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Design of Vehicle System using CAN Protocol

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Abstract: ***With rapidly changing computer and information technology and much of the technology finding way into vehicles, vehicles are undergoing dramatic changes in their capabilities and how they interact with the operators (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. So we propose a design for such System specially for vehicle to avoid the accidents due to drunken driving, low/high air in tyre's or an accidental fire in vehicle due to high engine temperature, accident(s) while parking & also this system controls the headlight & wiper of vehicle as per the environment condition.***
Keywords: PIC, Sensor, CAN, master, slave.

I. INTRODUCTION

Now a days accidents are occurred due to mistakes done by driver. An intelligent system needs to be developed to overcome these mistakes. We propose the system where the mistakes done by driver are eliminated or observed. Most of the intelligent car systems have monitoring system only. Antilock brakes, speed sensors and other automatic systems are present in sports cars and other luxury cars only. But these cars are not affordable to everyone.

So, a system needs to be developed which can be implemented in every car. A collision avoidance system is a system of sensors that is placed within a car to warn its driver of any dangers that may lie ahead on the road. Some of the dangers that these sensors can pick up on include how close the car is to other cars surrounding it, how much its speed needs to be reduced while going around a curve, and how close the car is to going off the road. A vehicle was generally built with an analogue driver vehicle interface for indicating various parameters of vehicle status like temperature, Raindrop sensor and Head light controller LDR, Accidental, Alcohol sensor etc.

Along with we use GSM modem. A microcontroller based data acquisition system that uses ADC to bring all control data from analogue to digital format is used. Since the vehicle information systems are spread out all over the body of a practical vehicle, a communication module that supports to implement a one stop control of the vehicle through the master controller of the digital driving system.

II. LITERATURE REVIEW

Several works are done to prevent the accident in recent year. Most of them have focused on highways or freeways.

A. Presi T.P et.al [1] system use PIC microcontroller to monitor temp. , presence of CO level in the exhaust, battery voltage and light due to spark or fire. It measures the few parameter.
B. R. Manoj Prasanth , S.Raja ,L.Saranya et.al [2] system use Pic microcontroller to measure the distance using ultrasonic sensor, detect the speed breaker & some critical zone.
C. Kashyp Joshi , Vipul Gohil et. Al[3] system use ARM processor to detect presence of alcohol in car , change of lane, speed & send only warning signal to the driver.
D. S. Vijayalakshmi et.al[4] system use ARM processor to indicate vehicle status like speed, fuel level, engine temp. etc.

III. PROPOSED SYSTEM OBJECTIVE

Our objective is to continuously monitor and display the Temperature, Alcohol Level, Pressure, Obstacle and Speed. Also take the action over these parameters like sending the information of car to the Police/Owner & block that car, etc.

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IV. SYSTEM SPECIFICATIONS

A. PIC Microcontroller

1) 16-bit wide instructions, 8-bit wide data path
2) High current sink/source 25 mA/25 mA
3) Three external interrupt pins
4) Four timers modules viz. Timer0module, Timer1module Timer2module, Timer 3module
5) period register (time base for PWM)
6) Message bit rates up to 1 Mbps

B. Conforms to CAN 2.0B Active Spec With

1) 29-bit Identifier Fields
2) 8-byte message length
3) 3 Transmit Message Buffers with prioritization
4) 2 Receive Message Buffers
5) 6 full, 29-bit Acceptance Filters

C. Temperature Sensor LM35

1) Linear + 10.0 mV/°C scale factor
2) 0.5°C accuracy guarantee able (at +25°C)
3) Rated for full −55° to +150°C range
4) Operates from 4 to 30 volts
5) Less than 60 µA current drain
6) Low self-heating, 0.08°C in still air
7) Nonlinearity only ±1⁄4°C typical

D. Alcohol Sensor MQ3

1) High sensitivity to alcohol and small sensitivity to Benzene.
2) Fast response and High sensitivity.

