CAN APPLICATION AS TO PROVIDE SECURITY FOR THE EMPLOYEE TRAVELLING IN CAB

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***Abstract*— There are various ways of implementation of PIC processor with CAN protocol . In the Proposed work PIC processor is decided to incorporate with Controller Area Network (CAN).The work of various researcher has been studied for deciding methodology of optimized PIC. Further PIC designed with CAN has been configured for employee's safety travelling late night. This has been done taking into consideration various parameters**

***Keywords*— PIC design, CAN Protocol, methodology for CAN implementation.**

I. INTRODUCTION

Controller Area Network (CAN) is a serial communication protocol which efficiently supports distributed real time control with very high level of security. Its domain of application ranges from high speed networks to low cost multiplex wiring. In automotive electronics, engine control units, sensors, anti-skid systems, etc are connected using CAN with bitrates upto 1Mbps .At the same time it is cost effective to built into vehicle body electronics ,e.g. lamp clusters electric windows etc to replace the wiring harness by using CAN. The intension of this specification is to achieve compatibility between any two CAN implementations. Compatibilty, however, it has different aspects regarding e.g. electrical features and the interpretation of data to be transferred. CAN is basically designed for industrial networking but now a days it finds wide use in automation, mobile machines, military and other harsh environment monitoring applications. In todays world employee security has become a major concern. Especially Employee's that are working in call centers who have to do night shifts and return home at late night hours. For such employees their safety is a major worry for all company's. We read many attacks on such call center cabs in recent times, morever there is no efficient way to inform the company or the police so that any immediate action can be taken.

To resolve above mentioned problem we have come with the ssolution of RF and GPS based employee tracking and Security.

Here we are tracking the employee cab as well as the employee's. Also we have an arrangement for emergency button so whenever any employee finds him/her self in any kind of trouble an SMS can be sent to the nearest police station and the company so that iiimmediate action can be taken by the concerned authorities.

A vehicle contains a network of electronic devices to share information/data with each other. For example A spark ignition engine requires a spark to initiate the combustion chamber at the correct time so it communicates with engine control unit that adjusts the exact timing for ignition to provide better power and fuel efficiency. Another example is of a transmission control unit that changes the ratio of gear automatically with the changing speed. It uses information from engine control unit and various sensors in the system. Every electronic device has an ECU/MCU (electronic microcontroller control unit) with its own set of rules to share/transfer information. For two or more devices to interact they should have the necessary hardware and software which allows them to communicate with each other. Before

CAN was introduced in the automobiles, each electronic device was connected to other device using the wires (point to point wiring) which worked fine, when the functions in the system were limited. One of the major problems for automotive engineers was linking the ECUs of the different devices so that real time information can be exchanged. CAN protocol was designed to address this problem. It laid down the rules through which the various electronic devices can exchange information with each other over a common serial bus. This in turn reduced the wiring connections to a great extend thereby reducing the bulkiness and complexity of the system. The image below shows how the different devices are connected using the CAN protocol.

II. RELATED WORK

The PIC is chosen because of the low pin count and powerful feature set, which includes an internal oscillator, on-board, multi-channel, 8-bit analog-to-digital converter (ADC), multiple interrupt sources and low power sleep mode.

The second is for the CAN interface comprised of the MCP2510 CAN controller and the MCP2551 transceiver. The MCP2510 provides a full CAN 2.0 implementation with message filtering, which relieves the host microcontroller from having to perform any CAN bus related overhead. It also provides a buffer between the CAN controller and the high-voltage spikes that can be generated on the CAN bus(Figure3) by outside sources. The main features are it supports 1 Mb/s operation. It is suitable for 12V and 24V systems. It is a low current standby operation. There is protection against damage due to short circuit conditions (positive or negative battery voltage). Also there is protection against high-voltage transients. Up to 112 nodes can be connected.

Thus this system will definitely work for implementing various application of CAN with PIC processor and gives more reliable results.

