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VEHICLE CONTROL SYSTEM USING CAN PROTOCOL

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Abstract—This paper is an attempt to analyze Vehicle Control System Implementation Using CAN Protocol. In this paper we have given an effective way by which we can increase the car safety. This paper presents the development and implementation of a digital driving system. The ARM based data acquisition system that uses ADC to bring all control data from analog to digital format. The communication module used in this paper is embedded networking by CAN which has efficient data transfer. The CAN Protocol it was necessary for the different control systems (and their sensors) to exchange information. This was usually done by discrete interconnection of the different systems (i.e. point to point wiring). The requirement for information exchange has then grown to such an extent that a cable network with a length of up to several miles and many connectors was required. The benefits of CAN is effectively implemented in vehicle it is used for achieving automation, over other tradition schemes it will offer increase flexibility and expandability for future technology. Generally a vehicle was built with an analog driver-vehicle interface for indicating various vehicle statuses like speed, fuel level, Engine temperature etc. The CAN is provide a high speed and the capacity is high it is capable for handling a large number of parameter with more efficiently .The parameters like temperature (Pt100 sensor) if the temperature increase above the 60^0 c the automatically cooling system apply due to this temperature is not exceed, speed measure using RPM sensor if revolution increase up to 70 per minute controller act and to avoid the maximum revolution and to check the fuel level continuously and display in the percentage if fuel level below 20 percent the controller gives buzzer to the driver and fuel level and temperature continuously display on the LCD.

Keywords—*ECU (Engine Control Unit), CAN (Controller Area Network), LCD (LIQUID CRYSTAL DISPLAY), RPM (Revolution per minute), LPC (Low Power Consumption), ARM (Advanced Risc Machine),Pt (Platinum Resistance Temperature).*

INTRODUCTION

The driving is make easier and safety and reduce the human efforts .To make travelling is easy and safe. We see every day thousands of road accidents in this accidents as many as thousands of peoples injured in a world's More than hundreds of people die and many people are disabled for live life normally this is a result of lack of speed control and violating the road rules. The highlighted interaction of several factors like lack of experience of drivers,low awareness of measures, narrow, broken rules ,excessive speed of vehicle ,ignore the temperature of engine. Although vehicles have provisions warning and alert the driver using buzzer this for taking right decision or controlling the vehicle autonomously, they usually must make these decisions in real time with only complete information. This is Important that human drivers control over the vehicle and check the parameters in vehicle on screen at the same time of driving, parameters like temperature, fuel.

