Design of Communication Protocol for the Controller Area Networks

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ABSTRACT

Since the integrated circuits and the single chip microprocessors have been applied intensively in the automotive industries, the control units and many car electronics inside the automobile increase significantly. The communication between controllers and sensors inside the automobile constitute the so-called automobile network. In 1983 Bosch Corporation presented the Controller Area Network (CAN), which nowadays has been applied in a variety of application fields, such as industrial controls and automations. CANopen is a high level communication protocol based on the CAN. It is also one of the most popular communication protocols for embedded networking applications, especially for those networks that are used for in-car communication systems. CANopen protocol defines several standard communication objects to encapsulate the messages, such as real time messages, emergent messages, network management messages, and control signals, for successful transmissions throughout the network. In this thesis, we focus on the research and study of the CANopen protocol. After that, we design the application layer protocol to meet specific needs and network management requirements. In hardware design, the core processor is AT89C51CC03 as the main part of the system. In addition to this, the voltage level translator and transceiver constitute the CAN master node. In software design, we use C51 language to realize the network communications between nodes and many other management functions. Currently, our research results concentrate on the laboratory experiments. We have successfully completed two major experiments. One is temperature sensing and the other is motor control. Both of them are implemented and simulated, based on the CANopen protocols.

Keywords : Controller area network、Embedded system、CANopen

Table of Contents

REFERENCES

[1]Robert Bosch, “ CAN Specification Version 2.0, ” Bosch, Sept. 1991.

[2]H. Boterenbrood，CANopen : high-level protocol for CAN-bus. March 20, 2000.
[3]顏豪緯，”CAN匯流排即時訊息排程與頻寬分配”，大葉大學電機所碩士論文，中華民國九十四年六月。
[4]CANopen Application Layer and Communication Profile. CiA Draft Standard 301 V4.02. 13 February 2002.
[5]CANopen Framework for CANopen Managers and Programmable CANopen Devices. CiA Draft Standard Proposal 302 V3.2.1. 09 April 2003.
[6]CANopen device profile for generic I/O modules. CiA Draft Standard 401 V2.1. 17 May 2002.
[7]CANopen Object Dictionary(Software Manual)．SYS TEC electronic GmbH[S] 2003.
[8]ATMEL, 8-bit Flash Microcontroller，http://www.atmel.com/.
[9]ATMEL, Enhanced 8bits MCU with CAN Controller and Flash Memory，http://www.atmel.com/.
[10]PHILIPS, PCA82C251 CAN transceiver for 24V systems，http://www.philips.com/.