**Journal of Computing and Electronic Information Management**
ISSN: 2413-1660 | Vol. 15, No. 3, 2024

# Research on the Application Status of Large Language Models in China's New Energy Vehicle Industry: Taking Huawei's NLP Large Model and XPENG 's XGPT as Examples

**Zhenyu Liu**

Hubei University of Economy School, Wuhan, Hubei, 430205, China
nangongluo6666@Outlook.com

**Abstract:** In the era of rapid development of artificial intelligence, large language models are widely used in various industries due to their powerful natural language processing and text generation capabilities, including intelligent manufacturing, intelligent services, voice interaction, and even music box text creation. In this article, I will use literature review and case analysis methods, using the Huawei NLP large model and XPENG XGPT model as examples, mainly focusing on two aspects: intelligent driving and intelligent cockpit. Deeply explore the advantages of big language models in the new energy vehicle industry, the feasibility and necessity of their application, and their future prospects. In my research, I found that previous studies on this topic mainly focused on the technical principles of intelligent driving and intelligent cockpit, model optimization solutions, and market and user feedback. In intelligent driving systems, large language models can achieve timely and accurate takeover of driving, precise navigation, and efficient scene learning through scene simulation and generation techniques. In terms of intelligent cockpit, I believe that the main approach is to utilize natural language recognition and text processing capabilities to timely complete user instructions and engage in efficient language interaction. Helping enterprises create intelligent cockpit systems that are personalized and emotional processing for users.

**Keywords:** LLM (Large Language Model); New energy Vehicle Intelligent Driving Systems; Intelligent Cockpit.

## 1. Introduction

The English name of Large Language Model is Large Language Model, short for LLM. The underlying logic of the big language model is the natural language processing model based on deep learning, and OpenAI's GPT series, BingAI and Google's BERT are typical representatives. They all have billions of parameters to improve their ability to understand and generate language. They are an important support for a good dialogue system with users, text generation and creation, knowledge question and answer, etc., and the large language model significantly improves the human-computer interaction ability. Through case study, I can demonstrate the practical application effect of large language model in the field of new energy vehicles, provide demonstration and reference for other enterprises in technological innovation, and promote the technological progress of the entire industry. The application of large language model can significantly improve the interactive experience of the intelligent cabin, and can become a new breakthrough for car companies to explore the market, and the future development prospects are good. In the period of rapid development of the new energy automobile industry, intelligent transformation has become the key to enterprise competition. This paper will analyze relevant literature and summarize the research status and future prospects of large language models in the new energy vehicle industry. Using the case study method, this paper compares the different focuses of XPENG XGPT and Huawei NLP model and summarizes the advantages and disadvantages of the two models. The application of NLP Grand model and XGPT is analyzed in detail from two aspects of intelligent driving and intelligent cockpit. Evaluate the application effect of the large language model in the intelligent cockpit, and discuss its advantages and suggestions for improvement.

## 2. Literature review

### 2.1. Research status

First of all, China's new energy automobile industry is perfect, and it has a very large-scale market to provide a good foundation for the development of China's new energy automobile industry. Nowadays, China's automobile industry is developing towards electrification, networking and intelligence [1]. Therefore, China has shown strong interest and investment in the research and application of large language models. For example, the "ERN IEbot" launched by Baidu is a typical case, which is applied to the intelligent cockpit system of Changan Automobile, improving the intelligent level of vehicles. In addition, a number of enterprises, including BYD Auto and Geely Auto, have also announced that they are ready to start deploying full-stack self-developed AI large model technology, covering many fields such as painting, music, language and autonomous driving. These developments indicate that China has made remarkable progress in applying large language model technology to the field of new energy vehicles. In terms of the market, intelligent pure electric passenger cars are in the early stage of market popularity, and many consumers still have certain doubts about their driving range. Sufficient driving range can not only enhance consumers' confidence in car buying, but also make them more secure in daily travel [2]. However, before the advent of battery production panels with longer range, a large language model combined with intelligent cockpit and intelligent driving system to bring

good driving experience may become another breakthrough to open up the market. By studying the existing literature and relevant cases, it is concluded that the big language model has good development prospects in intelligent driving, intelligent cockpit and intelligent manufacturing in the new energy automobile industry. This paper mainly elaborates from two aspects: intelligent cockpit and intelligent driving.

