

Vehicle Protection and Alarming System

Kanwaljeet Singh^{1*}, Dushyant Kumar Singh², P. Raja³, Himani Jerath⁴

1,2,3,4 Lovely Professional University, Phagwara

kanwaljeet.16905@lpu.co.in, dushyant.kumar@lpu.co.in, himani.22788@lpu.co.in

Abstract

In this paper we have described about a vehicle protection and Alarming System which will give a alarm to the Driver whenever car will go very close to the another car or if the distance is too close then apply the brakes automatically. So the proposed design will endlessly monitor the distance between the two vehicles measured by using the distance sensor will be compared with predefined threshold and based on alarm will go on alert the driver to take the immediate action to reduce the chance of accident. Many engineering solution has been provided by using the Different microcontrollers but in this proposed model we are going to describe this model by using MBED board LPC11u24. To avoid the complexity of in this system MBED board has been proposed in this model to compete the required model.

Keywords: *-Safety, Distance check, Alarm, MBED Board LPC11u24, Sensor, Brakes*

Introduction

Consistently everywhere throughout the world, car crashes happen because of vehicle negligence of the Driver [5]. While various elements add to vehicle accidents, for example, vehicle manufacturing issues and terrible climate or driver conduct [2]. Driver conduct is viewed as the main source accident in excess of 90 percent. Vehicle separation is one of the most significant files of traffic security [1]. Without a doubt, mishaps could be diminished if additional time is accommodated to respond with the circumstance by expanding or decreasing the main vehicle speed [4]. A few automobile companies have created the system which will give the warning to the driver whenever vehicle will be very close to the other vehicles [6]. The present frameworks use inputs from sensors around the vehicle to help the driver [8]. Present day vehicles consume a huge assortment to help the driver to understand the frameworks.

The drivers must aware of the about the framework distributing in their vehicles drivers can choose whether they need to have wellbeing disturbing framework in their vehicles or not [9].

In Present day vehicles securing system uses the radar, camera, infrared, ultrasonic sensors to protect the vehicles from the accidents [10].

Problem Statement:

Consistently everywhere throughout the world, car crashes happen because of vehicle crashes. While various components add to vehicle crashes, for example, vehicle mechanical issues and awful climate and driver conduct. Driver conduct is viewed as the main source of in excess of 90 percent everything being equal. Vehicle separation is one of the most significant records of traffic wellbeing. For sure, mishaps can be diminished if additional time is accommodated the driver to respond with the circumstance by expanding or lessening the host vehicle speed. A few automakers have created electronic admonition sound gadgets to caution the driver about the close to vehicles.



Fig 1:- Road accidents in India

In this system we are using safe distance and alarming alert system for Vehicle safety. In which we are using ultrasonic sensor for the distance measurement. These system is compulsory for all the vehicles. In these proposed system it can overcome the problems like overtake and suddenly brake off of the vehicles. In these system if the distance between the vehicle approximate 2 meters and right left distance between the vehicles is 30cm the alarming alert system starts and one another thing which is we providing that is blinking of small led light on the speedometer which gives the sign of alertness.

