

## Research on Automotive Electronic Control Technology

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**Abstract.**Modern automotive electronic control technology is the integration of electronic technology and automotive mechatronics. It is increasingly widely used in the car. Application and development of electronic technology and electronic car will drive into a new era, not only in the 21st century car traveling on the highway, also flew on the information superhighway. This paper introduces the concept of automotive electronic control technology, modern automotive electronic control system applications and the development of feelings of automotive electronic control technology.

### Introduction

With the development of society, human automobiles and put forward higher requirements for environmental performance. Traditional mechanical equipment has been unable to resolve certain issues relating to vehicle functions, needs, therefore, will gradually replace the control by modern automotive electronics technology, electronics and vehicle integration [1]. Electronic control technology has been widely used in various aspects of the use of the car, it can not only improve the car's power, economy and security, improved driving stability and comfort, to promote the development of the automotive industry, but also for the wider electronic product development market.

### The Concept of Automotive Electronic Control Technology

From the mid-1990s to 2010, automotive electronic control technology as engineering technology has matured. At this stage, the electronics industry for the automotive industry offers a lot more advanced dexterous stable power supply, sensor, and have eight or 16 large-capacity memory, microprocessor, on this basis, the overall design of the car's mechanical and electrical systems in on the basis of coordination and focus on the overall design of automotive mechatronics, automotive electronic control technology will be focused on solving the problem of automatic control car parts or assembly, began to widely used computer network and IT development to make cars more automated, intelligent technology, automobile and social integration and to resolve issues such as the transfer [2]. As the automotive electronic control technology, developed in the various systems of competing auto electronic control device. Automotive vehicle electronic control technology is not just the development of the application itself, but rather a comprehensive major project. There are factors of production and opened utilization, improve the efficiency of the system, personnel management, vehicle production process through advanced management methods and means to achieve the purposes of automotive electronic control technology applications.

### The Application of Modern Automotive Electronic Control Technology

As the automotive electronic control technology is in the development of automotive electronic control unit and competition systems development. More commonly, the electronic control mature automotive electronic control system of the main engine, chassis control, body electronics control and information transmission.

**The Automotive Chassis Electronic Control.** Vehicle chassis includes anti-lock brake control system, anti-skid control, electronic control, electronically controlled automatic transmission,

electronically controlled power steering, electronically adjustable suspension, four-wheel steering and cruise control system.

(1)The drive-slip control and anti-lock brake control. All important automotive safety device ASR and ABS, ASR is an additional condition to be maintained, the driving force of the full electronic control unit, the engine torque and the vehicle brake system and control measures to control the starting and driving the vehicle acceleration forces to reduce the adhesion of the tire and the road surface to prevent excessive power and result in rotation of the wheel slip, and maintain optimal driving force to improve the car's directional stability and maneuverability power. ABS prevents the wheels from locking when braking car, thus effectively avoiding accident-prone, because the wheels from locking. Make full use of the maximum adhesion between the tire and the road surface, greatly improving the vehicle brakes to prevent skidding braking, drift, and other hazards, shorten directional stability and maneuverability braking distance, so that full braking performance [3].

(2)The automatic electronically controlled transmission. The automatic transmission electronic control throttle opening degree and the vehicle speed, the throttle opening degree sensor and the speed sensor, by ECT? The input signal is transformed into an electrical signal in time ECU electronic control unit ECU, according to the solenoid valve and the shift schedule change characteristic of the output signal, the solenoid valves controlling the hydraulic circuit, thereby accurately controlling the transmission ratio of the vehicle to obtain the best the shift time and the best booth. Has a low fuel consumption, high precision, power transfer efficiency, automotive exercise steady, compared with the traditional transmission, extended service life and improve shifting comfort.

(3)The electronically controlled power steering. Basis of the steering angle applied to the required electronic control system of the power steering force on the steering wheel, the torque, speed sensors, the automatic control so that the car is stopped or at low speed, the steering wheel is rotated, the need to increase the power, i.e., under different driving conditions, to achieve optimum the force required on the steering wheel. All electronically controlled power steering system provides torque and adjustment of the damping torque, steering to get the best characteristics of the positive and significantly improve the stability of the vehicle. Additionally, electronically controlled power steering system can also obtain the best steering force characteristics, in order to improve the steering response characteristic.

(4)The suspension system control. Suspension system according to different road conditions and vehicle operating conditions, the degree of control of the body automatically adjust the suspension damping and elastic stiffness, improve vehicle handling, stability, ride comfort and ride comfort. Application is active suspension and semi-active suspension of two categories.

**Engine Electronic Control.** electronic engine control, covering the electronic ignition advance control, the electronic control fuel injection system, exhaust gas recirculation control, idle speed control, knocking control, and other appropriate control and back-up systems, the self diagnostic system. Electronic engine control can maximize the power of the engine, the engine running economic improvement, to minimize vehicle emissions of harmful substances. Electronic engine control is an important part of automotive electronic control technology applications.

(1)The ignition timing control. According to information from different computer operating state of the sensor, the timely processing of the corresponding output control signals to control the optimum ignition timing. Access microcomputer-controlled ignition system, the control power of the time, knock ignition timing control to prevent and control to achieve the desired accuracy. Computer control points are not part of the ignition system is divided into two major categories of electrical ignition system.