## 2.2. Intelligent driving

In the era of great changes in automotive technology, relying on cutting-edge technologies such as big data, artificial intelligence, Internet and cloud computing, the field of intelligent driving has achieved leapfrog technological innovation and industrial development. This not only heralds a radical change in the way people drive, making cars more and more "smart", but also brings safer and smarter transportation experience for people [3]. The large language model has highly accurate natural language understanding and generation capabilities, and can process various instructions and queries from users, providing a direct and concise operating experience for drivers. At the same time, the powerful scene learning and simulation ability of large language models is also an important support for the adaptability and safety of new energy vehicles when intelligent takeover driving and the deployment of road learning scenarios of automatic driving systems by enterprises. New energy vehicles have become the inevitable choice for smart vehicles because of their electrical balance, intelligence, precise control and extensibility of electronic and electrical architecture. The electronic electrification architecture of new energy vehicles is conducive to the realization of linear control and meets the requirements of the vehicle architecture for automatic driving [4]. The large language model can be directly sent to the battery, motor and electronic control through the computer data, to achieve the rapid response of the "three power" system.

## 2.3. Smart cockpit

Traditional in-vehicle system design research focuses on driving distraction and usability issues. However, with the development of intelligent driving vehicles, users' emotions and needs are increasingly being paid attention to in future intelligent driving scenarios [5]. The development of the car cabin has roughly experienced three stages: mechanization, electronization and intelligence. The intelligent cabin is constantly evolving on the basis of the traditional cabin, with higher intelligence and comfort, and more insight to meet user needs [6]. These cabins integrate advanced smart technologies such as AR-HUD and ADAS voice or gesture interaction to enhance the overall user experience. In addition, the multi-screen mode is also an important way for the intelligent cockpit system of new energy vehicles to interact with users in the future. With the continuous improvement of the infiltration rate of the intelligent cockpit, the on-board display is developing in the direction of "large-screen, multi-screen, personalized" [7]. Users have increasing demand for intelligent interaction of cars, hoping to command and interact through natural language. Large language model can not only achieve efficient and natural voice interaction, improve user experience, but also provide personalized services and recommendations by analyzing users' historical behavior. In addition, the information system in modern vehicles is complex and diverse, and the large language model can combine multiple information and present users through voice or text, further optimizing the convenience of information acquisition and management. Therefore, large language models with their powerful natural language processing, retrieval and learning capabilities have great advantages in the new energy source automotive industry.

# 3. Case analysis

## 3.1. Intelligent driving

NLP Grand Model 3.0 includes the "5+N+X" three-layer architecture, which refers to the five basic large models of the L0 layer, the N industry general large models of the L1 layer, and the more detailed scene models of the L2 layer that allow users to train independently. It adopts a complete hierarchical decoupling design, and enterprise users can choose suitable large model development, upgrade or fine-tuning based on their own business needs, so as to meet the changing needs of thousands of industries. The core of Huawei's development model is to focus on computing power and applications. The following is the structure of the NLP Grand model:

Therefore, in the process of my research, I found that the main focus of Huawei NLP grand model on its new energy vehicle products is intelligent driving. In the field of intelligent driving, Huawei uses artificial intelligence and big data technology to provide a complete set of solutions for intelligent driving.

Driving safety and behavior decision-making. Large models can improve sensor processing power, optimize path planning and environment. NLP Grand Model is a multi-modal, cross-domain AI grand model capable of processing multiple types of data text, images, voice and video. This is crucial for environment perception, behavior prediction and decision planning in intelligent driving. Using convolutional neural networks and recursive god network techniques, the model can efficiently analyze and analyze data from different sensors. To improve the safety of automatic driving and the efficiency of emergency handling.

Road learning and modeling. In the field of vehicle-mounted interaction, a scene is a description of the actors, environment, goals and objectives, actions, and sequence of events, as well as the context upon which a new design system is developed and demonstrated throughout the design cycle [8]. By constructing digital twin space and generating complex scene sample, NLP grand model can accelerate the learning and coping ability of automatic driving system to complex scene. This technological innovation can shorten the automatic driving learning training cycle from more than two weeks in the past to two days, greatly improving the iteration speed and application efficiency of automatic driving technology. By simulating different driving scenarios, such as mining environment, urban traffic, etc., the large model can accelerate the training cycle of the automatic driving algorithm, thereby improving the adaptability and reliability of the automatic driving system. To provide drivers with a reliable, safe and highly adaptive intelligent driving environment.

