

# Application of Intelligent Control Technology in Vehicle Engineering

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## Abstract

Intelligent technology has penetrated into all aspects of human daily life, and with the progress of society, its intelligent control technology is also becoming more and more mature. With the continuous development of the automotive industry, the application of intelligent technology is becoming more and more extensive. In the automobile manufacturing industry, the design and development of many production processes and parts are inseparable from intelligent technology and play a pivotal role in automotive engineering. In vehicle engineering, the rational use of intelligent control systems and other modern means can greatly improve the safety performance of automobiles and reduce the difficulty of operation, so as to achieve the purpose of preventing traffic accidents. This paper focuses on the detailed analysis of the application of automotive intelligent control system in all aspects of automobiles.

## Keywords

Intelligent control technology; Vehicle engineering; Apply.

## 1. INTRODUCTION

In recent years, China, as the world's largest vehicle production and consumption country, has greatly increased the demand for vehicles, which to a certain extent has effectively promoted the rapid development of the vehicle field [1]. In people's daily life, vehicles are widely used in various fields, everywhere, whether it is people's travel, the production and manufacturing of enterprise products, or the transportation of goods are inseparable from driving, which has become a key condition for economic development and industry progress. Therefore, people's concept of vehicle selection has gradually changed, has changed from the past functionality and practicality to the current stage of comfort, safety and intelligence, in the future vehicle production and manufacturing process, it is necessary to combine intelligent control technology with the overall effect design of the vehicle, in this way to meet the various needs of the driver, and the overall control level of the vehicle has also been significantly improved [2-4]. In addition, in order to ensure the safety of people's travel and cargo transportation, the effective application of intelligent control technology is also indispensable, so as to meet people's needs for vehicle comfort and safety.

## 2. THE MAIN CONTENT OF INTELLIGENT CONTROL TECHNOLOGY

In essence, intelligent control technology is a discipline in the development stage in the field of automation control, which is an important science with automation electronic technology as the main body and combines multiple technical types of disciplines, and gradually matures and perfects in the process of development. Automated vehicle engineering has undergone tremendous changes in its product structure, functional requirements, production operations

and management system, making the control of vehicles gradually change from the traditional "artificial" to an important stage of "automation".

### **3. APPLICATION OF INTELLIGENT CONTROL TECHNOLOGY IN VEHICLE POWER UNIT**

The auxiliary control system of the engine specifically includes the following: idle control, intake control, boost control, emission control, failure protection, emergency backup, self-diagnosis and alarm, etc., these systems can ensure that the engine can work smoothly under different working conditions, and can also provide some information to the driver. Nowadays, in gasoline engines, the application of intelligent control technology has been continuously developed, compared with traditional engines, the application of intelligent control systems in new energy engines is more prominent in: precise control of fuel injection, ignition energy, ignition advance angle, and can effectively solve all kinds of abnormal combustion problems in the combustion process of new energy fuels, and finally make the engine obtain the best power, economy and emissions [5].

The engine is the power source of the whole vehicle and plays a pivotal role in the whole vehicle. In the process of China's energy structure adjustment, its power source has changed from a single fossil energy to a multi-energy complementary new energy represented by "electric energy" and "hydrogen energy". Now, the world's largest car companies are working on the development of "hybrid gasoline-electric" and pure electric technologies. From the current development situation, the application of pure electric vehicles is in a period of rapid development, in order to make its development better meet the needs of the people, it is necessary to continuously improve the electrification technology.

### **4. APPLICATION OF INTELLIGENT CONTROL TECHNOLOGY IN AUTOMOBILE COLLISION AVOIDANCE SYSTEM**

At present, there is a big gap between the research and development level of China's automobile collision avoidance technology and the advanced level of foreign countries. The development of automobile collision avoidance system can reduce accidents in emergency situations such as driver fatigue or lack of time to react, and vehicle speed is too fast, giving drivers a relaxed and safe driving environment and making important contributions to social harmony. The intelligent control technology is applied to vehicle collision protection to realize the automatic detection of vehicle speed and distance [6]. By constructing a safe distance model, combined with the ranging sensor, when the distance between the two vehicles is smaller than the safe driving distance, the control principle such as fuzzy control is used to enable the control system to automatically adjust according to the actual situation, so as to achieve graded deceleration, which can effectively avoid or reduce the rear-end collision accident that occurs during driving, ensure the safety of the driver, and also extend the service life of the vehicle.

With the increase of motor vehicles, the driver's driving behavior is irregular, resulting in various traffic accidents, which can cause certain economic losses at best, and endanger personal safety at worst. When the car encounters an unexpected event while driving, it makes people feel nervous and unable to maneuver correctly, which leads to traffic accidents. That is, accidents caused by human factors are caused by human factors. This situation can be avoided as long as the intelligent control system is effectively applied to the design and manufacture of the car in the design and manufacturing process of the car. At present, many cars at home and abroad have adopted intelligent control technology in the collision protection system, such as the BMW 7 Series. When the vehicle is moving, it automatically collects information about the surrounding environment, including radar sounds, etc.

Through the analysis of this information, the corresponding scene model is established, on this basis, the distance between the vehicle and other objects is calculated, the time of collision between the two sides is calculated, and this information is displayed to the operator to provide information support for the accurate operation of the personnel. If the driver does not make any movement and there is no change in speed, the system controls the driver to slow down and avoid a collision. Take Dongfeng Honda's URV, when the car in front slows down, it will start the intelligent control technology, and when determining the slowdown of the car in front, it will automatically brake, open the safety distance between the car and the car behind, and also protect the safety of the driver and the driver.