TABLE I: METHODOLOGIES USED BY PREVIOUS RESEARCHERS

Sr.	Work done by various researchers		
	Presi. T. P.	**Fan Chao, Zhang De-xian,Fu**	**Mohanraj .M. ,Dr. Rani Thottungai.**
1	Design and developme nt of PIC microcontr oller based vehicle monitoring system using CAN Protocol.	Design of the measurement node of the grain quantity monitoring system based on the CAN Bus.	A CAN Bus based system for monitoring and fault diagnosis in wind turbine
2	Approache s:-i) It offers an efficient communic ation protocol between sensors, actuators, controller and other nodes in real time.	i) To realize the data transmitting reliability & real time, the design proposal of CAN bus by using AT89C51&S JA1000	i) Electrical energy can be produced using fossil fuels & also by natural resources.
3	ii) Data field is followed by CRC, error detection & handling are important for performan ce of CAN.	ii) Pressure sensors are mounted on ground and the wall of the barn in some regularity	ii) It describes the monitoring &fault diagnosis system for the wind turbine using CAN interface.
4	Parameters :- Temperatu re, Presence of CO level in exhaust, battery voltage, Light due to spark or fire	Measurement of error is no more than 3% under the conspicuous level is equal to 0.05.	Speed, Temperature, vibration, power, voltage, current.

In the proposed system CAN BUS is used for the faster communication among the nodes. It's simple structure which widely reduces the previous complexity problems. Here in the CAN protocol it has two Buses for communication. As shown in the figure named as CANH and CANL BUS. Different vehicular units can be attached to the High speed or Low speed Bus depending upon the requirement. So it will widely reduce the complexity of the vehicular unit. If any part has failure then anyone can access it without depending upon other parts of the vehicle.

This is useful for implementation of optimized PIC along with CAN Protocol. There are various

applications of CAN protocol, here the focus is on employee's safety those who are travelling late night due to their night shifts.

In the proposed system different parameters like temperature, fuel level, vibrations, Gas level, speed of the vehicle, battery voltage are measured and analysis can be done.

As the proposed system is designed taking into consideration the safety of the employees travelling in the late night. System will be also consisting of RFID module, GPS modem, GSM modem.

By this system we can track the position of the vehicle. And the data is sent to the nearby police station and office. Employees RFID will be saved in the database so that we can have the information regarding the which employee are travelling in the vehicle. The route of the vehicle that is employee cab will be fixed. If it changes the route in any case that will be automatically informed to the company. Then along with it company can check for the different parameters of the vehicle. If their is any problem company authority will come to know what is the exact problem happening to vehicle. And particular authority will have the proofs in hand for the vehicle problem if any.

Also emergency buzzer is also provided for the employees safety, if in any case employee may feel the insecurity so they can have emergency button through which immediate help can be provided to the particular employee.

III. IMPLEMENTATION DETAILS

A. *System Architecture*

Following Fig.1.shows the proposed system architecture.

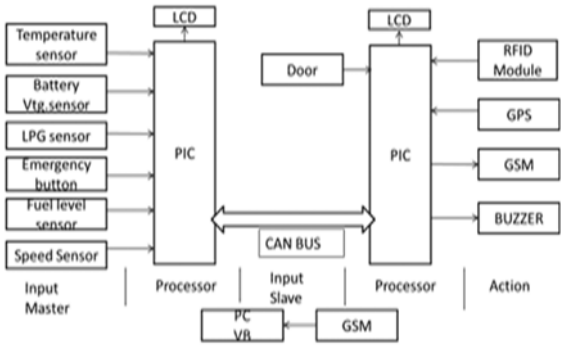

Fig. Block Diagram of RF and GPS based employee tracking and security system

Fig. 1. Proposed System Architecture

It shows different sensors are attached to monitor the different parameters of vehicle which will be helpful for deciding the emergency if exists.

Along with it the right side of the figure shows exact security system mounted in the company unit.

