USING A CAN BUS FOR CONTROL OF AN ALL TERRAIN VEHICLE

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ABSTRACT
There are lots of securities and other applications embedded in now a day cars. The driving habits of varied people are totally different and that we don’t have any system which might monitor these conditions. When the car is started driving then the driver behavior is reported by using the Driver Behavior Reporting System that will work by collecting and sending actual, real time data. Thus we can be aware and be informed so that we can reinforce the responsible driving habits or we can immediately address the area of concern. In this paper we are monitoring the driving habits of a person which is done with the help of CAN network. For the communication the CAN bus is used as a distributed control network. In this paper mainly we are explaining the hardware and software designs in detailed. This device helps in tracking the speed, engine temperature and also the alcohol consumption status. With this unique way of the Dashboard Reporting Tools, the owners can answer where, when and how fast to drive also importantly they can now have the insights as to "how" the driver is driving. The key area analyzed here are driving behaviors such as excessive braking, quick acceleration and how these things are changed between the daytime and the night time. Thus the dashboard report helps in providing a quick and easy way to understand the summary of the behavior of each session. In this project we are having two sections. The first one runs with ARM as the Master node and the other as the normal ARM data acquisition node for which all the required sensors are connected. The communication between the two nodes is accomplished with high speed CAN communication. The sensors used here are temperature, speed and alcohol sensors. The master node will collect all the information from these sensors through CAN network and stores them in three sessions. For the results respective switches are provided for the sessions at the master node. These results can be monitored on the display provided.

Keywords: ARM7, Gas sensor, lm35

I. INTRODUCTION

Automotive safety has been gained with an increasing amount of interest from the public, government and from the car industry. Every year around 1.2 million people die* due to road accidents so this is more justified by the traffic accident statistics. Due to these reasons safety remains the core value for the cars. This paper presents some of the latest active safety developments within cars. The common accident scenarios are rear end collisions and the common cause for these accidents is distraction of driver and thus no time for reacting. There is no vehicle system as a substitute for the most important safety feature in any vehicle.

However, Volvo is harnessing innovative technologies to help by alerting the drivers to avoid the collisions and reduce the impact when a collision cannot be avoided. Collision Warning with Auto brake is one of the systems where the area in front of the vehicle is monitored continuously with the help of the long range radar and a forward-sensing wide-angle camera fitted in front of the interior rear-view mirror. Warning and the brake support will be provided when collision occurs with other vehicles, both moving and stationary. Additionally, if the driver does not intercede for the warning then the possible collision is unavoidable then the intervention braking is applied automatically to slow down the car. This helps in reducing the impact of speeds and the risk of consequences. This system has been verified using innovative CAE methods and practical tests. Thus finally here we are discussing about how the benefit of such real time systems can be judged from real time safety perspective using traffic.

II. LITERATURE SURVEY

Vehicle control system implementation using CAN protocol discussed in [1] emphasizes the development and implementation of a digital driving system for a Semi-autonomous vehicle to improve the driver-vehicle interface. It uses an ARM based data acquisition system that uses ADC to bring all control data from analog to digital format and visualize that through LCD. The communication module used here is an embedded networking by CAN which has efficient data transfer. It also takes feedback of vehicle conditions like vehicle speed, engine temperature etc. The development of such a control framework for the vehicle which is called the digital-driving behavior consists of a joint mechanism between the driver and vehicle for perception.

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decision making and control. In [2] CAN have been used as a device which can enhance the utility, performance, speed & security of a system. Two CAN nodes are connected by 2 Mbps CAN bus. Temperature & voltage sensor at one node called as NODE A is connected to CAN through Microcontroller A. The other node called NODE B is connected to Microcontroller B through CAN controller. In Microcontroller B an IR sensor & machine control is attached to exchange the automatic of automobiles. When the sensor at NODE A senses the change in temperature it captures the information and passes it to CAN connected at NODE A. CAN transfers this data to NODE B of CAN and then the NODE B microcontroller displays it on LCD. Similarly the IR sensor is used to sense the light and increase or decrease the speed of motor based on intensity of light. Furthermore, there is another feature that clearly distinguishes in [3] CAN protocol differs from other protocols with respect to time-triggered communication.CAN reduces communication overhead and supports a high efficiency and flexibility in the time-triggered traffic.