#### **4.1. Application of intelligent control technology in automobile taillights**

When the vehicle is driving, the headlights are usually used to issue warning signals such as "turn left", "turn right", "overtake", "brake", "pull over", etc., and these signals are automatically displayed by the rear headlights. The intelligent control system of rear light is applied to the rear light, which can realize the early warning of the vehicle behind when the vehicle brakes and turns, which greatly reduces the incidence of traffic accidents.

Tail light is an important part of the car, through the control of the tail light, can transmit the corresponding information outward, such as turn left, turn right, turn around, etc., other people or vehicles will respond accordingly after receiving this information, thereby reducing the occurrence of traffic accidents [7]. When designing taillights, the use of intelligent control technology can effectively improve the control effect of taillights and convey more accurate information to the outside world, which is of great help to prevent traffic accidents.

Lights are the key components of motor vehicles, and their role is to transmit the operating status of the vehicle to the surrounding pedestrians and vehicles through the lights. The intelligent control technology is applied to the lights, and in the process of car driving, such as turning, braking, etc., the system can open and close the taillights in a timely manner according to the actual action of the car, thereby effectively reminding the surrounding vehicles and reducing the occurrence of traffic safety accidents. Applying intelligent control technology to the lighting system of the car, the sensor can monitor the change of external light, so as to adjust the brightness of the headlights, especially when driving at night, and automatically turn on the headlights. When detecting a headlight ahead, the system will automatically switch the headlamp to low beam, which not only facilitates driving, but also ensures driving safety and prevents car accidents caused by the "blind spot" caused by high beam. The specific application of this technology in the lamp is mainly manifested as: the system can automatically control the car lights, when the car driver is reversing, the rear lights of the system will automatically turn on, and remind the rear personnel to pay attention to avoid the vehicle. When it is dark, the system can also automatically adjust the lights and turn on the headlights. The use of this technology can minimize the danger caused by human activities and improve the safety of vehicles.

#### **4.2. Application of intelligent control technology on automobile body**

From the perspective of safety, instrumentation, communication, ride comfort, etc., the intelligent control of the car body is very important. Intelligent handling seat belts generally work in tandem with airbags, and once a collision is detected, the seat belt will be quickly tightened by 10-15 cm under the manipulation of the control unit, reducing the forward distance between the driver and passengers and avoiding collision accidents [8]. The vehicle's immobilizer system usually works in tandem with the locking system of the central door. In the alarm state, when someone forcibly enters the car or opens the trunk and hood, the anti-theft system will emit alarm information such as flashing lights and horn honking, and cut off the ignition, start and fuel supply circuits, thereby preventing the operation of the vehicle and

preventing the vehicle from being stolen. The instrument control part is composed of electronic instruments and multi-function integrated displays. The system uses a single-chip microcomputer to process the data of each sensor and display various data, such as speed, speed, fuel consumption, mileage, etc. This paper introduces a new communication control method and analyzes it in detail. The car navigation system can receive the GPS global positioning signal to determine the current position of the vehicle and display it on the screen. Comfort control is achieved by adjusting the constant speed. This fixed-speed driving system eliminates the need for the driver to constantly press the accelerator while driving, and only needs to grasp the steering wheel tightly, so that the driver can drive safely and easily. This can greatly reduce the driver's work burden, and at the same time, driving at a constant speed can also reduce the incidence of car accidents.

At present, under normal circumstances, in the production and manufacturing of the vehicle body, the main consideration is safety, the reasonable application of intelligent control technology, not only can ensure the safety of the car in the application link, but also can strengthen the effective control of various electronic systems, such as instrument systems, communication systems, etc., can be effectively installed and positioned by the body through the intelligent control system. Therefore, in the process of manufacturing the automobile body, it is necessary to use intelligent control technology to carry out reasonable testing of the performance of the body, for example, to test the resistance of the car in the running link, the resistance of the car body can be better designed. Or equipped with a corresponding anti-theft device in the car, when it detects damage in the car or is impacted by external forces, it can automatically sound an alarm. At the same time, in order to ensure the safety of the car in the application link, once encountering various collision-type dangerous accidents, the induction system on the car body can respond accordingly in time, and quickly pop off the airbag to protect the life safety of passengers to the greatest extent. Or in the driving link, when the existence of potential safety hazards is detected, it can automatically send dangerous signals to relevant personnel, and automatically locate and isolate the fault problem area, so as to effectively control the car and prevent hidden dangers in safety. At present, the intelligent control system and the car navigation system can be organically combined to design the corresponding driving route for it, provide faster and more convenient services for the driver during the driving process, ensure the effective control of the driver's safe distance of the vehicle during driving, and avoid collisions and other accidents in the driving link.

## 5. CONCLUDING REMARKS

All in all, at this stage, intelligent control technology has been widely used in various fields of vehicle engineering, which can not only effectively improve the accuracy of vehicle control, but also meet the needs of customer comfort, safety and intelligence, occupying a vital position in vehicle engineering. Especially the effective application of intelligent control technology in vehicles, because the vehicle in the process of driving and loading and unloading goods has greater danger, the application of intelligent control technology greatly reduces the frequency of safety accidents, at the same time also reduces the cost of enterprise input, to the production has brought great convenience.

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