ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

CAN Based Vehicle Condition Monitoring And Auto Detection of Speed Zones Using RF Technology

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ABSTRACT:

The main purposes of Present Automobiles are being developed by more of electrical parts for efficient operation. Generally a vehicle was built with an analogue driver-vehicle interface for indicating various vehicle statuses like authentication key, fuel level, line detector, tire pressure and 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 a PIC based data acquisition system that uses ADC to bring all control data from analogue to digital format and transmit data through Controller Area Network (CAN BUS) and visualize driver through LCD.

Internal systems: ***PIC18F458 microcontroller, CAN bus, LCD display, controlling sensors, RFID module.***

Introduction

Rapid advances in physical science, control, communication, and computing technologies have resulted in complicated network-embedded automotive systems. Today's automotive vehicles contain over seventy distributed electronic management units (ECUs), 100's of MegaBytes of software package, five or a lot of distinct communication networks, a good kind of sensors and actuators, and 1000's of information and management signals changed in time period each second. ECUs in fashionable vehicles perform a range of cyber-physical functions, for instance, stability management, remote observance (e.g., via OnStar), energy-efficient propulsion, adaptative control, by-wire steering and braking, keyless entry with button begin, blind zone detection, lane departure warning, and autonomous driving. some 80-90% of those inconsistencies square measure massive within the presence of malfunctions and little within the presence of traditional disturbances, noise and modeling errors. 2 main ways of generating the consistency checks square measure supported observers (e.g., Kalman filters, reduced-order unknown input observers, interacting multiple models, particle filters) and parity relations (dynamic consistency checks among measured variables stemming from hardware or info redundancy relations). A knowledge-driven approachis most well-liked once the system observance data for nominal and degraded conditions is on the market. Neural network and applied math classification ways square measure illustrative of information driven techniques. The knowledge-based approach uses graphical models like dependency graphs (digraphs), Petrinets, multi-signal (multi-functional) flow graphs, and Bayesian networks for diagnostic data illustration and logical thinking.

RELATED WORKS

A .Existing System

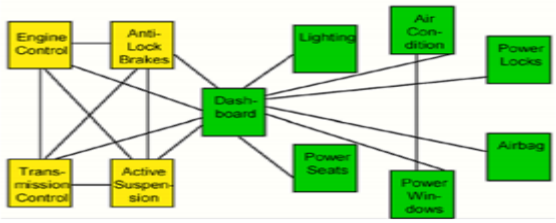

Fig.1 Block Diagram of Existing System (Without CAN)

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To improve the working of vehicle further, it is necessary to control overall system to exchange information. In existing system this is done using discrete interconnections of different systems means by using point to point wiring. For information exchange up to several miles length of cable network becomes very large and it increases connectors. This produces growing problems along with material cost, production time.

B. Need of CAN

- CAN is mature standard
- CAN protocol more than 16 years
- Numerous CAN products and tools on the object
- Hardware implementation of the protocol
- CAN Bus used for the combination of error handling
- And fault confinement with high transmission speed (up to 1Mbps) Simple transmission medium
- Twisted pair of is the standard, but also just one wire
- Will work other links works, too: Opto – or radio links
- Excellent error handling
- Fault confinement
- High speed, real time communication
- Provide noise immunity in an electrically noisy environment

PROPOSED SYSTEM

The solution to this problem was the connection of the control system via a serial bus system. This bus had to fulfill some special requirements due to its usage in vehicle. With a use of CAN, point to point wiring is replaced by one serial bus connecting all control systems. This is accomplish 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.

