the vehicles into five levels in terms of intelligence, namely, driving assistance
(DA), partial automatic driving (PA), conditional automatic driving (CA), highly automatic driving (HA) and fully automatic driving (FA). In terms of networking, it will be divided into three levels, namely, auxiliary information networking, environment aware information networking, collaborative decision-making and control.

After years of development, breakthroughs have been made in the key core technologies of Chinese intelligent connected vehicles. In terms of ADAS, cameras, lidar, millimeter wave radar, high-precision digital positioning map, automatic emergency braking system (AEB), automatic cruise (ACC), lane keeping assistance system (LKA) and on-board computing unit have basically achieved technical breakthroughs, and they are autonomous and controllable. In terms of networking, Chinese third generation BeiDou navigation system has achieved high-precision positioning service. The new generation of vehicle wireless communication (5g-v2x) based on 5g communication technology has been applied in some areas, realizing the situation that the overall technology is synchronized with the international and some indicators are leading.

3.3. Relevant Enterprises Have Made Remarkable Progress

With the strong support of governments at all levels, relevant domestic enterprises have made their own plans in the field of intelligent connected vehicles. For example, in June 2020, Baidu and Chengdu high tech Zone jointly promote the construction of intelligent driving project. After the completion of the project, the pilot operation of Robo taxi and other automatic driving vehicles will be carried out, and various types of automatic driving vehicle operation services such as manned connection and site delivery will be provided. In September 2020, the ideal car signed a contract with NVIDIA and DESAY Siwei. On the basis of the chip and automatic driving controller provided by the partners, it completed the program design and algorithm logic independently. It became the first new energy vehicle company to independently develop L4 level automatic driving system in China. Weima automobile will carry the AVP autonomous parking function, which is in-depth cooperation with Baidu, to realize L4 unmanned driving in specific scenes.

3.4. Development Status of Netcom in Chengdu Economic Development Zone

Chengdu Longquanyi District, as a national economic and Technological Development Zone and Chengdu automobile industry functional zone, has 11 vehicle enterprises including Toyota, FAW Volkswagen, Geely and DPCA, and more than 300 auto parts supporting enterprises such as German mainland and Bosch. It ranks sixth among the top ten automobile industry bases in China, and has a solid foundation of automobile industry. In terms of promoting the development of intelligent Internet connected vehicles, Longquanyi District has also launched a series of powerful measures. First, Longquanyi District cooperates with China Academy of communications and communications to establish the Internet of vehicles (Sichuan) innovation center of China Academy of communications and communications, and build the first batch of 5g-v2x network access certificate certification and issuance base in China. Support related enterprises to carry out research on key common technologies such as perception, decision-making, execution system, inspection and testing, etc. The second is to carry out the construction of intelligent transportation infrastructure, plan the development type test road, actively carry out the demonstration application of automatic driving, and plan to open the demonstration line of automatic driving bus from the main stadium of the Universiade to the Universiade village. Third, build a L3 and L4 level vehicle manufacturing capability system, and establish a cooperative ecosystem of vehicle manufacturing, key technology enterprises, travel service platform and financial service platform.
4. Analysis of Restrictive Factors and Countermeasures

4.1. Relevant Supporting Policies and Regulations are not Perfect

At present, no matter from the national level or the local government, in order to promote the development of intelligent connected vehicles, many policies and regulations have been issued, which have effectively promoted the development of intelligent connected vehicles in China. However, due to the fact that intelligent connected vehicles are new things, supporting policies and regulations have certain lag, and the development of related technologies is not perfect, and the supporting civil tort liability, insurance liability, etc. The supporting system is not perfect, which restricts the development of intelligent network vehicle.

It is suggested that the relevant policies should be issued step by step and systematically according to the needs of the technology, industrial development and standards and regulations system construction of the intelligent connected vehicle. At the same time, some policies and measures should be given priority to solve the prominent problems in the development of the intelligent connected vehicle industry.

4.2. Research and Development of Key Core Technologies Needs to be Strengthened

Intelligent connected vehicle is a complex network system, which can be roughly divided into three parts: vehicle system, intelligent road test system and remote cloud computing platform, which contains a large number of key technologies. Although in recent years, domestic systems have made breakthroughs in some core technology fields, and even take the lead, we are still in the exploratory stage of more technologies, and rely heavily on foreign core devices and algorithm modules.

It is suggested to strengthen collaborative innovation and development, increase support for key core technology research and development of intelligent connected vehicle through national science and technology special fund, promote the integrated development of intelligent network connected vehicle and new technology, build collaborative innovation network with multi participation, give full play to the advantages of system and system, and concentrate efforts to achieve new breakthroughs in key core technologies and core devices.

4.3. The Development of Industrial Chain Lacks Overall Planning

Intelligent connected vehicle is a field of high investment and high risk. If there is no overall planning, different enterprises will rush forward, which will not only cause repeated investment and waste of resources, but also the quality of industrial chain development is not guaranteed. It is difficult to form the agglomeration effect of the industrial chain and cannot meet the high-quality development of the industry.

It is suggested that through the construction of intelligent network connected automobile industry cluster, the construction of intelligent network automobile basic data exchange platform and industrial service sharing platform, reduce the risk of repeated construction and investment, promote the integration of communication, information, electronics, transportation and other fields, form a joint force, improve the stability of the industrial chain, and jointly support the rapid development of the industrial chain of intelligent network connected automobile.
5. Conclusion

It can be predicted that the intelligent Internet connected vehicle has a very bright future, with huge application scenarios, which can change people’s existing living habits\[7\]. Chinese intelligent connected vehicle industry is still in its infancy, but its development is very stable. We have established a development strategy suitable for Chinese characteristics of intelligent connected vehicles, and comprehensively promote the development of intelligent connected vehicles. I believe that in the near future, the intelligent Internet connected vehicle will enter ordinary people’s homes and become a part of life.

Acknowledgement

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Fund projects: 2020 Science and technology project of Longquanyi District, Chengdu (Soft Science);

Training quality and teaching reform project of Sichuan Provincial Department of education 2018-2020

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