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Vehicle Collision Avoidance System

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ABSTRACT:- This paper describes automobile collision avoidance system by using of an ultrasonic sensor for a vehicle. We utilize the electronic systems application embedded in car that is anticipated to minimize the disaster of car accident. This paper is concentrating on developing a model of rear end car collision avoidance system that detects the gap among motors moving in the identical lane, inside the identical direction and alert the driver each time she or he is in danger range by using a microcontroller. The gap is measured via an ultrasonic sensor used to experience the obstacle beforehand.

KEYWORDS: collision avoidance system, ultrasonic sensor, microcontroller

I.INTRODUCTION

The enterprise approach for automobile safety structures has been evolving over the last two decades. To begin with, character passive devices and functions including seatbelts, airbags, knee bolsters, crush zones, and so on, were developed for saving lives and minimizing accidents while a twist of fate happens. Later, safety measure which include enhancing visibility, headlights, windshield wipers, tire traction, etc., have been deployed to lessen the chance of entering into an twist of fate. Now, we are on the stage of actively warding off accidents as well as providing most protection to the car occupants and even pedestrians. The systems which can be below severe improvement consist of collision avoidance systems (Megha & Srivani, 2016; Nyamati, Chaudhuri & Jayavel, 2017). In this paper, we deal with advanced thoughts which include pre-crash sensing, an ultrasonic sensor is used to experience the item in front of the vehicle and gives the signal to the microcontroller unit. Based totally on the signal received from the ultrasonic sensor, the microcontroller unit is sending a signal to the braking unit for applying the brake automatically. A vehicle or vehicle accident is a street traffic incident which typically involves one avenue vehicle being in collision with, either another car, or every other road user, or a desk bound street side object, and this may result in death, damage and/or belongings harm (Joukhadar, Issa & Kalaji, 2018; Sanjana, Wahid, Habib & Rumel, 2018)

It's far a famous truth that the socio monetary, physical and psychological crisis entails designing, programming and implementing a vehicle collision avoidance as a result of car accidents needs to be system that is able to stop the vehicle handled significantly. Diverse studies and before it hits an obstacle. A program is to research must be carried out to conquer this be written to make sure the vehicle hassle (Hang, Han, Chen & Zhang, 2018). responds in real time. The work is This study is devoted to strive implemented using a toy car. This study is devoted to strive implemented using a toy car. alternative solution for this recognized hassle by means of developing low value

II. SYSTEM DESIGN

The collision warning system version that would be installed on the designed in this paper consists of hardware present automobile fashions and alert the and software parts. The hardware consists motive force in danger zone. Consequently, of construction of the paper circuit. rather than putting apart inbuilt energetic The software part deals with the protection gadget development to the car programming part of the paper. producers, the person shall find ways to The research consists of five units remedy the problem by growing home that is the power supply, the lively safety gadget model that could be microcontroller, obstacle sensor, warning advanced later to be fitted to street system and the motor driver system. automobile despite their version and twelve months of making. The scope of the paper The block diagram in Figure no. the different units.