E. Accidental SensorADXL335 module

1) The ADXL335 gives complete 3-axis acceleration measurement.
2) This module measures acceleration within range ±3 g in the x, y and z axis.

F. Headlight Control LDR

1) Easy to use with Microcontrollers or even with normal Digital/Analog IC
2) Small, cheap and easily available
3) Available in PG5 ,PG5-MP, PG12, PG12-MP, PG20 and PG20-MP series

G. Raindrop Sensor FC37

1) Working voltage 5V
2) Output format: Digital switching output (0 and 1), and analog voltage output AO
3) Uses a wide voltage LM393 comparator
4) Comparator output signal clean waveform is good, driving ability, over 15mA
5) Anti-oxidation, anti-conductivity, with long use time

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V. BLOCK DIAGRAM OF PROPOSED SYSTEM

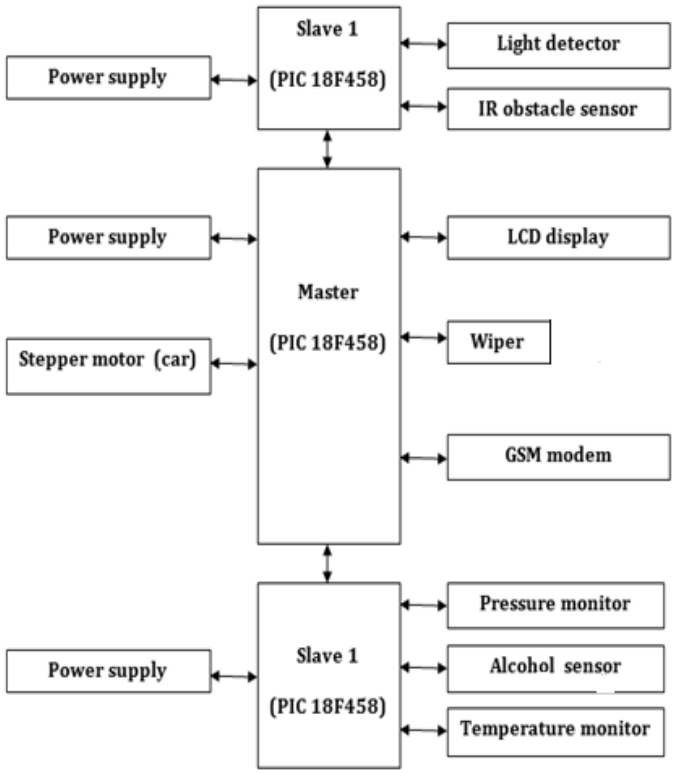


Figure 1- Block Diagram of Design Vehicle System Using CAN Protocol

1) Power Supply block (7805) -For all the system components requires 5V power supply.
2) Master/Slave- PIC 18f458 this microcontroller is use as Master and Slave. Slave has all sensors and depends on sense value
3) Light detector (LDR) -for light detecting we use Photo-resistor as a light detector.
4) IR obstacle sensor (HC-SR04) -for intelligent breaking we use IR sensor to measure distance between other vehicle.
5) LCD display-for Displaying all parameter we use 16X2 LCD.
6) Wiper-this is car-glass wiper, when water detect on glass then it moving in 120^0.
7) GSM (SIM-900) -for sending message to police or owner of vehicle if driver drink.
8) Pressure monitor (MPV3V5050) -for sensing air in tyre's and display using LCD display.
9) Alcohol sensor (MQ3) -for sensing Alcohol in vehicle.
10) Temperature Monitor (LM35) -for sensing Temperature of engine.

VI. SYSTEM DESIGN

A. Power Supply Design

The +5 volt power supply is based on the commercial 7805 voltage regulator IC. This IC contains all the circuitry needed to accept any input voltage from 8 to 18 volts and produce a steady +5 volt output, accurate to within 5% (0.25 volt).