III. PROPOSED METHOD

In this application we are designing two sections. The first one runs with ARM as the Master node and the other as the normal ARM data acquisition node for which all the required sensors are connected. The communication between the two nodes is accomplished with high speed CAN communication. The sensors used here are temperature, speed and Alcohol sensors. The master node will collect all the information from these sensors through CAN network and stores them in three sessions. For the results respective switches are provided for the sessions at the master node. These results can be monitored on the display provided.

![Fig1: Block Diagram](image-url)

IV. SYSTEM HARDWARE

**LPC2148 Processor:**

LPC2148 Microcontroller Architecture.The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers the high speed performance and very low power consumption. The architecture is based on the principles as RISC (Reduced Instruction Set Computer) Principles, Instruction set and decode mechanism are simpler than those of CISC (Complex Instruction Set Computers). This results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. The pipeline techniques are used so that all the parts of memory and processing systems can be operated continuously. Also while one is executed, its successor instruction is decoded and the third instruction is fetched from memory. The ARM7TDMI-S processor is having a unique architecture known as Thumb, which makes it suit ideally to high volume applications with code density as an issue or with memory restrictions. The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:
• The standard 32-bit ARM set.
• A 16-bit Thumb set.

**Temperature sensor:**

The LM35 pin diagram is shown in the figure 2. The temperature sensor will read the temperature of the surrounding environment and relay temperature back to us in degree Celsius. The LM35 is a low power and low voltage IC which uses approximately +5VDC. This is ideal because the Adriano’s power pin gives out 5V of power. The IC has 3 pins in which 2 are for the power supply and the other for analog output. The output pin provides an analog voltage output that is linearly proportional to the Celsius (centigrade) temperature. Pin 2 gives an output of 1 millivolt per 0.1°C (10mV per degree). So to get the degree value in Celsius, all that must be done is to take the voltage output and divide it by 10 - this give out the value degrees in Celsius.

![Fig2. Temperature sensor LM35](image)

**Gas sensor:**

Gas sensor is one of the ideal sensors which are used for the detection of the presence of the dangerous LPG leak in the car or in a service station or in a storage tank environment. This sensor can be incorporated easily into an alarm unit to sound an alarm or give a visual indication of the LPG concentration. The sensor has a quick response time and has excellent sensitivity. This sensor can also sense propane, iso-butane, LNG and cigarette smoke.

![Fig3: Gas sensor](image)

**LCD display**

Liquid crystal displays (LCDs) have materials with the properties of both liquids and crystals combine. Rather than having a temperature vary at intervals that the molecules are virtually as mobile as they’d be in an exceedingly liquid, however are reclassified along in a degree ordered type just like a crystal.

**Wired communication:**

**CAN Overview:**

CAN development have been begun when more electronic devices are implemented into modern vehicles. Examples for such devices are engine management systems, active suspension, ABS, gear control, lighting control, air conditioning, airbags and central locking. These entire devices mean more safety and more comfort for the drivers and also help in reduction of fuel consumption and exhaust emissions. To improve the vehicle behavior even further, it is necessary for different control systems (and their sensors) to exchange information. This is usually done by the discrete interconnection of different systems (i.e. point to point wiring). The requirement for the exchange of information has been grown to such an extent that several miles and cable networks and many connectors were required. This has raised the problems like...
material cost, production time and reliability. The major solution for this problem is the connection of the control systems via a serial bus system. This bus had to fulfill some special requirements due to its usage in a vehicle. With the help of the CAN, point-to-point wiring has been replaced with one serial bus connecting all control systems. This is accomplished by adding some CAN-specific hardware to each control unit that provides the "rules" or the protocol for transmitting and receiving information via the bus.

V. CONCLUSION

The CAN bus is used as a communication of a distributed control network. This paper mainly introduces the design of the hardware and the software in detail. This device track speed, Engine speed and Alcohol consumption status. With its unique Dashboard Reporting Tools, Owners not only know answers to where, when, and how fast, but importantly they now have insights as to “how” their driver is driving. Driving behaviors such as excessive braking, quick acceleration, and how those can change between the daytime and nighttime are just some of the key areas analyzed. Dashboard Report provides a quick and easy to understand summary of behavior of each session.

VI. REFERENCES


Time is the most valuable thing a man can spend.

~ Laertius Diogenes