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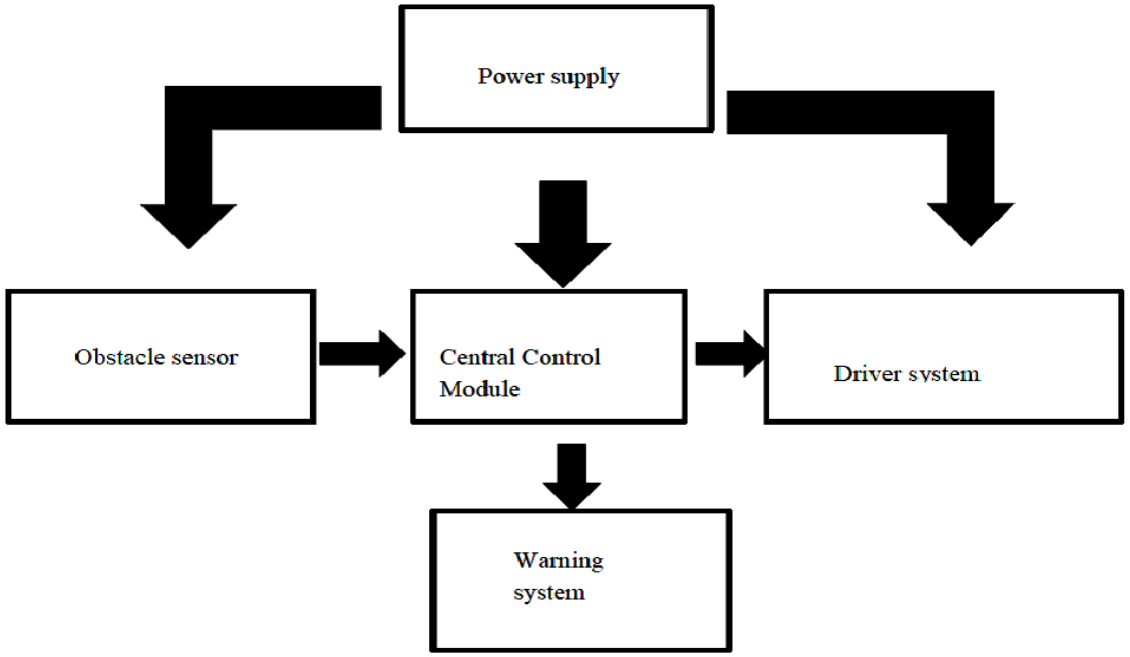
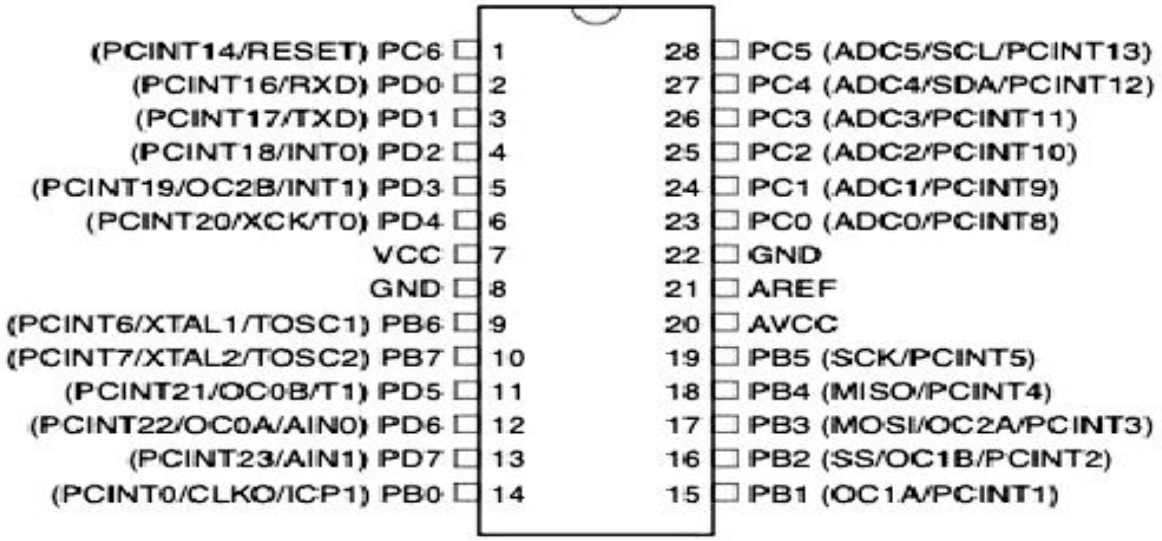


2.1 Central Control Module

The external interrupt is activated The microcontroller used is when there is a change in the rising and Atmega 328P. The interrupt pin one is used to receive the echo pulse from the sensor falling edge. This microcontroller is chosen unit and the bit 1 pin of register is used to because it is cheap and locally available. send the 10µs trigger pulse. Figure no. 2 shows the pinout of the Atmega 328P



2.2. Driver Circuit

The DC Motor is already included in The driver circuit consists of the the toy car that draws a current of following components: 0.08 ms.The tip 122 is used to design the

- 9v battery H-bridge because it has its own internal
- H-bridge diodes. The maximum collector current
- DC Motor allowed for tip122 is 5A. Thus, it is sufficient to drive the motor.

