Design and Implementation of Car Black Box Based on ARM7

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***Abstract*—** The automotive electronics systems technology has been changing very rapidly over the past few years. So the main aim of this paper to develop a advanced embedded based prototype for vehicle safety to diagnosis the parameters of the vehicle installed to any vehicle which is used to record parameters according to sensor used to analyze the accidental vehicle for future safety .this will help to construct safer vehicle driving, improving the treatment for crash victims, helping to driving schools to provide data for better and safer driving to avoid accidents, it also helps the insurance companies for the investigation of crash. So the death rate due to accident can be minimizing. So this explores the developing the in vehicle technology to monitor and analyze the real life driving behavior. Recorded data can also be used for forensics, revealing the problems that caused the accident and give manufacturer an idea for improvement. So the aim is to develop an embedded integrated system consisting of a ARM7, a power supply unit, sensors, memory, a motor driver unit.

Keywords- Car black box**,** RPM Sensor, temperature sensor, seat belt sensor, door lock sensor, ARM7.

INTRODUCTION

The vehicle accident is a major public problem in many countries, particularly India. The car black box is a vehicle-based recorder which records various parameters like rotation of wheel, temperature of vehicle inside, battery voltage, seat belt and door lock observation. These data can be used for accurate car accident investigation and some public crimes prevention. Car black box is a digital electronic device which can record and store vehicle speed, in real-time and vehicle's other status information. It communicates with computers through specially designed communication interfaces and instrument buses. We can use this device to analysis and judge automobile driving state and deal with traffic accident. In this paper, the design of the car black box uses LPC2148 with ARM7 kernel as the master CPU, large capacity flash memory as data carrier storage, uses high precision A/D converter to collect analog value captured by sensors and directly record various kinds of switching values. Car black box communicates with Computers through serial port and computers store the data in the hard disk by binary system. Car black box records driving data, before and after the accidents so that it can be used to analyze the accident easily and to settle many disputes related to car accident such as crash

litigation, insurance settlements. It can be used to not only reconstruct what happened before an accident by Insurance agents and police but improve vehicle design, roadway design and emergency medical service by automakers, government and hospital.

DESIGN OF THE SYSTEM HARDWARE

1) System Structure

The system uses LPC2148 with ARM7 kernel as the master controller. Mainly includes information collection module, information storage module, communication module and information processing module. The block diagram of system hardware design s shown in figure.

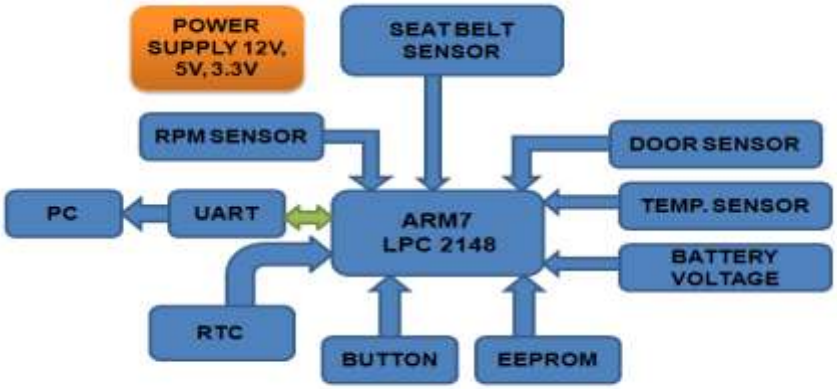


Fig. system hardware design

A. Information collection module

The black box collects various kinds of signal through the vehicle sensors when the wheel turns around. After data collection, the signal will change count pulse which we need.

B. *Information storage module*

Car black box has a high requirement on Storage on real-time and reliability which can record the data in less than 0.2sec of time interval.

2) Hardware Structure

The hardware structure of the system is dominated by ARM controller LPC2148, EEPROM memory and sensors RTC, UART for serial communication.