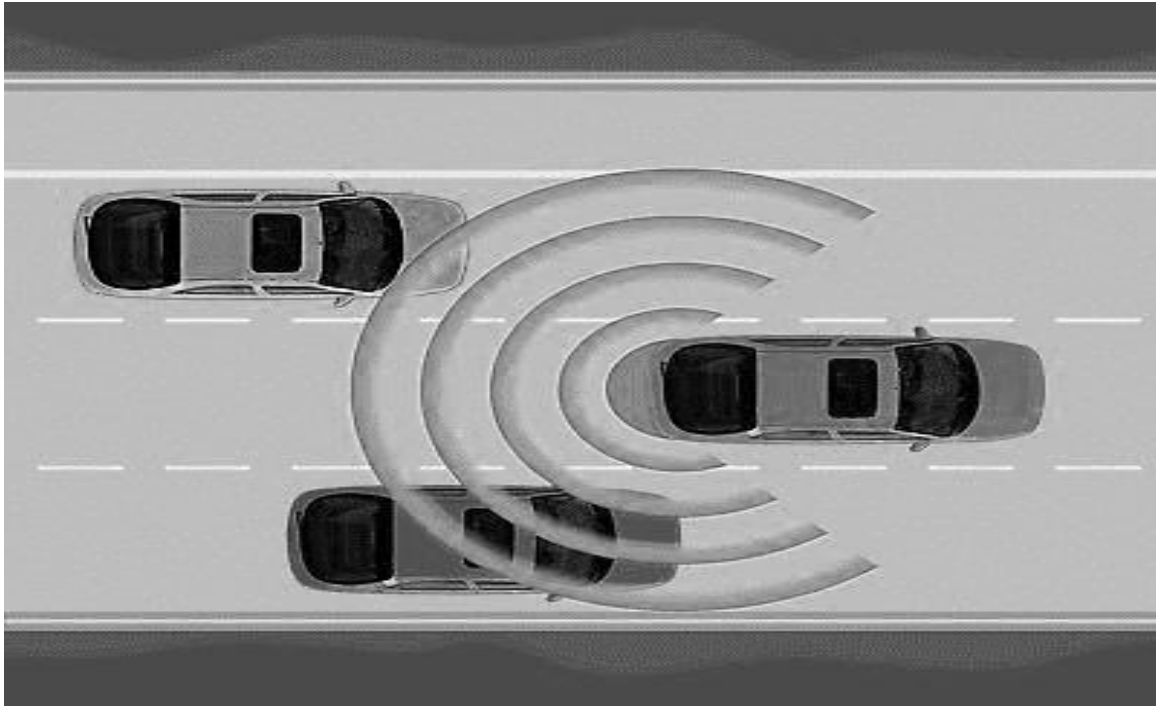


Fig 2:- General sensing mechanism

Methodology

After getting the motivation do to this type of project in this we have used the MBED LPC11u24 board. We have used ultrasonic sensor to detect the distance range between the other vehicle and the main vehicle. So the interfacing of the ultrasonic sensor and MBED LPC11u24 board has been done. Programming has done in the embedded C for MBED board and based on that two servo motors are controlled so that automatically brakes will be applied if the distance becomes smaller than the predefined threshold. To drive the motors properly with MBED board motor driver has been used in the model. We have explained the methodology in the following steps:-

1st Step: MBED board will collect the distance data between the main vehicle and another vehicle.

2nd step: - threshold need to be defined in the program by evaluating main vehicle properly .it is important to put the distance variable according to the speed of the main vehicle.

3rd Step: in this step we will compare the actual distance with the threshold.

4th Step: generate the alarm and take the necessary action.

Hardware Description

COMPONENTS USED:

- 1) Arm mbed board LPC11u24
- 2) Ultrasonic Sensor
- 3) DC Motors
- 4) Motor Driver Module L293N

- 1) Arm mbed board LPC11u24

The MBED LPC11U24 board there is total 28 Pins. There are 2 I2c and 1 SPI protocol. It providing the two Dc voltages 3.3 V and 5 V to operate the other circuit .program will burn inside the Flash memory and online complier is used to Write and execute the code.

