Design And Fabrication Of Automotive Vehicle Dynamic Control With Collision Avoiding And Warning System

N. Boopalan, K. Ranjith, S. Praveenraj, B. Piruthiviraj

Abstract: Evolution of automobiles over the decade is just and moving towards autonomous vehicles, in which the safety becomes an important aspect. In automobile, collision is a major problem which happens due mechanical failure and mainly it occurs due to driver’s careless mistake. This project aims at ensuring safety by avoiding collisions between operating vehicle and the obstacle infront and both side of the vehicle. Safety measures has been found to avoid these collisions by applying the brake. Here ultrasonic sensor has been used to detect the distance between operating vehicle and the obstacle (either a vehicle or some other object). Then using by Arduino programming distance is calculated the speed of the vehicle can be controlled by which the collision can be prevented. Such a technology is used to prevent collision even if driver gets confused and suddenly accelerates vehicle instead of applying brake; even after visualising the obstacles presence.

Index Terms: Collision avoiding, Warning system, Ultrasonic sensor, Arduino Uno U3, Arduino programming.

1 INTRODUCTION
Vehicle collision avoidance system and method includes a 360 degree circumferentially rotating pulsed infrared laser beam scanner apparatus which rotates in a horizontal plane and vertical plane simultaneously for generating a first signal representative of an obstacle. An analog processing circuit is coupled to the circumferentially rotating pulsed infrared laser beam scanner apparatus for processing the first signal and generating a plurality of signals. From that signal braking signal gets generated and brake will be applied. Here this rotating laser beam determines features of vehicle too and braking the vehicle in the event the processed signals indicate an imminent collision [1]. Developed sensor system is useful for detecting vehicles, motorcycles, bicycles that pass by the lateral side of a vehicle. Ultrasonic sensors widely used show on cars for rear object detection during parking, are developed for lateral object detection at low speeds. Tentative results that the anticipated system can detect a vehicle at speeds up to 40km/hr with a maximum range of 5 meters. Moreover, the inspiration of wind on the measurement is also explored. The developed sensor system gives sensible results for a wind speed up to 30km/hr [2]. A speed detecting device for detecting a speed of the subject vehicle, a control device for receiving signals from the distance measuring device and the speed detecting device and estimating a possibility of collision to the obstacle based on the received signals, and an alerting device electrically connected to the control device.

Here, as measuring distance millimeter wave, laser radiation, or ultrasonic waves and as an alerting device stop lamp, hazard lamp and radio communication has been used [3]. A possibility of collision of subject vehicle against an object ahead of the subject vehicle is determined at least based on values measured by a distance measuring unit for measuring longitudinal and lateral distances between the subject vehicle and the object and a value detected by a subject-vehicle speed detecting device, an actuator is operated in accordance with the result of such determination to avoid collision. By using actuator distance is calculated and collision of vehicle is avoided, so drivers easily accepts it [4]. Research on the topic of user interface design has gradually transitioned from the study of how individual sensory modalities (predominantly vision) interact with a system to the study of multisensory human-computer interaction. One applied area that has attracted a great deal of research interest in this respect is the car industry, given a general concern over potential visual overload during driving. As a result, many researchers have started to inspect the potential implementation of a wide variety of nonvisual devices in cars in an attempt to lessen any visual overloading of driver attention [5].

2 LITERATURE SURVEY
Design and Experimental Study of an Ultrasonic Sensor System for Lateral Collision Avoidance at Low Speeds. Method of avoiding side collision of vehicles at cross roads by utilizing a side collision prediction algorithm. In this Radar sensor is used for detection and to avoid collision. If the object is located in front of vehicle then with the help of sensor deceleration signal gets generated and brake will be applied to decelerate the vehicle. If the object is located at backside of vehicle and if there is possibility of collision means then acceleration signal gets generated and speed of vehicle increased to avoid collision. In the cross roads to avoid side collision, distance and time of approach of vehicle B is calculated then accordingly vehicle A speed is accelerated or decelerated. If the collision is supposed to occur in substantially perpendicular angle means then angle between vehicle A and vehicle B is found, finally distance and exact location for collision of vehicle is found accordingly vehicle A speed is accelerated and decelerated. If speed of vehicle is beyond the
limit means then this method is not suitable fig 2.1.

3 CONCEPT DEVELOPMENT
More than 1.3 lakh people died on Indian roads, giving India the dubious honor of topping the list of road deaths across the world. Until 2 years ago, the International Road Federation placed India second behind China. China has managed to reduce the number of road deaths from over 100,000 to 90,000 and in India the situation has worsened. With just 1% of the world’s vehicles, India manages to account for 10% of its road fatalities, up from 8% at last count. In India the situation is exacerbated by poor enforcement of traffic laws and myopic policies on the part of our policy makers. In the United States which has close to 350 million people and more than 250 million vehicles, the number of deaths per 10,000 vehicles in India, this known as the road fatality rate. In comparison, China has a road fatality rate of about 5 with almost twice as many vehicles. Besides in China the accident rate has seen a downward trend while in India it is raising.