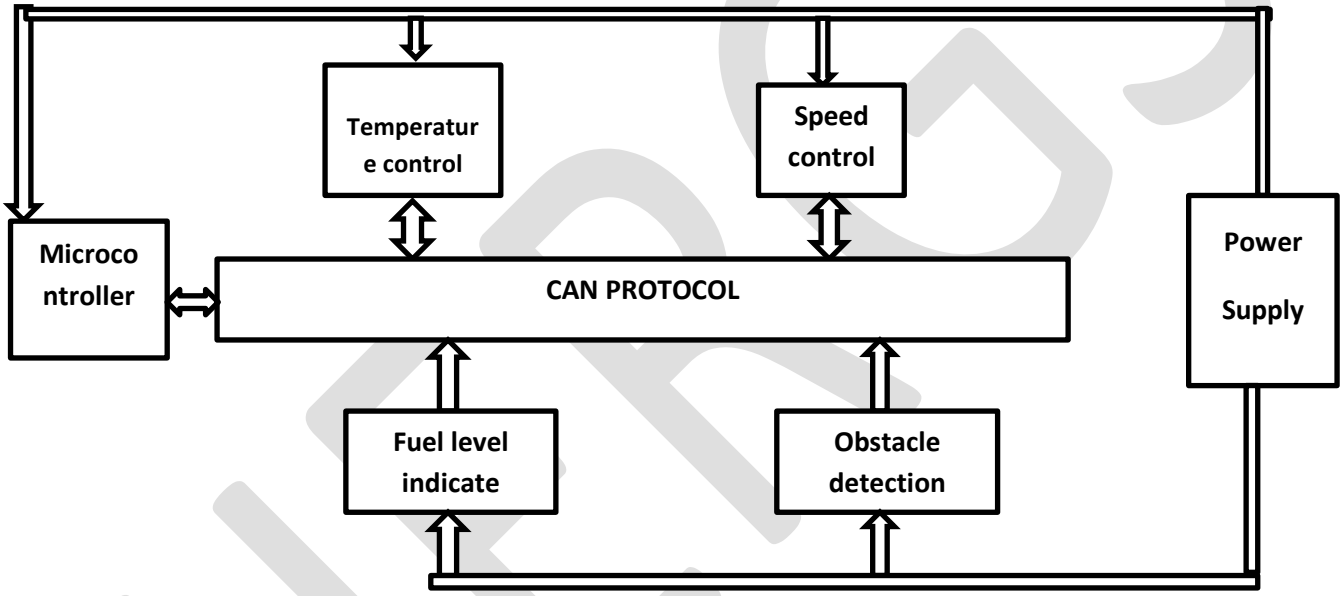
This paper discusses the development of such a control framework for the vehicle which is called the digital-driving behaviour, which consists of a joint mechanism between the driver and vehicle for perception, decision making and control. CAN protocol (bus) are used for data transmission, it is Application domain is from high speed network to low cost multiplex wiring because of its special capabilities. The transmission rate of CAN bus up to 1 mbps. A vehicle was generally built with an analog driver vehicle interface for indicating various parameters of vehicle status like temperature, obstacle, and fuel level indication digitally and speed etc. for improving the driver vehicle interface interactive digital system is designed. For implementation of this digital circuitry we use need a different component the main part for controlling all parameters to check working for this purpose use a processor for the sensing purpose use a temperature sensor ,speed sensor fuel level sensor obstacle detection sensor and power supply this are main parts . Ultrasonic sensor is adapted to measure the distance with respect to the previous car. For rear-end end collision avoidance Subsystem, the currently available ultrasonic sensors for vehicles are adopted for approaching cars with relatively low speed. While the rough reading of distance data cannot be applied directly, an intelligent approach is proposed to process the raw distance readout of sensors to produce appropriate warning signals, temperature sensor continuously measure the temperature of engine if temperature is exceed up to critical level automatically cooling system is applied, fuel level sensor measure the fuel level and display on lcd fuel below critical level alert the driver using buzzer.

REMAINING CONTENTS

HARDWARE STRUCTURE-

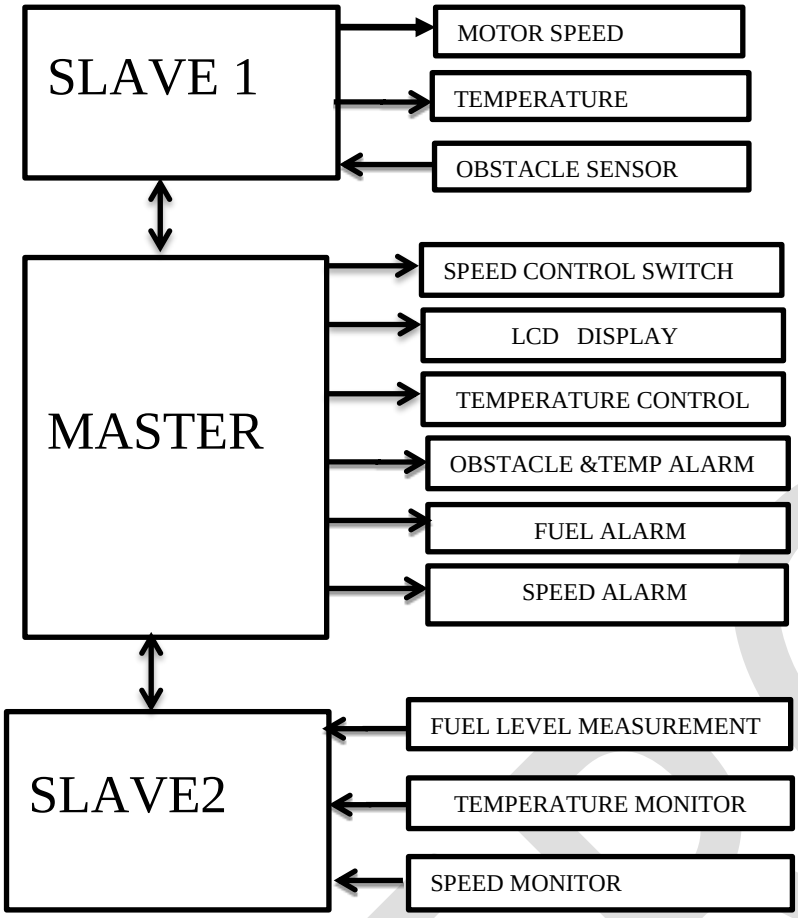
The hardware structure mainly integrates the CAN bus controller, ARM LPC1768 as the main control module, Speed sensor, temperature sensor, ultrasonic sensor(obstacle detecting sensor),level sensor, LCD display to provide Digital interface and other accessories .Block diagram of CAN vehicle control system. It consists of one master node and two slave nodes .ARM as the master controller (Engine Control Module) which controls the vehicle status with various sensors. Two PIC ICs are used as slave nodes to receive the inputs of vehicle status. The communication between these sensors is done by using CAN controller. Slave controller receives the signals from vehicles like speed, temperature, fuel level, and ultrasonic obstacles detector etc., send to master controller with high speed rate. Master controls the status of vehicle and sends the feedback to operator panel by providing digital information's via LCD display and alarms. Here Operator interface is digital type. By this operator can easily see the signals and able to control the vehicle. Ultrasonic obstacle sensor helps in identifying the obstacles presence around the vehicle.