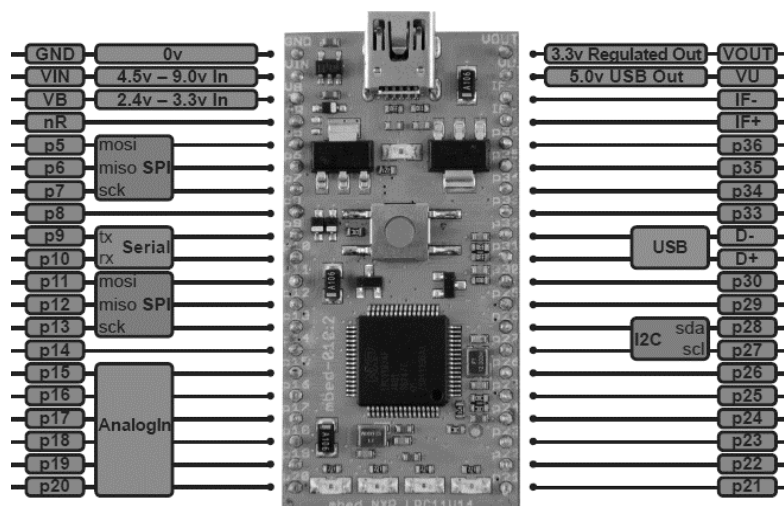


Fig 3:- Pin Layout of MBED LPC11u24 Board

ULTRASONIC SENSOR:

To measure the distance between object and sensor Ultrasonic sensor is used. it uses sound pulses of 40 KHz to measure the distance. Ultrasonic sensor which we have proposed in this model is HC-SR04 having four pins. Range of the sensor is 2 cm to 4 m .Distance is calculated by using a formula $D = S * T/2$.



Fig 4:- ultrasonic sensor pin layout

Motor Driver Module L293N

Motor driver IC L293D has been used to control the DC motors. Enable pin is used to control the speed of the motor by using the PWM technique.

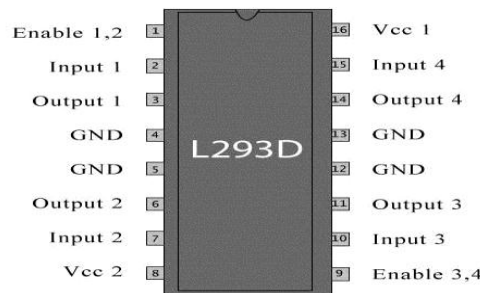


Fig 5:- Pin layout of Motor driver IC

Block Diagram of the discussed Model:

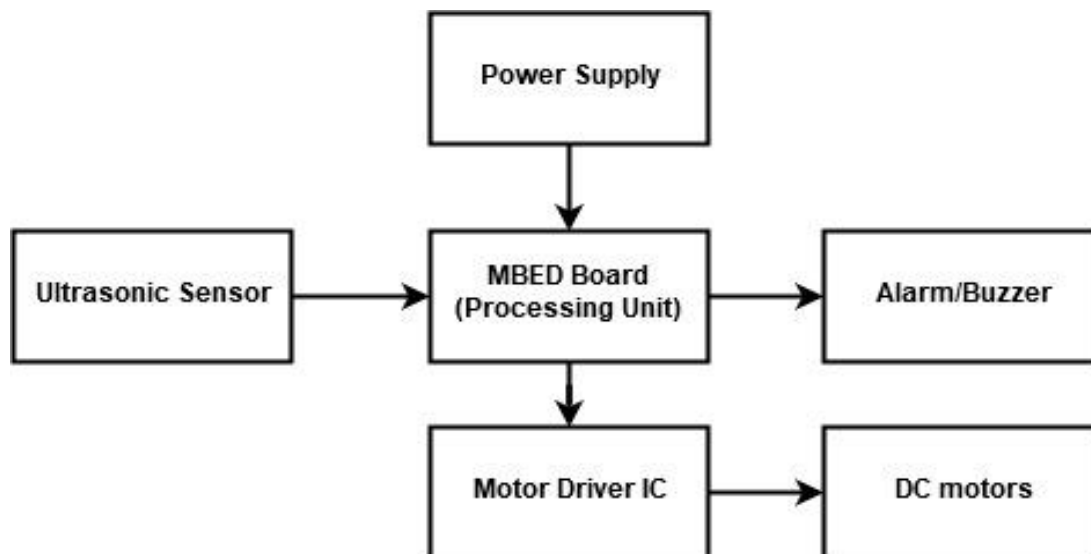


Fig 6:- General Block Diagram

FLOW CHART AND ITS WORKING:

The transmitter transmits an ultrasonic wave. That wave reflected if any object is in path of transmit wave. And it is reflected from object and receiving in ultrasonic receiver. By calculating the time of wave who travel and reflected back in ultrasonic receiver then we can be calculating a distance by the equation of $\text{distance} = \text{duration} * 0.034 / 2$;

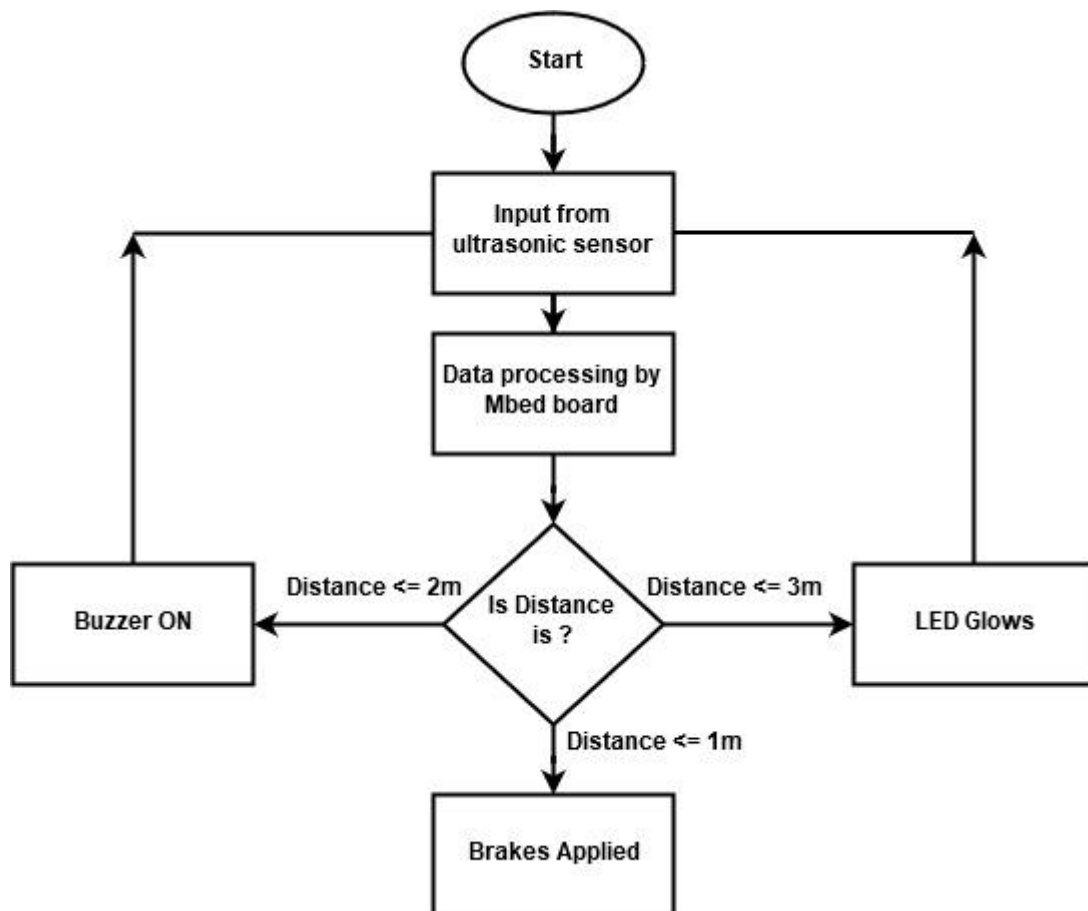


Fig 7:- Flow chat

The basic blocks of the Safe Distance Alarming and Automatic Braking system circuit is explained in detail;

Ultrasonic transmitter: - Trigger pin transmit an ultrasonic wave.