4 BLOCK DIAGRAM

From smart phone by using Bluetooth module as a signal passer to Arduino Uno movement of the vehicle is instructed i.e. direction in which the vehicle should move is instructed and controlled. from the DC 12V battery power supply is given to the Arduino Uno and L298n motor driver for its operation in the Arduino Uno already program has been feed, by keeping that program only L298n motor driver is operated and then input will be given by L298n motor driver to the DC motor, with that data only DC motor is operated is shown in the fig 4.1.

5 COMPONENTS USED IN THE SYSTEM

5.1 DC GEAR MOTOR

It is a simple DC motor featuring metal gearbox for driving the shaft of the motor, so it is a mechanically commutated electric motor which is powered from DC supply. The Johnson geared motor are known for their compact size and massive torque-speed characteristic.

5.2 ULTRASONIC SENSOR (HC-SR04)

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object’s proximity. High frequency sound waves reflect from limits to produce distinct echo patterns.

5.3 ARDUINO UNO U3

Fig: 5.3
Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins of which 6 can be used as outputs 6 Analog inputs a 16 MHz quartz crystal a USB connection a power jack an ICSP header and a reset button. It contains everything needed to support the microcontroller simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started. The Bluetooth module HC-05 is one of the best selections for projects where you need wireless communications. The transceiver module transmission / reception allows Bluetooth wireless connections like master or slave, works in a transparent way as if we made a RS-232 TTL serial connection with cable.

5.4 BLUETOOTH MODULE (HC-05)

This is LCD1602 Parallel LCD Display that provides a simple and cost-effective solution for adding a 16x2 White on Liquid Crystal Display into your project. The display is 16 character by 2-line display has a very clear and high distinction white text upon a blue background/backlight. The values shown on the display can be either a simple text or numerical values read by the sensors, even the number of cycles that the Arduino is performing. One thing to consider is you waste about 8 Pins on your Arduino for the display to get working. Luckily there exists an I2C adapter that you can solder right onto the pins of the display. So, all you need to connect are the I2C pins, which shows a good collection and little of coding. We have the same LCD module with assembled.

5.7 I2C INTERFACE MODULE

It can be changed to any between 0x20 and 0x27 depending on whether you have soldiers. With this module the communication between the Arduino and the LCD is done only through two outputs, LCD screens can be connected to the same I2C by choosing a different address.

5.8 12V BATTERY

The L298N is an integrated monolithic circuit in a 15- lead Milliwatt and Power SO20 packages. It is a high voltage, high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive dc motors.

5.6 LCD DISPLAY
An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode.

5.9 BUZZER

The piezo electric emits a high-pitch beep that is sure to capture everyone’s attention. If the volume is too loud, simply use a piece of tape over the top hole on the buzzer and the volume will substantially lower.

5.10 BREAD BOARD

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. They’re also great for breaking out DIP package ICs to jumper wires. If you run out of room no worries these mini breadboards can be shattered together to form larger stretches of board.

6 RESULT

In this prototype model, by using the ultrasonic sensor distance of the obstacle is sensed and calculated. Then that value is given as input to Arduino Uno were Arduino program is already feed and speed of the vehicle is also taken automatically from vehicle, by keeping all those data automatically movement of vehicle is also controlled.

This graph is denoting drive will been delay to apply the brake when the obstacle is ahead. The system will totally decelerate the vehicle at with in 2 seconds avoiding of the obstacle.

6.1 Experimental setup

In this experimental setup, movement of the car can be controlled by Bluetooth module. In this as a first step, coding has to be feed to Arduino Uno U3 and then connections are given as per the circuit diagram. Then by using Bluetooth module we operate means then, the car moves according to your command. If any obstacle is determined by the ultrasonic sensor then the car will slow, when it goes too close to the obstacle means then vehicle will stop moving. Here, the ultrasonic sensor senses the obstacle by sending the ultrasonic sound waves. The L298n motor driver makes DC motor to function and decelerate it, with the help of the Arduino programming code.

7 CONCLUSION

Thus, we have learned the basic concept and purpose of using ultrasonic sensor detect distance and Arduino programming in calculating distance between vehicle and obstacle (either or other object) and controlling vehicles.
movements. By implementing such a technique in real time application, we can prevent the accidents in cars and other commercial vehicles. By this can improves safety and comfort to drivers, since he/she reacts to obstacle wrongly.

8 REFERENCES

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