Fig –General Block Diagram of System



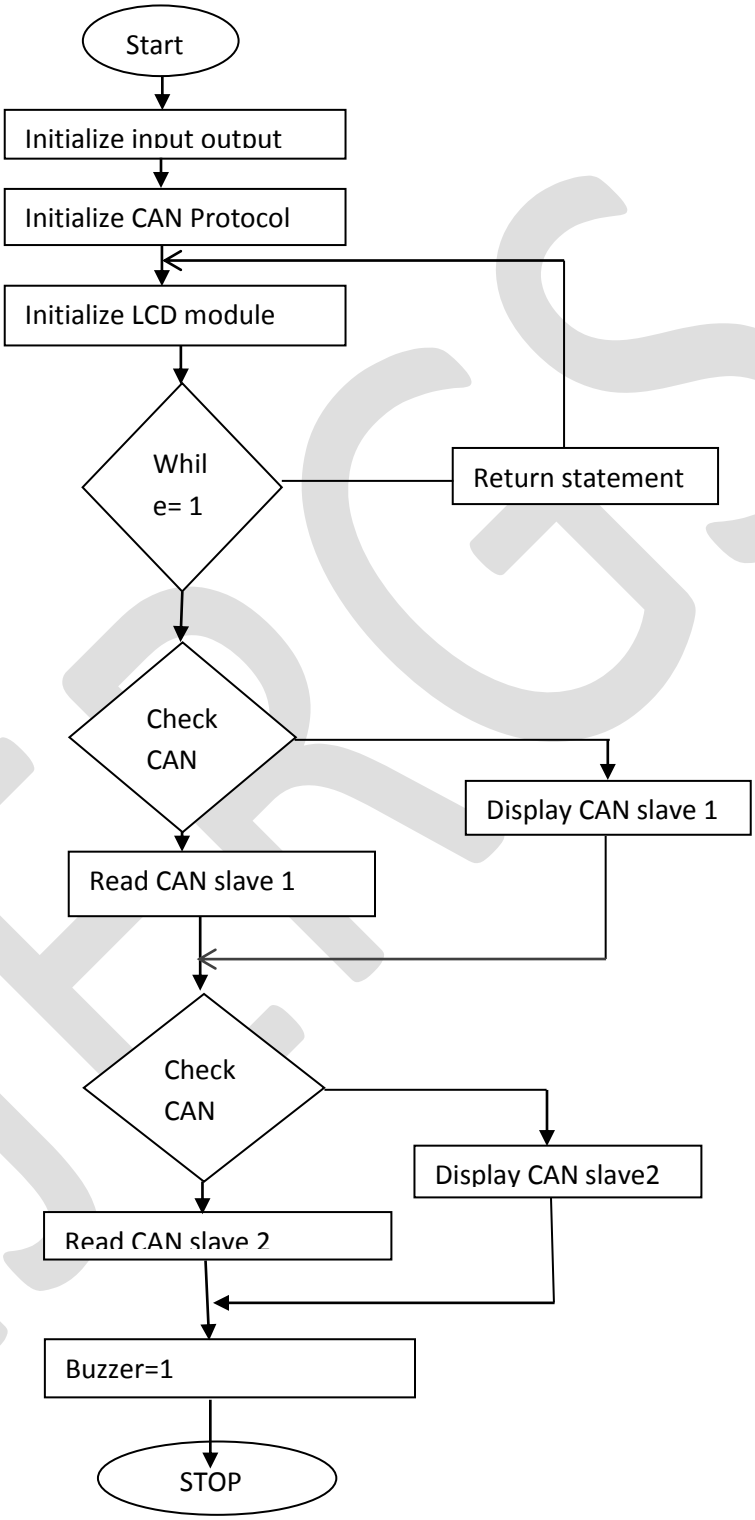
In this block diagram there are four parameters such as Temperature sensor, Speed sensor, Fuel level indicator and Obstacle sensor These sensors are interface with the microcontroller and Data transfer through the CAN bus. Power supply gives to the microcontroller and every sensor as per the requirement. These sensors continuously sense the information and send the information to the microcontroller. If hazardous condition is occurred then microcontroller controls it automatically.