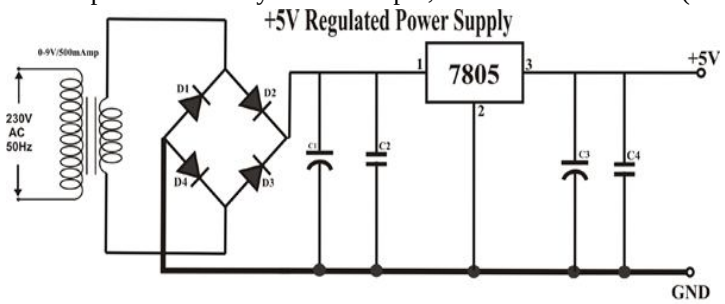


Figure 2- +5 V Regulated Power Supply

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B. Master Design

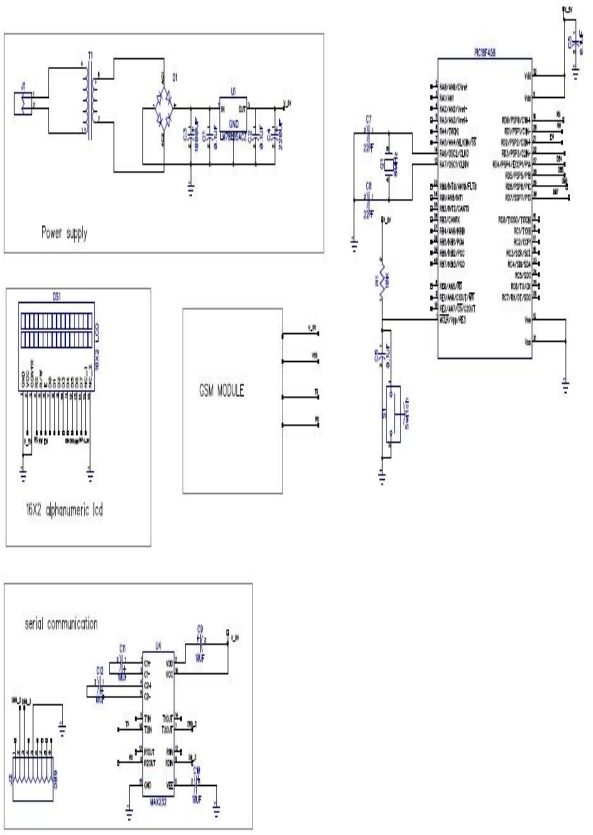


Figure 3- Master Design schematic

C. Slave Design

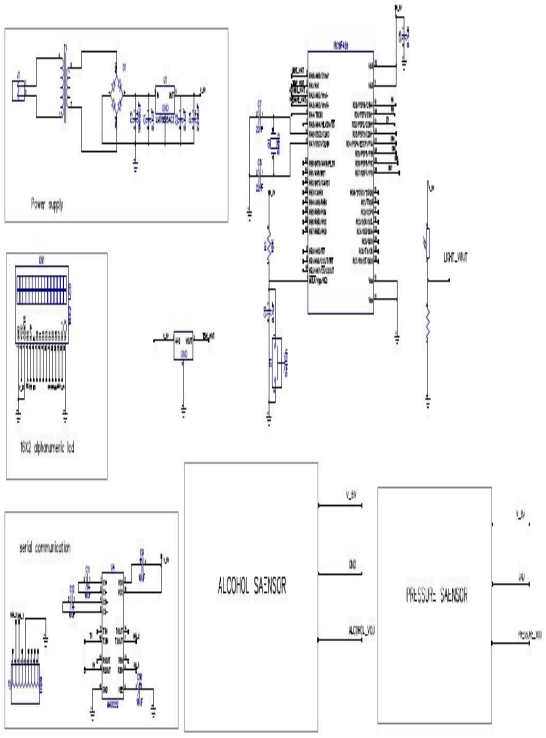


Figure 4- Slave Design schematic

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D. PCB Design

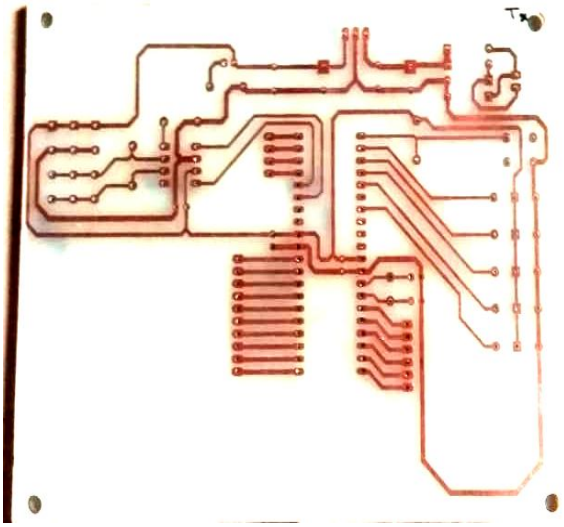


Figure 5- Master PCB design