DESIGN OF SOFTWARE

Under the support of the system hardware, Car black box uses μC/OS-II as operating system, C language as embedded programming language. Because μ C/OS-II only provides a task scheduling kernel, and

to achieve a relatively complete, practical embedded real-time operating system (RTOS), need to do the corresponding scalability work that expand driver software parts.

The Car black box working mode can be concluded to record mode and communication mode. Record mode is in the car running processes, regularly to collect and storage all kinds of vehicles state parameters. Communication mode completed data exchange with outside by the communication interface when the car stops.

C. *Communication module*

System uses asynchronous serial communication mode. Car black box communicates with computer through the MAX232 for level conversion. In the microcontroller, serial communication control MSCOmm32.OCX provides all RS232's communication agreements, it is convenient for users to visit the Windows serial communication driver's characteristics, including the input and output buffer size and decide when to use the flow control command to hung data transmission, etc. After activating serial port by the MSComm control, microcontroller receives data transmitted by the car black box. When you press the start button, microcontroller sends ready signal to the single chip, when the single chip received

ready signal, and then begin to send data stored in car black box to the microcomputer. The computer receives data, shows data in computer interfaces and storages data in the form of binary file in the hard drive.

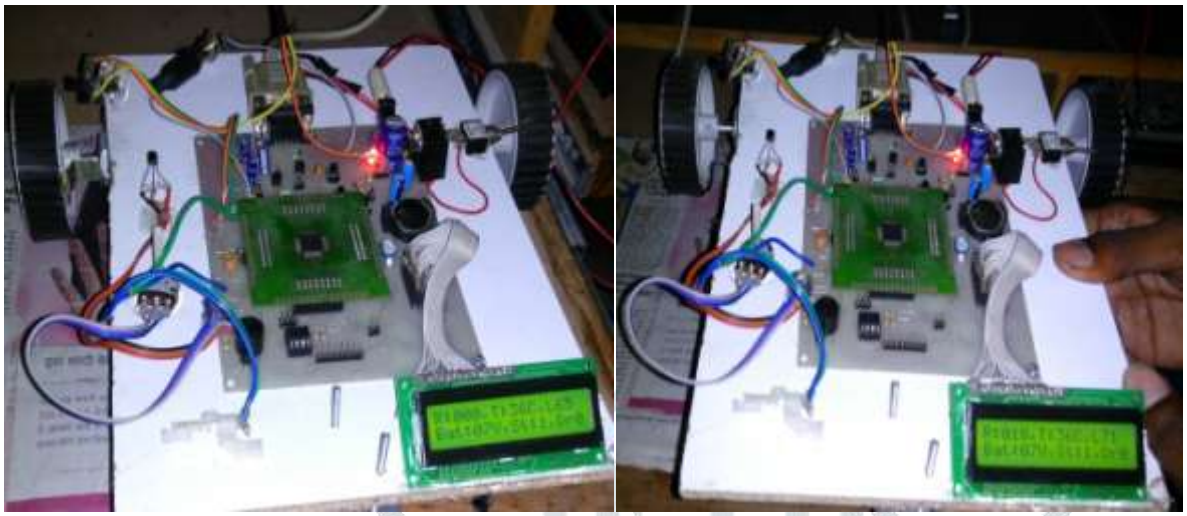
APPLICATION

Analysis of accidental vehicle to provide continuous measurement of cause, tool for employers to monitor and assess their staff who drive for work, improve safety, reduce crash rates and operational costs, meet their legal obligations and reduce the risk of prosecution or civil action.

CONCLUSION

In this paper, the design of the Car black box based on ARM microprocessor and μ C/OS- II operating system completely satisfy the state standards, and realize the precise measurement and reliable storage of the vehicle's various parameters. The test shows that the software program of the recorder can completely and accurately storage various parameters of the car; the function of complete real-time data collection and data storage provides reliable basis for the analysis and identification of the traffic accident.

SNAPS



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