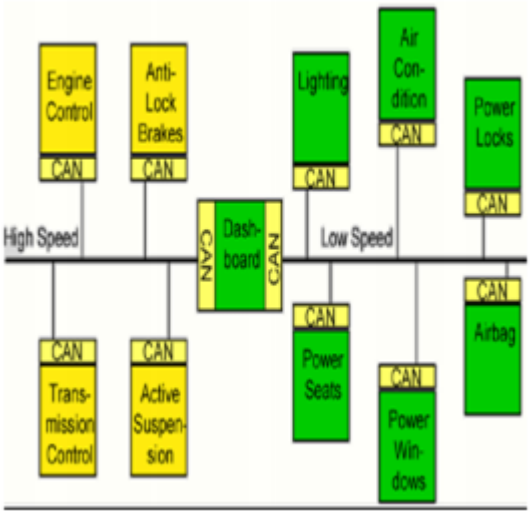
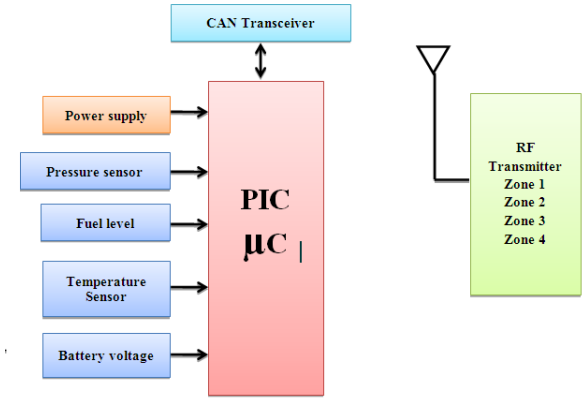


Figure 3.1 General diagram of implementation of CAN Protocol

The block representation of the proposed system is divided into two nodes:
(a)SLAVE (Sensor) Node, (b) MASTER Node

(A)Slave (Sensor) node:



In the proposed system the slave node consists of different sensors like Temperature, fuel level, pressure and battery voltage measurement circuit. here the PIC microcontroller reads the sensor details and then convert it into CAN Protocol and fed to the CAN transceiver which will boost up and transmit into the CAN BUS.

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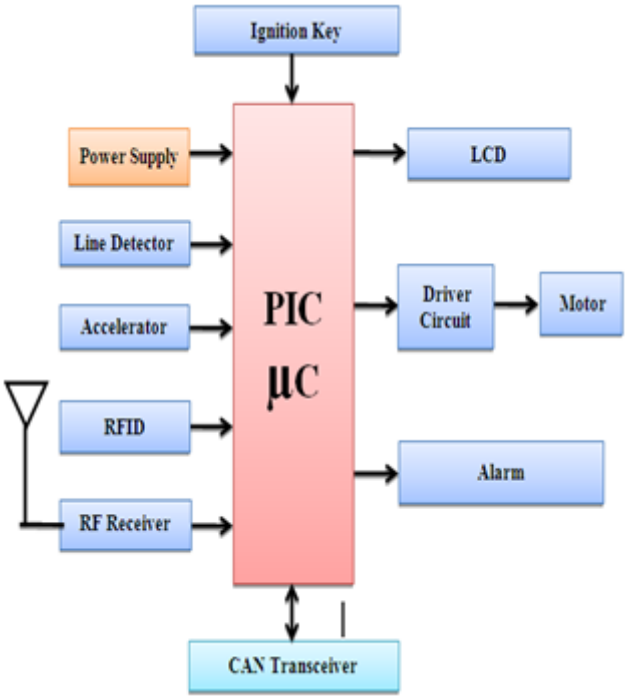
LM35 (Temperature sensor)

The LM35 series square measure exactitude integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 therefore has a plus over linear temperature sensors tag in ˚ Kelvin, because the user isn't needed to cipher an outsized constant voltage from its out place to get convenient Centigrade scaling.

CAN BUS:

CAN bus (for controller area network) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer. CAN bus is a message-based protocol, designed specifically for automotive applications but now also used in other areas such as aerospace, industrial automation and medical equipment.

(B)Master node:



The Master node consists of different vehicle access and monitoring sensors along with PIC microcontroller. Here the PIC microcontroller reads the ignition Key and then RFID tag if both are matches then only it will allow to switch on the ignition and then it will read the monitoring sensor information through sensors as well as from the CAN BUS like temperature, fuel level, pressure, Line detector, Accelerator, and RF to know the road conditions and important zones along the road. And then the microcontroller converts the sensor data into Controller Area Network protocol and fed to the CAN transceiver which will transmit the data to Master node through CAN BUS.