## 3.2. Smart cockpit

XPENG Automobile adopts the XGPT Lingxi large model based on GPT-3, which has the intelligent interaction ability of multi-mode, multi-scene and multi-task. Compared with Huawei's NLP model, although its main focus is on natural language processing and voice interaction, Xpeng's XGPT model performs well in voice control, AI assistant and

personalized recommendation in the intelligent cabin, and pays more attention to mentioning

Interactive experience between human and machine. Therefore, XGPT Lingxi Grand model has been widely used in the intelligent cockpit system of XPENG Automobile [7]. The convenience, ease of use, design sense, reliability and intelligent performance of the intelligent cabin are the final performance of the intelligent cabin for users [9].

Intelligent voice assistant small P. XPENG Motor's self-developed XGPT Linxi Grand model has been successfully integrated into its voice system, significantly enhancing the functions of the new AI assistant "Little P", which now has more than 800 skills. Users only need to add the wake-up word "small P" when they ask for it to achieve a precise and natural interactive experience. The introduction of XGPT large model greatly improves the perception, understanding and reasoning ability of "small P", enabling it to proactively provide service recommendations during the process of vehicle use.

XPENG Automobile launched the scene car sense SR, which further integrated the all-round scene from boarding, driving, temporary parking, charging to parking on the previous generation system, to achieve a one-stop environmental perception experience. The system can provide drivers with more than 20 auxiliary warning features, such as stopper alerts, large vehicle alerts and pedestrian over-approach alerts, significantly improving the safety and comfort of driving by showing the full range of vehicle perception in 360 degrees.

## 3.3. Conclusion and comparison

### 3.3.1. Technical focus

NLP Grand Model: The main advantage lies in multi-modal data processing. Adept at processing multiple data types such as text, images, voice and video, it has powerful advantages for environmental perception, behavior prediction and decision planning. This makes it widely used in core technologies of autonomous driving, such as sensor fusion, path planning, and multi-sensor data processing.

XGPT: I think XGPT mainly focuses on natural language processing and voice interaction, performs well in voice control, AI assistant, personalized recommendation and other aspects of the intelligent cabin, and pays more attention to improving the interactive experience of passengers and drivers.

### 3.3.2. Advantages and disadvantages

1)Huawei NLP large model

For the advantages, the NLP Grand model is capable of handling multiple data formats of text images, voice and video, which is essential for environment perception and rule learning in intelligent driving. Advanced roll neural network and recurrent neural network technology are used to improve the recognition and decision ability of the model in complex field. In addition, Huawei is also a very mature communications company, so Huawei can combine the NLP model with its own mature hardware equipment, and Huawei can use its advantages in chips and computers to provide very powerful computing capabilities for NLP model to process data and learn scenarios.

On contrary, compared with some companies that focus on intelligent driving, such as Tesla, I believe that Huawei needs to be further improved in terms of the integration of the upstream and downstream of the autonomous driving ecosystem. Second, NLP may need more time and real-world scenario testing to model in terms of autonomous driving data accumulation. Therefore, my research found that Huawei NLP model is still in the preliminary stage, but also needs time to accumulate and precipitation, to further improve Huawei's own database and scene model, at the same time, if Huawei wants to carry out global deployment is also facing international policy challenges, so I think how to let China's intelligent driving products to the international is also a problem worth studying.

2)XPENG XGPT

The main application of XGPT in the intelligent vehicle cabin is the intelligent cabin. XGPT is integrated into the vehicle's AI assistant Small P, so Small P has more than 800 skills XGPT can analyze the user's usage habits and preferences, XGPT can provide personalized content recommendations with unusual accuracy, and will automatically filter out older content, prioritize the latest content, including music. Multimedia content such as video. In addition, XGPT can also support voice combined with gestures, touch to improve the accuracy of command execution and user experience. Therefore, I think in the intelligent cabin personalized service and good human-computer interaction, XPENG XGPT is more prominent.

