

Development of Automotive Electronic Technology and Application of Single Chip Microcomputer

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Abstract: At present, the development of automotive industry to the electronic direction, the paper summarizes the application of automotive electronics technology in the automotive industry. It points out the important position of the automotive electronic system in the whole vehicle, and the single chip computer technology plays an important role in the modern automotive electronic control, and it clarifies the important role of the CAN bus in the automotive electronic control system.

Keywords: Automotive electronic control; Electronic controlled fuel injection; CAN bus; Single chip microcomputer

1. Introduction

The continuous progress of science and technology is reflected in all aspects of computer and microelectronics, biological engineering, materials science, technology and other fields have emerged in a large number of landmark achievements. In the manufacturing industry, the development of automotive technology has a strong representation, and become the carrier of many new technologies. Electronically controlled engine, automatic transmission, anti lock braking system, airbags, intelligent navigation and other large innovation technology makes the car in the power, economy and emission levels, ride comfort and safety has reached a quite satisfactory degree. New technology has also brought vitality to the development of the industry, and the direction of the progress of the industry.

As the car / heart 0 engine, in the process of automotive technology progress has always been in the forefront. When the gasoline engine electronic control injection technology combined with three-way catalyst, diesel engine fuel injection system, variable cross-section turbocharged, variable valve is and lift technology, hybrid technology and many other machine, electricity, liquid tight binding technology make the performance index of the engine is increasing day by day. Power technology has been the core problem of the automobile research and development, with the gasoline engine, diesel engine as the representative of the internal combustion engine since the invention of become main power equipment of automobiles and other vehicles and position can not be replaced. In recent years, with environmental protection and energy issues outstanding, the situation change, to alternative fuel, hybrid, fuel cell is representative of

many emerging power is used in automobiles, and achieved good effect. However, due to technical or commercial reasons, the majority of the world's investment in the operation of the car is still in the traditional power as an engine, this situation will not be a fundamental change in the short term.

Automatic transmission, can effectively improve the driving convenience. Since 1980s, with the development of electronic technology, automatic transmission control technology is more perfect, in a variety of operating conditions can achieve the best match between the engine and the transmission system. Has been widely used in automatic transmission there are three main types: mechanical hydraulic automatic transmission, the torque converter, gear transmission mechanism, hydraulic and electronic control system is composed of three parts, the electronic hydraulic control system by the sensor, electronic control unit, shift solenoid valve, hydraulic regulating electromagnetic valve, pump and valve gear and other components, the technology is mature, the most widely used; automatic mechanical transmission (AMT) by the conversion of electronically controlled transmission device of the traditional manual gearbox and can realize gear automatic switching.

Currently in the truck more chosen; CVT by V type belt and adjusting the radius of the belt pulley stepless speed, are widely used in more than two liters car; its main advantages are variable speed is stepless, under various driving conditions can choose the best ratio, compared to its power, economy and emission performance and at about the improvement of 5% or so. Self diagnosis device for modern automobile. For example, EBD ABS+, airbags and other functions are normal, after each start will show. In addition, the door is closed, the trunk lid,

hood is locked, whether the system is good safety belt, brake system has no fault, whether the hand brake release will give warning. Recently, more and more stringent emission requirements, so the control requirements of the engine combustion process is becoming more and more accurate. The modern engine controller can use the sensor to detect the system, which has the function of self diagnosis.

Some advanced vehicles are equipped with a car navigation system, which displays the map, car position, trajectory, direction and distance from the display device in the car. The system can also be based on the direction of the vehicle traffic flow information, such as reflected in the map on the display, the best route for the direction of the vehicle. Vehicle navigation system can be divided into two types of satellite navigation system and terrestrial radio fixed navigation system.

24V (12V) vehicle power supply has been unable to meet the needs of the vehicle on the successful introduction of 42V (36V) vehicle power supply system is only a matter of time. There have been many instances of the application of 42V power, but there is a higher cost of replacement.

2. Automotive Electronic Systems in the Vehicle Status

Looking from the world scope, automobile industry to the electronic development trend, in the early 90s of the 20th century has been very obvious, application of electronic technology in automobile promoted the development of the performance of the automobile, automobile companies around the world have invested heavily in developing their own automobile electronic products to win greater market space. Therefore, the automotive electronics will be an important means to seize the car market. Since 2005, the world's automotive electronics market field scale has exceeded 100 billion U.S. dollars, the United States, Japan, Europe and other developed countries, the price of automotive electronics products accounted for more than 20% of the price of the vehicle, the premium car even reached more than 30%.

A decisive factor in the success of the German automotive industry is the creative application of electronic technology. With the vehicle level and the internal configuration of different, electrical and electronic components accounted for 10% to 30% of the vehicle cost, and will be increased by 10% in the next 5 years.

Modern automotive electronic control technology not only improves the car's power, economy and safety of and improve the driving stability and comfort, promoted the development of automobile industry and also for electronic products opened up a broad market, so as to promote the development of the electronic industry. To develop the new technology of automobile electronic

control, to speed up the electronic speed, is an important means to revitalize and develop the automobile industry.

