ISSN 2395-1621

Vehicle Control System Implementation Using CAN protocol

[#1]Dr. S. L. Lahudkar, [#2]Nitin V. Jadhav., [#3]Hanmant D. Chat., [#4]Sainath S. Mahajan.

[2]nitin.jadhav4413@gmail.com
[3]hanmantchat@gmail.com

[#1]Prof. Department of Electronics and Telecommunication, JSPM's Imperial College of Engineering & Research, Wagholi.

[#234]Department of Electronics and Telecommunication, JSPM's Imperial College of Engineering & Research, Wagholi.

ABSTRACT

Present Automobiles are being developed by more of electrical parts for efficient operation. Generally a vehicle was built with an analog driver-vehicle interface for indicating various vehicle status like speed, fuel level, Engine temperature etc., This paper presents 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 through LCD. The communication module used in this project is embedded networking by CAN which has efficient data transfer. It also takes feedback of vehicle conditions like Vehicle speed, Engine temperature etc., and controlled by main controller. Additionally this unit equipped with GSM which communicates to the owner during emergency situations.

ARTICLE INFO

Article History

Received :6th March 2016

Received in revised form :

9th March 2016

Accepted : 13th March 2016

Published online :

16th March 2016

Keywords : **GSM, CAN, ARM, Display node, Sensor node.**

I. INTRODUCTION

Present Automobiles are being developed by more of electrical parts for efficient operation. Generally a vehicle was built with an analog driver-vehicle interface for indicating various vehicle status like speed, fuel level, Engine temperature etc., This project presents the development and implementation of a digital driving system for a semi-autonomous vehicle to improve the driver-vehicle interface. It uses ADC to bring all control data from analog to digital format and visualize through LCD. The communication module used in this project is embedded networking by CAN which has efficient data transfer. Additionally this unit equipped with GSM which communicates to the owner during emergency situations.

With rapidly changing computer and information technology and much of the technology finding way into vehicles. They are undergoing dramatic changes in their capabilities and how they interact with the drivers. Although some vehicles have provisions for deciding to either generate warnings for the human driver or controlling the vehicle autonomously, they usually must make these decisions in real time with only incomplete information. So, it is important that human drivers still have some control over the vehicle. Advanced in-vehicle information systems provide vehicles with different types and levels of intelligence to assist the driver. The introduction into the vehicle design has allowed an almost symbiotic relationship between the driver and vehicle by providing a sophisticated &intelligent driver-vehicle interface through an intelligent information network. This paper discusses the development of such a control framework for the vehicle which is called the digital-driving behavior, which consists of a joint mechanism between the driver and vehicle for perception, decision making and control.

Problem Statement

To design a real time system for automobile to monitor vehicle parameters and indicate the same on dashboard (In our case LCD).Normally most of the protocols are Master-slave. So time delay is there in transmission and reception. Also vehicle has GPS, GSM/GPRS facilities, so of course RF noise. Vehicle motors can causes EMI noises also. So conventional protocols will not work fine in such environment.

Solution

With considering such noise problems in conventional protocols we are going to use CAN protocol in our system which have-

1) Greater noise immunity

2) Multi-master node communication

II. LITERATURE SURVEY

On Since the early 1940's, automakers and industries have continuously improved their industrial technologies by integrating an increasing amount of electronic components. As technology progressed, the machines became more complex and fast as electronic components replaced mechanical systems and provided additional comforts, convenience, and safety features. Up until the release of CAN Bus, machines contained enormous amounts of wiring which was necessary to interconnect all of the various electronic components.
CAN Protocol was designed specifically for automotive applications but is now also used in other industrial areas. The main reason for Bosch to come up with CAN is to reduce the harness in various machines. Before CAN bus all the controllers and sensors were connected peer to peer. Also CAN is known for its faster communication so used for emergency applications. Controller-area network (CAN or CAN-bus) is a computer network protocol and bus standard designed to allow microcontrollers and devices to communicate with each other without a host computer. CAN is a serial communication protocol. The CAN bus may be used to connect engine control unit and transmission, or different distant units of an industrial plant.