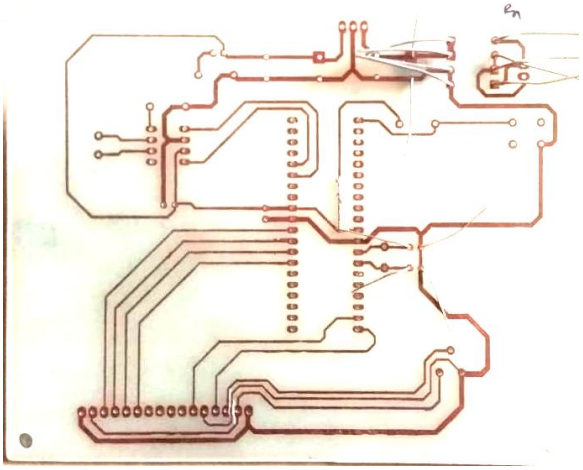
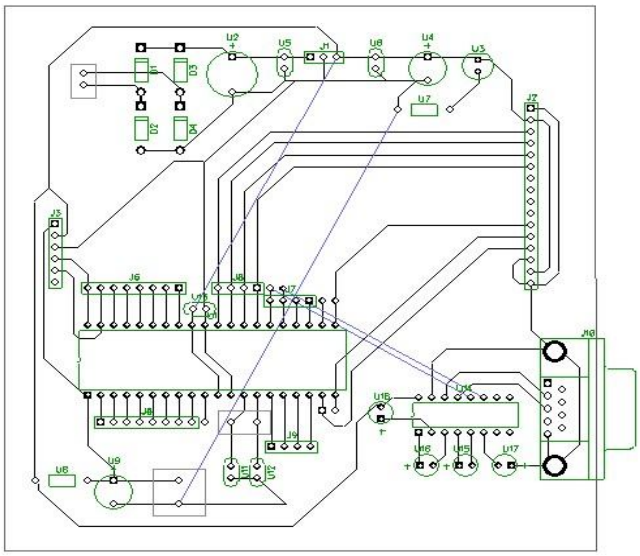


Figure 6- Slave PCB design



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VII.ADVANTAGES

A. High speed data rate 62.5kbps-1Mbps, 50m-1Mbps & 50Km-50Kbps
B. Reduces complexity because of CAN having signal BUS.
C. Automatic Error correction because of CAN having 15bit CRC.
D. Data transmit in priority method.
E. Secure of vehicle form accidents.