B. *System Unit*

It consists of mainly two units:

CAR UNIT

COMPANY UNIT

Car Unit

This unit is placed on to the car .When the car picks up the employee, the employee has to first show the RF card .The µC matches the RF card no. from its database. If the no. Matches the µC sends the employee's ID ,Cab IDand the GPS co-ordinates via GSM module.

Company Unit

Upon receiving the sms ,the VB s/w sorts the employee's no. And the GPS co-ordinates. In this way the company official's can keep a track of all the employee's.

C. *Experimental Setup*

The system is built using MPLab IDE, OrCAD is used for schematic coding is done in Embedded C,VB for maintaining database of employees.

Following Fig.2. shows practical hardware set up.

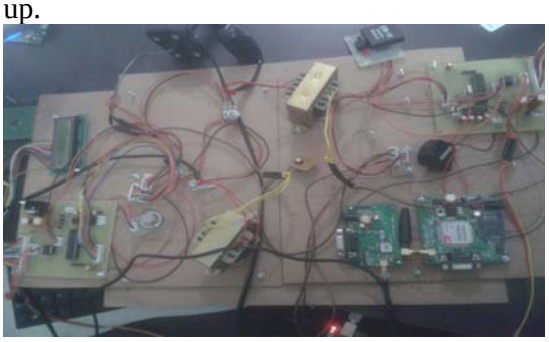

Fig.2. Hardware set up as per the block diagram

Above figure shows how exactly CAN communication takes place. Left part of the figure shows master which communicate with the right part as slave. Security system is implemented on slave over here.

GSM modem and GPS receiver are mounted at the slave side to send the SMS and to capture the GPS co-ordinates of the vehicle respectively. By this exact position of the vehicle is captured and continuously updated data is sent via SMS to particular company and nearby police station.

IV. RESULTS AND DISCUSSION

A. *Simulation Results*

Following Fig.3. shows the two vehicle monitoring parameters temperature and fuel gas and its simulated result.

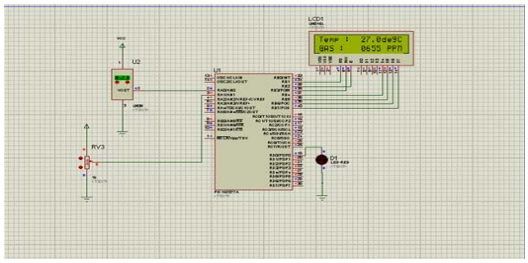

Fig.3. Simulation results of monitoring parameters

As shown in Fig.3. LM35 is temperature sensor used for measuring the temperature which is connected to PIC microcontroller. Monitoring parameters are displayed on LCD as shown.

Fuel gas is measured here by varying POT whose readings will change according to change in environment. Practically MQ6 is used as a fuel gas sensor to sense LPG gas content in vehicle. Again by observing such parameters authorized person can take immediate action in any emergency. Thus security can be provided to employees travelling in Cab.

Following Fig.4.shows the actual security system which is observed in company. Where all the updated parameters are displayed and also the position of vehicle from which place it is travelling.

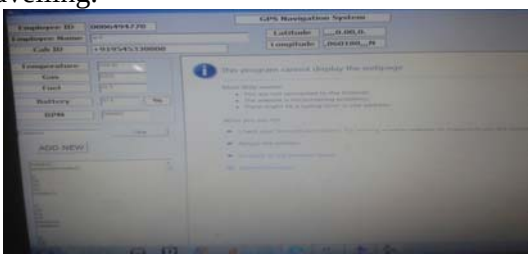

Fig.4. Proposed security system

As shown in above Fig.4. proposed security system is having employee database along with their employee ID's. Along with this monitoring parameters are observed. If in any case system fails that will shows the emergency. In this way emergency is informed in short time and by observing vehicle parameters decision is taken by the authorized person and security is provided to employees and dangerous attacks are avoided.

V. CONCLUSION

Looking at the requirement for employees safety the system is designed using CAN protocol for communication and security can be provided to companies employee using RF and GPS based system. CAN Protocol can be used in hazardous area.

Existing system of employees safety gives delay which can be overcome by CAN with PIC.

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