Ultrasonic receiver: - receiver or echo pin receive reflected wave.

Braking circuit: - In this kind of braking circuit we produce PWM signal in motor driver with help of Mbed board

Car brake: - with help of motor driver system we slow down the PWM pulse and car will stop before accident.

Project model Description

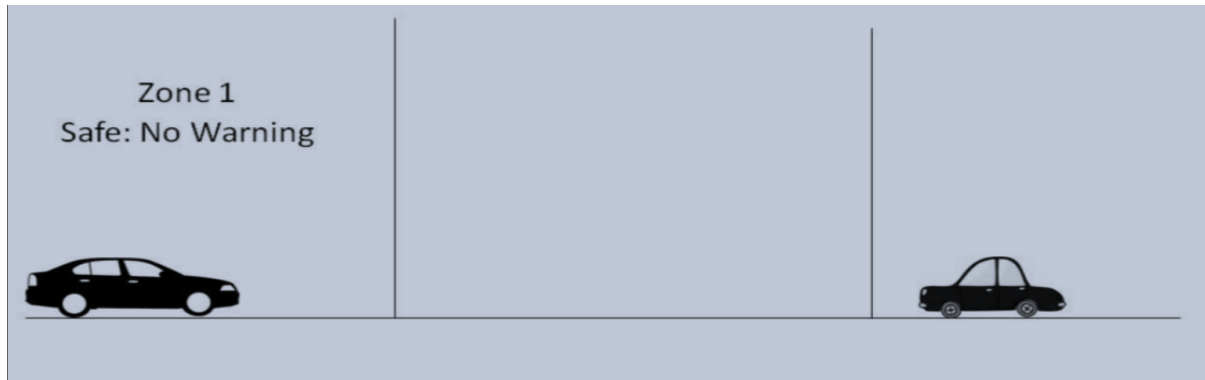


Fig 8:- Safe Zone- No brakes and Alarm



Fig 9:- Alarm Zone- no brakes and switch on the Alarm

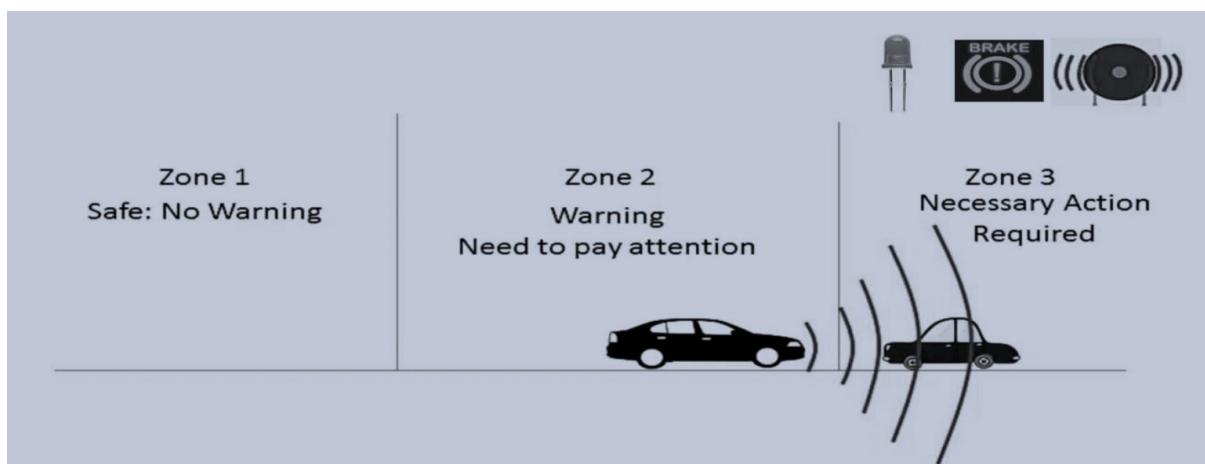


Fig 10:- Danger Zone - Apply Brakes and on the Alarm

Result and Discussion

Ultrasonic sensor will detect the distance range from 2cm to 4 m. distance, so in the proposed model some action will take if distance range will be 1m to 3m. So the interfacing of the ultrasonic sensor and MBED LPC1114 board has been done. Programming has done in the embedded C for MBED board and based on that two servo motors are controlled so that automatically brakes will be applied if the distance becomes smaller than the predefined threshold. To drive the motors properly with MBED board motor driver has been used in the model.

CONCLUSION

In the proposed model a vehicle safety alarm system has been described that will detect the distance between the main vehicle and front vehicle. After measuring the distance necessary action will take by board. If the distance is 3 m then light will be on inside the vehicle but in the proposed model it has been shown by LED .if the distance is 2m then buzzer will be on but in actual vehicle Horn of the vehicle will be ON. And if the distance is 1m then brakes will be applied gradually to the vehicle so that nobody gets hurt inside the vehicles.

Advantages

- Low capital cost
- Low Maintenance cost
- High accurate
- Less power consumption
- Small in size

Reference

1. Shi, Lei, and Ki Won Sung, "Spectrum requirement for vehicle-to-vehicle communication for traffic safety", In IEEE 79th Vehicular Technology Conference (VTC Spring), PP:1-5, 2014.