LINE Detector:

Here we are using Infrared sensor as a Line detector. The infrared sensor is operated as a reflection sensor, which is placed in the bottom of the vehicle. It will sense the line crossing of the vehicle and intimate to microcontroller.

RFID:

Radio frequency Identification technology is basically used for authentication. Here we are usinf RFID technology for driver authentication to start the ignition of the vehicle.

RF:

In the proposed system RF technology is used to know the road conditions wirelessly (avoiding physical sign boards). In this concept we place the RF transmitter along the road. And RF receiver section placed inside the vehicle.

RESULT

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. The screenshots of the developed system has been presented in Figure bellow.

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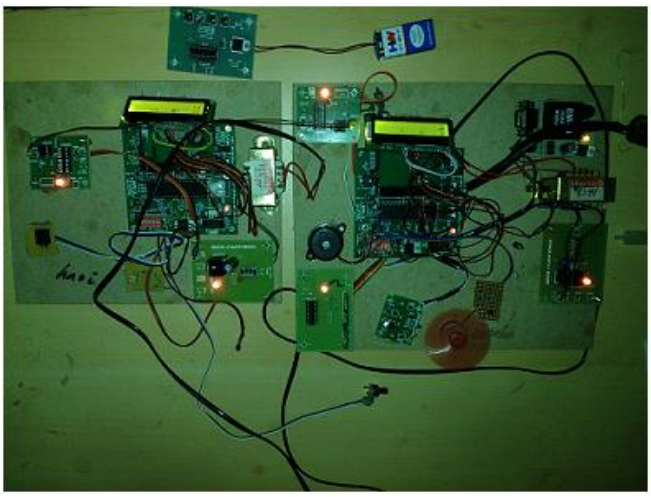
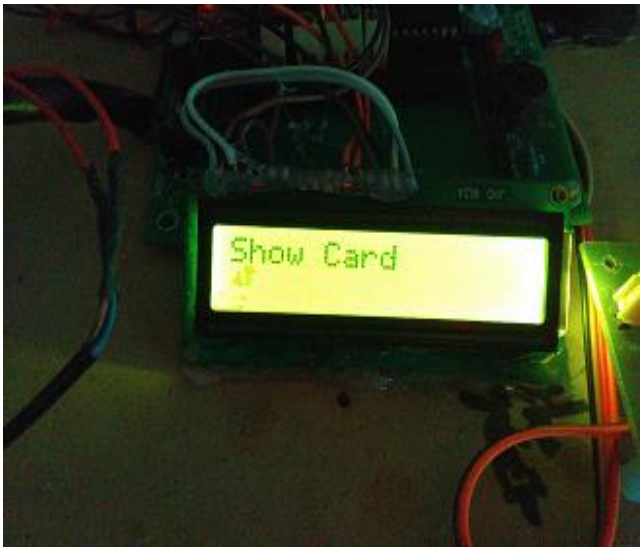


(a)Slave and master communication using can proptocol



(b)Requesting for RFID authentication

(c) Monitoring sensor values

CONCLUSION

This project introduces an embedded system with a combination of CAN bus systems. Digital control of the vehicle is an important criterion of modern technology. With the rapid development of embedded technology, high performance embedded processor is penetrated into the automotive industry, which is low cost, high reliability and other features to meet the needs of the modern automobile industry. The proposed high-speed CAN bus system solves the problem of automotive system applications, also has a certain practical value and significance. With PIC as the main controller and it makes full use of the high-performance of PIC18f458, high-speed reduction of CAN bus communication control networks and instrument control. so ,as to achieve full sharing of data between nodes and enhance their collaborative work. This system features efficient data transfer among different nodes in the practical applications. And it introduced the RFID authentication and tire pressure sensors. This proposed system provides the intelligent road condition alert system using RF module.

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