3. Single Chip Microcomputer in the Use of the System in the Car

The single chip microcomputer is introduced in the automobile, which is applied to the control of automobile engine. Is the use of single-chip 1976 General Motors R & D of engine ignition time control (MASIR). It can better according to the engine operating conditions, the ignition advance angle to make precise control. Automotive electronic control computers from the analog era into the digital era. In 1984, TOYOTA launched the speed - intensive T-LCS TOYOTA lean burn system of gasoline injection device, can be in a variety of operating conditions on the injection time and ignition time for effective, excellent control. Can carry on the complex logic, the intelligent control computation, to the engine running speed and the air intake flow and other conditions change can make the quick response, at present already was the main jet way. Throughout the current gasoline injection car, has set high technology, high precision in one. Its control of exhaust emissions, such as H, C CO reached 0 orders of magnitude, near / zero 0 emissions. Also SCM technology in the car for the rest of the system, has been widely used, which makes car's performance has been greatly improved, become a vehicle to develop in the direction of energy saving, informationization, intelligent, powerful driving force.

The automobile is composed of many subsystems, such as power transmission system, chassis body system, braking system, steering mechanism, vehicle communication system and entertainment system. In control function is simple or only in several parts system adopts electronic control when using a microcontroller can be, but this microcontroller features should be more powerful, like the more popular on the market boom boom powerPC, 68K and Siemens and infineon company of some high-end chip. But for more complex sub systems such as engine control system, its itself requires more powerful chips to meet the complex control functions, such as in the 1990s Intel 8098 and 196 series chips have a very wide range of applications. With the development of the times, especially the increasing maturity of the computer bus technology, chip used in the car more and more, such as ABS, EBD, a SR, suspension, electronic anti-theft and satellite navigation system application, and in these systems in some function is relatively simple, even a 8-bit chip after all powerful to meet the use requirements.

So in many cars began to use a bus based multi chip system, we pass the bus system arranged in the car, sharing information, so that the car can be very comfortable to work. In addition, with the development of the world automobile industry, especially the rapid development of

automotive electronic technology, microprocessor has been widely used in Yu Anquan, environmental protection, engine, transmission system, speed control and fault diagnosis. At present, the United States accounted for 8 of the majority of automotive microcontroller, accounting for about 65% of the total. 16 bits and 32 bits .MCU is rapidly expanding the market. In recent years, the amount of 32 increased by about 50%, while the 8 increase in the amount of 11%.

4. Generation of Bus System and its Application in Vehicle

A large number of applications of electronic equipment will inevitably lead to a huge and complex wiring, the installation space is in short supply, the operational reliability is reduced, and the difficulty of fault maintenance is increased. In order to improve the utilization of the signal, a large amount of data information can be shared among different electronic units, and a large number of control signals in the integrated control system also need to be exchanged in real time. Most of the traditional electrical systems use point-to-point communication mode.

Aiming at this problem, the automobile network technology arises at the historic moment. Automobile network has many advantages, such as greatly reduce the wiring harness and realize the data sharing and significantly improve the level of intelligent control of vehicle, improve the ability of fault diagnosis and maintenance, reduce the combined switch and other switch input requirements for and simplify the device, low cost and so on.

Although the electric control system has improved the power, economy and comfort of the vehicle, the complicated circuit of the electric control system also reduces the reliability of the automobile, and increases the difficulty of the maintenance. To this end, as early as 1970s, the communication problem between the automotive electronic control units has been put forward. With the rapid development of the integrated circuit, the use of serial bus to form a network, both in reliability and economy, has become possible. CAN bus that is the controller area network, BOSCH company in Germany in early 1980s, was originally developed for the vehicle monitoring, control system design. Now, due to the excellent characteristics of CAN bus, in addition to the application of the automotive electronic control system, the other real-time control system has also been widely used. The N CA bus is designed to be a multi master structure with a maximum transmission rate of 1Mbit. Unlike traditional CAN network, it is not a point-to-point transmission of message. The identifier in the CAN message is given to the data rather than the node. The message is broadcast on the network, any node that is interested in the message is able to receive the data. For example, car of a node may transmit the speed of the wheel, the data may will

also be anti lock brake system and engine management system received, and these components will know from where to retrieve this information.

At present, the development and application of new technology and the contradiction between the quantity of wire harness and the sharp increase of the wiring harness is very prominent. In order to solve these problems, the data bus has been widely used in automotive electronic control system. Modern automobile typical control unit electronically controlled fuel injection system, electronic control transmission system, anti lock braking system (ABS), anti slip control system (ASR), exhaust gas recirculation control, cruise control system and air conditioning system. In a perfect automotive electronic control system, a lot of dynamic information must be synchronized with the speed of the vehicle. In order to meet the real-time requirements of each subsystem, it is necessary to share the automotive public data, such as engine speed, wheel speed, accelerator pedal position, etc..

5. Concluding Remarks

The rapid development of automobile electronic technology has created the conditions for the development of intelligent, networking and multimedia, the automobile industry has entered the digital era. As a professional automotive electronics research personnel should first understand the condition of automobile electronic technology is used in the car, and then combined with the knowledge of their own research direction and the microcontroller, determining the direction, it is possible in their field of study has found .

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