BLOCK DIAGRAM OF PROPOSED SYSTEM-



SOFTWARE STRUCTURE

The vehicle control system is programmed using the Embedded C. Software of the system has two parts, one is the program working with control module and other one is the Monitoring



And logging ofand running on the pc. After power on The Master & Node1's ports have been initialized, LCD initialized in command data mode. After this CAN control built in functions i.e. CAN init() etc. being initialized, Now read the sensor port process this data and out put it on the LCD screen of the Node1 read the slave node 1 data and control the parameter this is found then display on the LCD and gives information to the driver ,and transfer this data to master through CAN bus using CAN bus protocol after transfer of

the Message, Master identify the node ID and if this message is valid then it will be displayed on the LCD screen of the Master. If invalid it will check next message.

WORKING MODEL CIRCUITS-

1. TRANSMITTING SECTION-

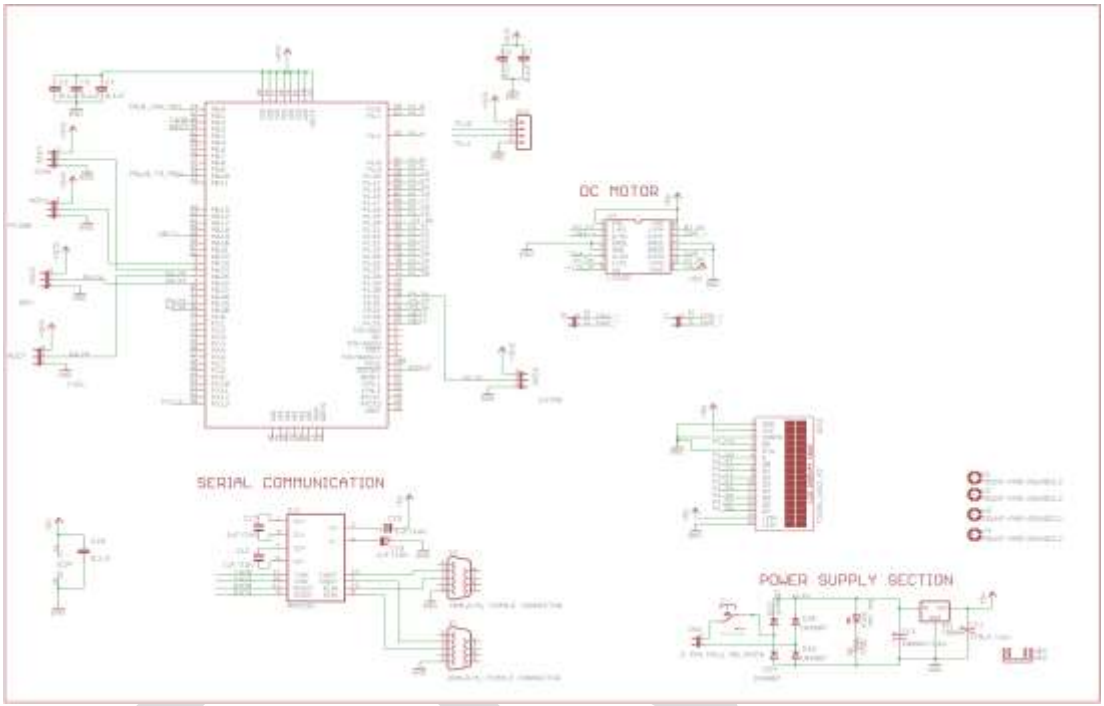


Fig -Transmitter section

In the transmission section there is microcontroller, sensors, power supply section, serial communication circuit and DC motor is used. Sensors continuously sense the information and send to the microcontroller.