III. PROPOSED SYSTEM

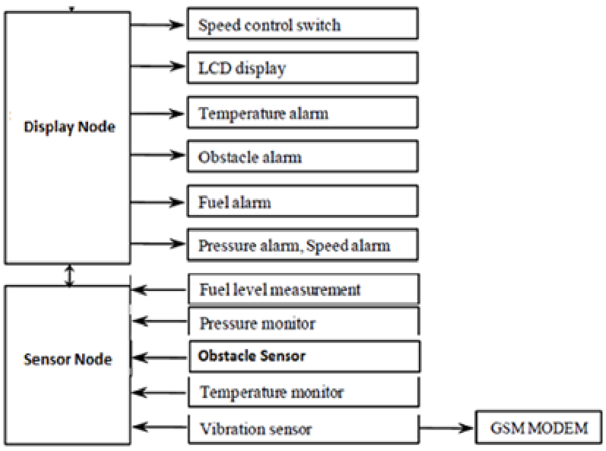

Fig 1. Block Diagram

Description:-
In this project there would be two sections. One slave part and one master part. The one of slave would be connected to sensors. The master part contains the LCD which will display and control peripherals. When the sensor values violets set value, vehicle will react accordingly. The master and slave communication would be through CAN two wire communication.

TRANS-RECEIVER (MCP2551):

- It acts as an interface between CAN BUS and CAN NODE.
- It converts voltage levels: From TTL to CAN compatible (-13v to 13v).
- Suitable for 12V and 24V systems.
- High Noise Immunity due to differential voltage levels.

NODE 1:

- Contains PIC18F458: Main Microcontroller
- Contains Inbuilt CAN module.
- Contains LCD display 16X2
- Speed control will be done by potentiometer which will interface to 10 bit built in ADC.
- Alarms and respective signals will be connected to this master node.

NODE 2:

- Contains PIC18F458: Main Microcontroller
- Contains Inbuilt CAN module.
- Has 8 channels 10 bit ADC.
- Temp Sensor: LM35
- Pressure Sensor: Flexy Force Sensor
- Obstacle Sensor: IR sensor
- Vibration Sensor: ADXL 335
- LCD Display: 16X2

IV. CIRCUIT DIAGRAM

Regulated Power Supply

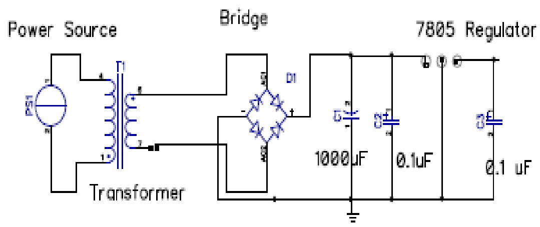

Fig. 2 Circuit Diagram for Regulated Power Supply

Circuit Diagram for System (Display Node)

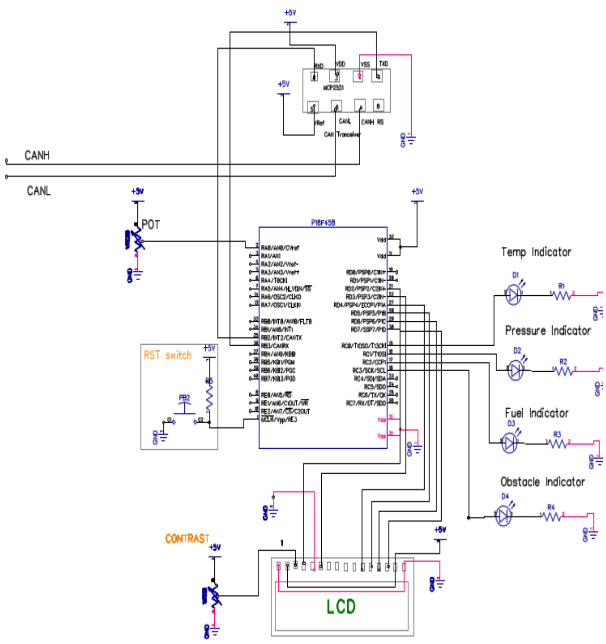

Fig. 3 Circuit Diagram for System (Display Node)

Circuit Diagram For System (Sensor Node)