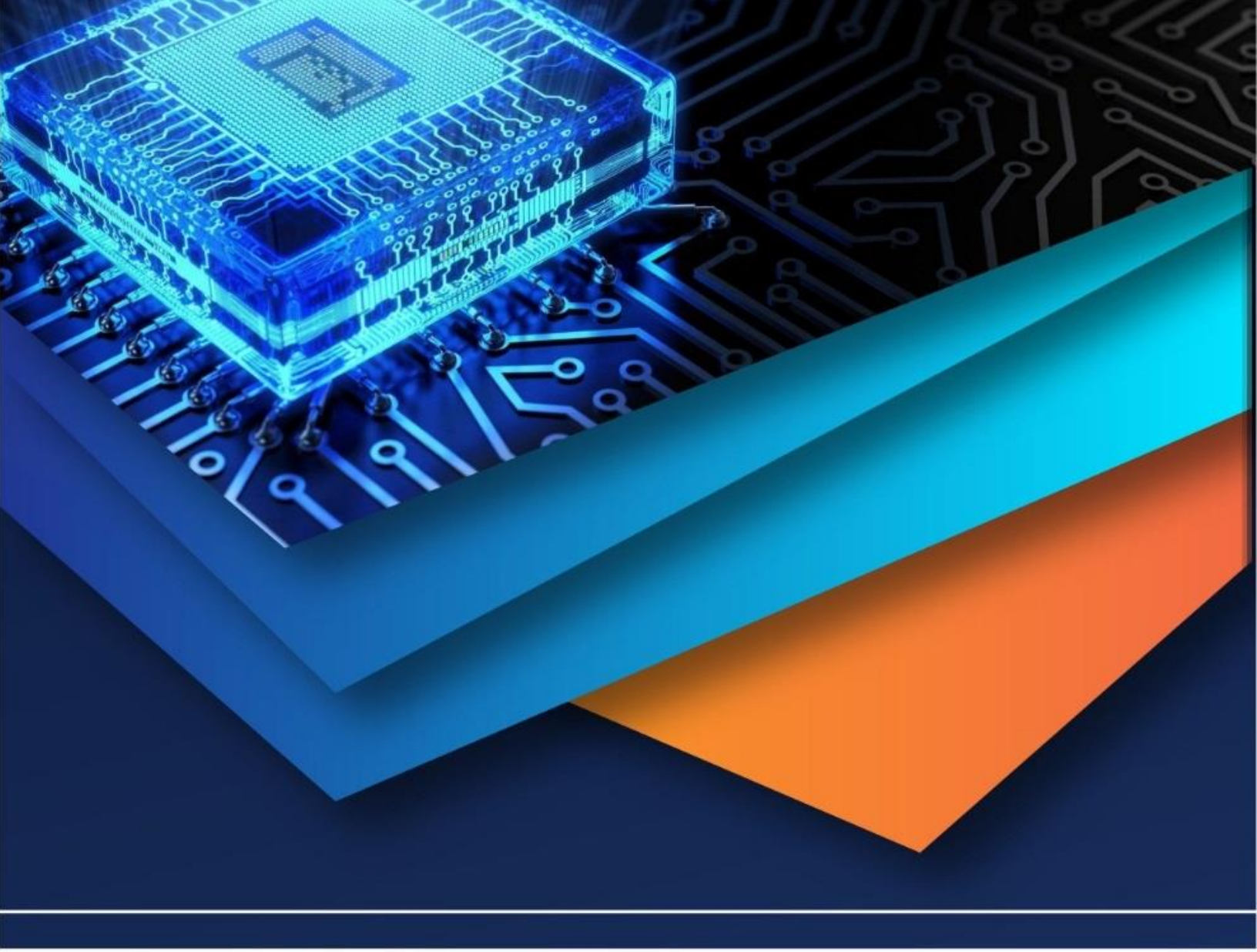
VIII. CONCLUSION

In our system, we propose PIC based intelligent accidental control vehicle system using CAN protocol. Our proposed system continuously monitor and display the Temperature, Alcohol Level, Pressure, Obstacle, Speed. Also it takes the action over it. Suppose if the alcohol is present in the car then the GSM modem send the information of car to the Police/Owner & block that car. Also if the distance between the two cars is less, then automatically speed of vehicle is reduces. The high-speed CAN bus system solves the problem of automotive system applications, also has a certain practical value and significance.

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