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Analysis of Data Coupling Mode of On-Board Information Acquisition and Communication

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Abstract: This paper studies the research status and development trend of the Internet of Vehicles and vehicle information acquisition system. According to the basic functional requirements and basic design principles of the vehicle information acquisition system, the overall design scheme of the system is proposed. The key technologies used in the system design are also studied Provide convenience for vehicle positioning and navigation services. In order to facilitate the intelligent dispatching of intelligent public transport vehicles, the information collection module designed by the system provides the collection of various information of vehicles, such as the number of people on board, the opening and closing of doors, fuel consumption and driving status. In this way, the control center can formulate corresponding more intelligent scheduling strategies, and manage vehicle operation more effectively and conveniently.

Keywords: Data coupling mode; on-board information; acquisition; communication

1. INTRODUCTION

With the continuous increase of vehicles and the expansion of population, urban traffic congestion, congestion and accidents are becoming more and more serious, and people's travel problem has become an urgent problem to be solved. Moreover, with the increase of people's travel demand and the endless traffic problems, the traditional public transport system has been unable to solve new problems. The intelligent electronic stop board has the functions of bus route information display, dispatching information display, arrival prompt, station monitoring, video advertising, etc.

Intelligent electronic station signs also need to have wireless network function, which can realize the remote function of bus route information, automatic real-time update of dispatching information, automatic reminder of incoming vehicles, remote update of advertising information and other functions. The electromagnetic immunity measurement (EMS) of automobile electronic products is an important part of the electromagnetic compatibility test of automobile, which is related to whether the product can work normally in the complex electromagnetic environment of automobile and realize the function of the product.

When conducting immunity measurement, the method used is to apply useful and useless test signals to EUT through signal generator, and the basic schematic diagram of immunity measurement. The power supply voltage of ELM327 is 5V, and the voltage of passenger cars is generally 12V, so a voltage conversion circuit is required. Generally, 78L05 is used for voltage conversion to convert 12V voltage to 5V voltage required by ELM327. 78L05 is a common regulated power supply chip with few pins. In order to prevent interference, a 104 capacitor is added between Vout, VCC and GND respectively. On-board video monitoring can record all kinds of situations in the bus in real time, generate video streams, and keep them for archiving.

The on-board information transmission terminal can collect the video stream of the monitoring equipment and upload it to the remote server through the 3G network to realize the remote real-time playback of the on-board video. At the same time, the on-board information transmission terminal receives the control command issued by the remote server and forwards it to the video monitoring equipment. The main function of the on-board information transmission terminal is to collect the operation data of various on-board equipment on the bus through various communication interfaces, process it and transmit it to the remote server through the network. The vehicle environment in which it operates is characterized by large fluctuation range of on-board power supply, limited capacity of on-board power supply, severe equipment turbulence, long operation time of equipment, large temperature difference, etc.

SAE J1850 protocol interface circuit is shown below (Imane from the public document).

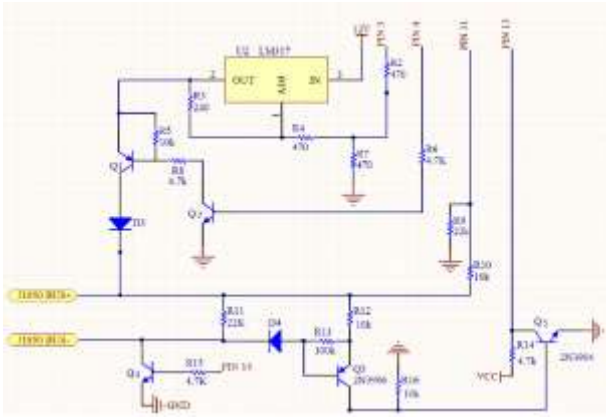

Figure. 1 SAE J1850 protocol interface circuit

2. THE PROPOSED METHODOLOGY

2.1 EMC design and test related technology of vehicle information acquisition module

When designing EMC-related PCBs, we mainly start with the layout and wiring of PCBs. The mutual position of various components on the PCB directly affects the EMC

performance of the circuit board. Reasonable layout can reduce the electromagnetic interference between components, and reasonable wiring can also effectively reduce interference and improve immunity The system will select the corresponding resolution nearby. When installing the application, the system will automatically select the layout and pictures according to the resolution and size of the device. Because the virtual dashboard in this article takes up a lot of space, the orientation of the screen is set to horizontal display in the Activity under the AndroidManifest.xml file, which avoids the switching between horizontal and vertical screens. The horizontal display is more humanized. In the design of this system, a total of 5 serial ports are required, while S3C2410A chip has 3 serial ports, so the serial port expansion chip needs to expand two serial ports.

The serial port expansion chip used in this system is Philips SC16C2550. This article uses the Bluetooth module to realize the connection and communication between ELM327 and Android vehicle-mounted platform. Android can support the software development kit (SDK) of Bluetooth 2.0 and later versions. The Android program provides the application. program programming interface (API) for Bluetooth, These. APIs enable applications written in the Android development environment to wirelessly connect with other Bluetooth devices and devices. The main feature of MCP2551 is that it supports a maximum speed of 1Mb/s, meets the physical layer requirements of ISO 11898 standard, has an external control slope mode, can detect TXD input ground fault, and can connect up to 112 nodes.

2.2 Software design of vehicle information acquisition system

There are two states of CAN bus, namely dominant state and recessive state. When the voltage difference between CANH and CANL is greater than 1.2, it is considered as dominant state. The recessive state refers to when the voltage between the two lines is less than 0V. In order to facilitate the selection of 3G network operators in the future, the 3G module is designed as an independent small module. When replacing 3G operators in the future, only the small module containing 3G needs to be replaced. In this system, the 3G module used is SIM5218A of SIMCOM.

It communicates with the main controller through USB port After the Android terminal receives the vehicle's engine load, rotational speed, vehicle speed, engine load and other relevant information through the OBD-based vehicle information acquisition module, it will display and store the data first, and then transmit the vehicle data to the background server through the wireless network on the Android terminal, such as 3G/4G network, and the server will extract the relevant data The hardware part of the vehicle information collection system is the FS4412 development board of the Android system and the OBD Bluetooth module inserted on the OBD II interface of the vehicle. The on-board resources and processing speed of the development board can meet the development requirements, and the user experience of the APP can be detected through the development board.

3. CONCLUSION

Based on the relevant theories of the intelligent public transport system, the development status of the intelligent public transport system in Changsha, and the mature embedded Linux, ARM, 3G and other information communication technologies, this project has completed the design and implementation of the intelligent public transport vehicle information transmission terminal based on 3G. This paper introduces the software realization process of vehicle information acquisition system based on OBD, including the realization of vehicle OBD system and Bluetooth communication function of Android terminal, the realization of vehicle information acquisition function and the realization of data remote transmission function.

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