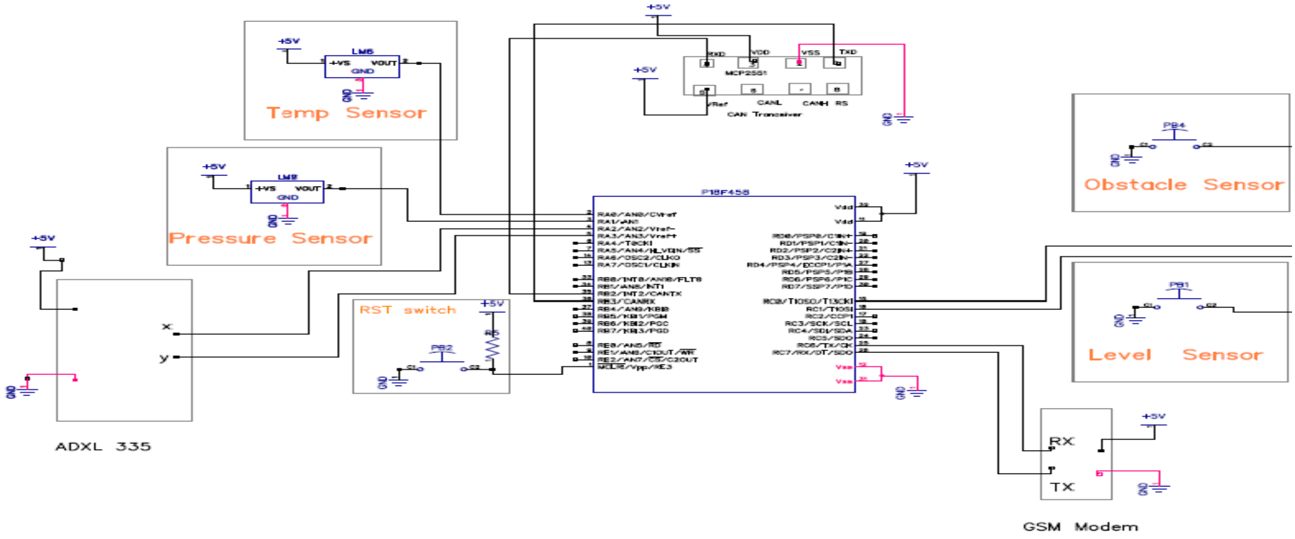

Fig. 4 Circuit Diagram for System (Sensor Node)

V. CONCLUSION

In this project, up till we have designed the regulated power supply. We tested the power supply output using the multimeter. First we connect the positive point of multi-meter to the o/p leg of regulator-7805 and connect the negative point to the head. The multi-meter shows a reading of 4.99V.Then the negative point of multi-meter is connected to the top of regulator-7805.Also we design the PIC controller on the DIPTRACE S/W and the traces trace on the PCB. In this way, we designed the power supply and also compared and tested theoretical and practical values.

REFERENCES

[1] Kumar, M. A.Verma, and A. Srividya, Response-Time "Modeling of Controller Area Network (CAN). Distributed Computing and Networking,Lecture Notes in Computer Science Volume 5408, p 163-174, 2009.

[2] Tindell, K., A. Burns, and A.J. Wellings, Calculating controller area network (CAN) message response times. Control Engineering Practice, 3(8): p. 1163-1169, 2005.

[3] Li, M., Design of Embedded Remote Temperature Monitoring System based on Advanced RISC Machine. Electrotechnics Electric, 06, p. 273, 2009.

[4] Prodanov, W., M. Valle, and R. Buzas, A controller area network bus transceiver behavioral model for network design and simulation. IEEE Transactions on Industrial Electronics, 56(9): p. 3762-377, 2009.

[5] ISO (1993). Road Vehicles: Interchange of Digital Information: Controller Area Network(CAN) for High Speed Communication. ISO11898:1993.

[6] B.Gmbh, "CAN specification" vol 1 Version 2.0, 1991.

[7] Pazul, "Controller Area Network (CAN) Basics", Microchip technology Inc., AN713, May 1999.

[8] Wilfried Voss, A comprehensive guide to controller area network, Copperhill Media Corporation, 2005-2008.

[9] Benjamin C Kuo, M. Farid Golnaraghi, Automatic Control systems, Eight edition, John wiley & sons., Inc 2003.