(2)The fuel injection control. Computer-controlled fuel injection control is the amount of fuel required by the engine. Controlle judges provide information from a variety of sensors, hydraulic control nozzles, accurate and fast fuel injection engine intake manifold, the air sucked into the engine cylinder mixed air-fuel ratio of the combination. Today, the major D-type applications: MOTRONIC applications and L-type applications. D-type is calculated based on the intake of the

engine intake manifold pressure and engine speed air quantity, and calculate the required fuel. The advantage is that the intake resistance, high efficiency, the disadvantage is somewhat less accuracy. MOTRONIC system is a collection of subsystems petrol injection and electronic ignition, the system is a good implementation of digital control, anti-jamming performance and control accuracy. L-type is a direct measurement by the air flow meter as a control system to determine the amount of fuel injection quantity of air sucked in by the engine. The disadvantage is that the intake resistance, low efficiency and high accuracy [4].

(3)The exhaust gas recirculation. Part of the exhaust gas recirculation control is introduced into the trachea of a mixed gas mixed with fresh, recycled to return the cylinder, according to the engine operating conditions, by the intake manifold passage open EGR valve is mounted on the exhaust pipe to control the EGR rate to reduce the nitrogen oxides in the exhaust gas emissions. Electronic control not only the structure is simple, control of EGR rates can be larger that it has been widely used in modern electronic engine control system. Mechanical control of the EGR rate is small, the degree of freedom of control is restricted.

(4)The idle speed control. Today, gasoline engine idle control, centralized control of the idle speed control system is widely used. According to shut down completely by the ECU distinguish engine throttle signal and the speed signal is idle, then the target engine speed is determined by the ECU according to the input signal from the sensor and analyzed according to the actual speed of the tourism value of comparative analysis to determine the amount of control, Driver signal to drive the air amount corresponding to the target speed to perform the control mechanism. This is to achieve a closed loop control of the engine idling speed signal.

## **The Thoughts of Automotive Electronic Control Technology Development**

(1)From the start of performance, the development of automotive electronic control technology R&D units and related businesses the ability and the basic philosophy presented new challenges. According to the auto companies production levels, detailed consideration to achieve electronic control technology, according to the actual work situation, leading auto companies have the bigger picture, formulate their own development plan and in line with the relevant provisions of the supply to the automotive electronic control technology R&D capital, talent, technology support.

(2)The personnel management, improve staff capacity, particularly the leadership ranks. The first is training, so that employees truly understand the meaning and methods of automotive electronic control technology; secondly reflect competition, survival of the fittest approach to take; the strengthening of discipline supervision at this time, to avoid a variety of planning objectives, saying the cost of the project to be carried out in a timely manner audit and financial oversight; and finally the lack of capacity and production units for the low quality of management personnel at all levels should promptly adjust or update the post to avoid more waste, resulting in automotive electronic control technology research and development costs jumped up. Optimize internal institutions, scientific configure various aspects of employees, reducing overhead costs. Optimize internal mechanism to avoid overstaffed, saving a lot of hidden costs of wages, scientific configure all aspects of personnel, can improve overall efficiency, avoid duplication, duplication of investment.

(3)From upgrading hardware technical facilities, automobile manufacturers to develop new technologies, it is necessary to fully configure the automotive electronic control technology to develop the required hardware technical facilities, conditions permitting, companies can hire professional institutes, colleges and universities to consider their own situation, planning to meet their own needs hardware, promote the improvement of production technology [5].

(4) Have a detailed look at automotive electronic control technology, R&D projects, if necessary, modify optimization. I believe that the R&D units to be pre-feasibility study of the project, proposed on the basis of scientific and efficient automotive electronic control technology research and development program. Conditions can produce two or more programs can be cost-benefit comparison, the best of the best. Note that the program to be quality, costs, payments proportional control detail included. In the actual construction costs of various types of suitable multi-analysis, timely introduction of new equipment, new methods, new materials, etc., can reduce costs and

increase revenue.

(5)The implementation of specific accountability is on general people. In order to ensure the quality of automotive electronic control technology to give customers meet the requirements of the finished product, which is the research and development, the first production unit due obligations and responsibilities, as well as the unit can win the excellent quality reputation, win market, and then for the sustainable development of the unit and lay good bedding. The good quality of the project depends on the person, the human work efficiency depends on the system, therefore, implement the responsibility system specific to people with clear standards and responsibilities to promote the ideology of the working status of participants, and the costs with them remuneration linked to upgrade, is to play staff initiative, self-awareness necessary guarantees.

## **Conclusions**

In short, automotive electronic control development and application of technology can promote the work of a long-term campaign, a wide social popularization, how to do research and development of automotive electronic control technology, making it possible to mass popularity, the service people and on this basis to sustained revenue growth, the need for scientists and R&D joint efforts of enterprises, improve the production model to improve production efficiency.

Meanwhile, the user must first have a certain openness of mind, namely to avoid the beaten track, to participate in the application of new technologies, only to take advantage of new automotive electronic control technology and equipment will we enjoy the convenience of a new era of new technology. Enterprise pricing must "passive "transition to"active" and be capable of moving with the market demand, while encouraging customers to use initiative, to achieve double growth of economic and social benefits.

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