Receiver Section-

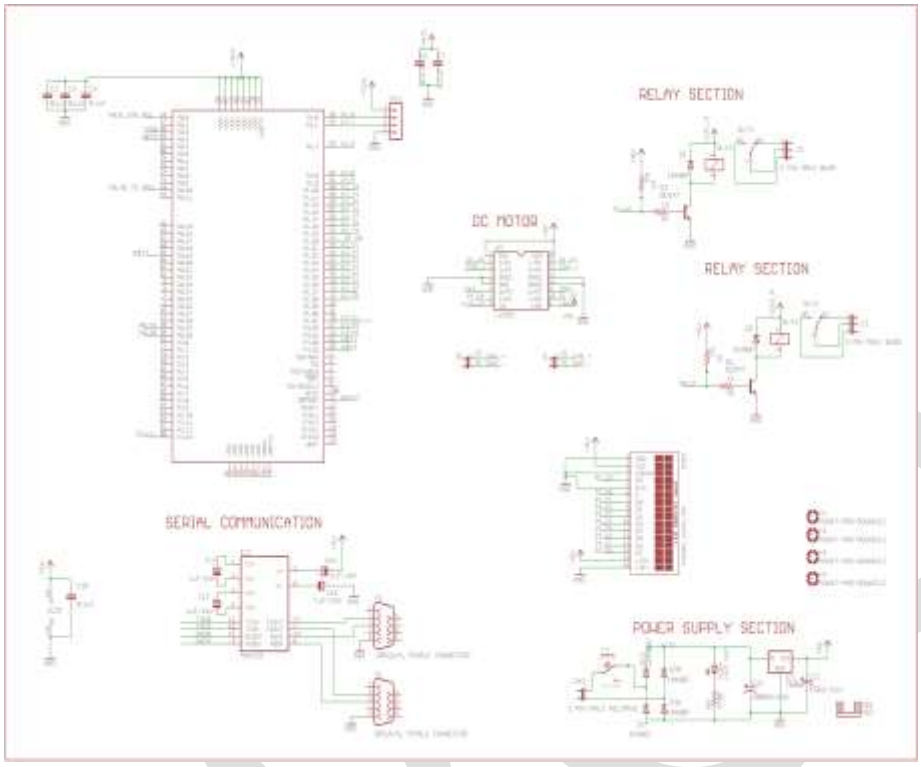
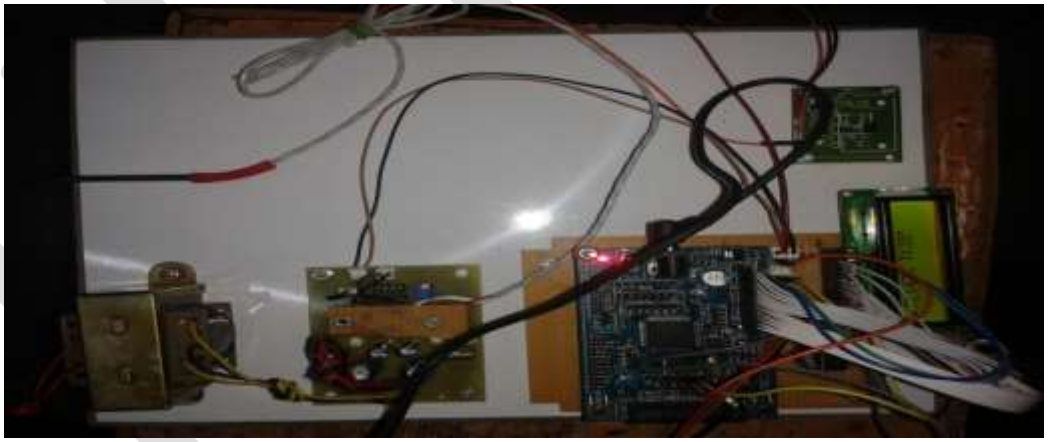


Fig-Receiver section

In the receiver section there is microcontroller, sensors, power supply section, two relays, serial communication circuit and DC motor is used. If hazardous condition is occurred then microcontroller gives specific commands and control it.



RESULTS-

Fig. Result of fuel level and temperature sensor in percentage indicated on LCD

CONCLUSION-

The main goal of this paper is to show development of car system. Parameters of car like Fuel level indication, Temperature of engine and speed of car are displayed on LCD digitally and also controlled. The proposed high-speed CAN bus system solves the problem of automotive system applications.

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