2. K. Darabkh, S. Ismail, M. Al-Shurman, I. Jafar, E. Al khader, M. Al-Mistarihi, "Performance evaluation of selective and adaptive heads clustering algorithms over

- wireless sensor networks”, *Journal of Network and Computer Applications*, Elsevier, Vol. 35, No. 6, PP:2068-2080, 2012.
3. S. Ismail, E. Alkhader, S. Elnaffar, "Object Tracking in Wireless Sensor Networks: Challenges and Solutions", *Journal of Computer Sciences*, vol. 12, no. 4, PP: 201-212, 2012.
 4. R. B. Chen, N. Li, H. Feng Xiao, W. Hou, "Research on Safety Vehicle Distance Recognition Based on Stereo Vision and DSP", *Applied Mechanics and Materials*, vol. 333, pp. 805-810, 2013.
 5. S. Biswas, R. Tatchikou, F. Dion, “Vehicle-to-Vehicle Wireless Communication Protocols for Enhancing Highway Traffic Safety”, *IEEE Communications Magazine*, Vol. 44, No. 1, PP. 74-82, 2006.
 6. H. Attia, B. Getu, H. Ghadban, M. Abu, "Portable Solar Charger with Controlled Charging Current for Mobile Phone Devices", *International Journal of Thermal & Environmental Engineering*, vol. 7, no. 1, pp. 17-24, 2014.
 7. H. Attia, “Multi-Functional Microcontroller Based Monitoring Alarming and Protection System”, *International Journal of Applied Engineering Research*, vol. 11, no. 18, pp. 9491-9496, 2016.
 8. M. Prabha, M. Seema, P. Saraswathi, “Distance based Accident Avoidance System using Arduino”, *International Research Journal of Engineering and Technology (IRJET)*, vol. 02, no. 07, pp. 777-780, 2015.
 9. X. Yin, M. Wang, "Research on Safety Distance Mathematical Model of Pro-Active Head Restraint in Rear-end Collision Avoidance System", *International Journal of Security and Its Applications*, vol. 9, no. 1, pp. 347-356, 2015.
 10. Hayashi, Hideaki, Ryo Inomata, Ryo Fujishiro, Yusuke Ouchi, Koji Suzuki, and Takeshi Nanami, “Development of pre-crash safety system with pedestrian collision avoidance assist”, In *Proceedings of the 23rd International Technical Conference on the Enhanced Safety of Vehicles (ESV)*, 13, vol. 271. 2013.