XGPT is excellent in terms of intelligent cockpit, but in terms of intelligent driving, XGPT's data processing and scene simulation capabilities are poor. In the future, XGPT may need to strengthen XGPT's data processing computing capabilities, improve the calculation model, or cooperate with mature communication companies to improve scene simulation and network interconnection capabilities in automatic driving. Secondly, efficient natural language processing and speech recognition require a lot of computing resources and costs, and XPENG needs to specify a good R & D, production and sales plan, balance product prices and production costs, build a good brand image and strengthen market competitiveness.

Compared with the large language model intelligent system independently developed by the two car companies, Huawei NLP Large Model makes good use of its advantages in the field of communication, and creates a NLP large model with powerful data processing, multi-modal processing and scene generation capabilities, which is committed to improving the overall performance and safety of the automatic driving system. However, XGPT is mainly used in the smart cockpit to improve the driver and passenger interaction experience, providing intelligent services through efficient speech recognition and natural language understanding. I believe that the advantages of NLP Grand Model and XGPT can complement each other and bring more possibilities for the development of intelligent driving technology in the future. Car companies can choose or combine these solutions according to their own technical architecture and needs to provide a better driving experience and intelligent vehicle services.

# 4. Conclusion

By studying a number of previous literatures in the industry, I found that the current big language model is mainly applied in the new energy automobile industry in three aspects: intelligent driving and intelligent cockpit of vehicles, intelligent production and planning of products. This paper mainly focuses on the automobile product itself, so the main research of intelligent driving and intelligent cockpit two aspects. I have used Huawei NLP large model and XPENG

XGPT, two mature large models independently developed by China, which are also representatives of intelligent driving and intelligent cockpit. NLP Grand Model and XGPT model significantly improve the safety and accuracy of intelligent driving through powerful data and analysis capabilities as well as natural language processing capabilities. The large language model can process and interpret a large amount of road information in real time and optimize route planning and driving decisions. Therefore, I think the large language model pays more attention to providing users with a conscious driving environment with a good sense of experience. In addition, in terms of intelligent cockpit, the large language model provides users with a more natural and intelligent interaction experience, and can realize voice assistants, emotion recognition and other functions, making the driver and passengers feel more comfortable and convenient. The large language model has greatly improved the performance of new energy vehicle products and the sense of experience, laying a good foundation for promoting the intelligence of new energy vehicles. With the continuous development of science and technology, scientific and technological progress is the core of the development of China's new energy automobile industry [9] At present, the application of large language model in the new energy automobile industry is in a stage of certain foundation but rapid development, and researchers and enterprises at home and abroad are actively exploring its potential. With the continuous progress of technology and the continuous expansion of application scenarios, there will be more breakthroughs and innovations in this field in the future.

# References


[1] LI Xiaohua. Development Status and Prospect Trend of new energy vehicles in China [J]. People's Forum,2024

[2] Zhu Mingzhe. Research on competitiveness evaluation and promotion strategy of intelligent pure electric passenger car products of A Company. Beijing University of Technology.2023

[3] Zhang Qiaoqin, Xu Kaijie. Cars are "smarter" and travel is "smarter". Today's technology. 2024

[4] Gong Mengze. Why are new energy vehicles the preferred carrier of "intelligent driving"? Securities Daily. 2024

[5] FANG Hao, Wang Huihan. Research on user expectation in future intelligent driving scenarios. Meizhou Bay Vocational and Technical College.2024

[6] Xia Huan, ZHENG Liqiang, Zheng Chunping, Wu Longlong. Research on the development status and future trend of automotive intelligent cockpit. Geely Automobile Research Institute

[7] Canalys. Multi-screen intelligent cockpit will become the standard of China's new energy vehicles.2023

[8] Qin Jingyan, He Jiacong. Study on the scene interaction design of unmanned vehicle element space intelligent cockpit. University of Science and Technology Beijing 2023 (Ningbo) Co., LTD.2023

[9] Zhang Di, He Hao, Shi Wenjie. User Perception-oriented Intelligent Cockpit Development Model and Evaluation Method [J]. China Automobile,2024

[10] Li Peijun. Research on the innovative Development Path of New Energy Vehicles in the New Era [J]. Automotive Testing News,2024