The diagram in Figure no. 3 shows the driver circuit.

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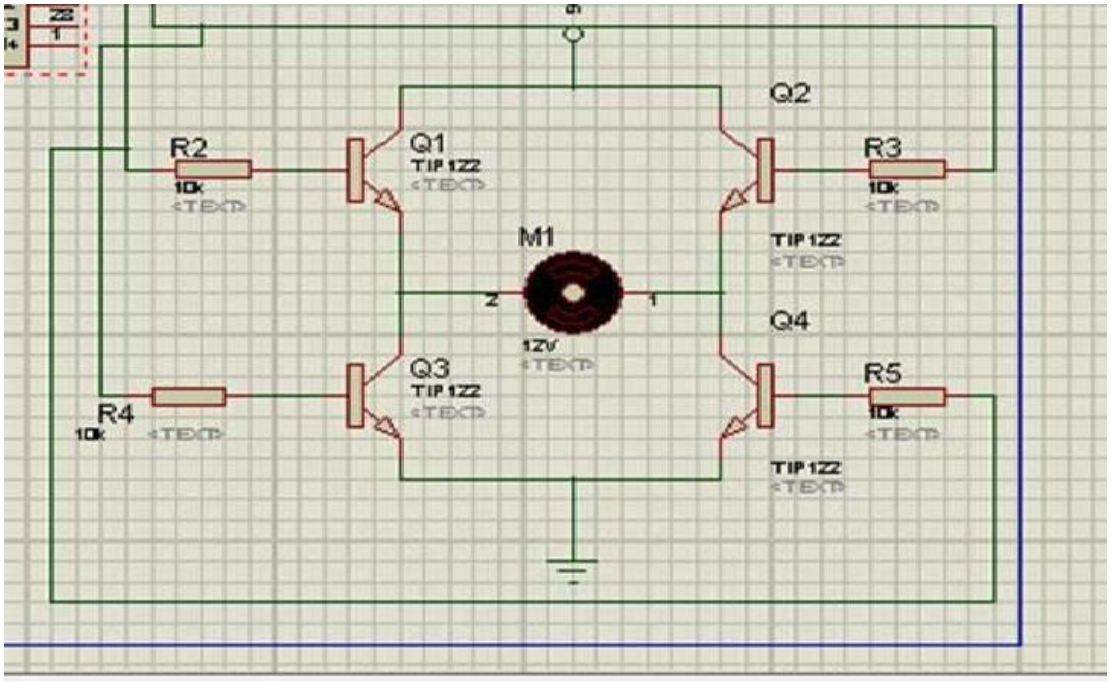

2.3. Obstacle Sensing Unit

To make a successful obstacle sensing unit, the block diagram shown in Figure no. 4 is used The sensor has four pins that is VCC, 2.4. Warning System ground, echo and trigger pulse. VCC and The caution device used includes a ground are connected to the respective pins Light Emitting Diode (LED) and a buzzer. in the microcontroller. The trigger pulse is The LED is utilized as pinnacle distance connected to pin1 of PORT D while the warning and comes with the aid of echo pin is connected to pin 3 of PORT D. connecting an LED to the microcontroller The operation of the sensing unit is as output pin thru a series resistor of 220Ω. follows:

The LED is consuming 20mA for regular ●Send a short, but long enough 10µs brightness and the voltage drop across LED pulse on the trigger pin (module is about 2V. But the voltage at the automatically sends eight 40KHz square microcontroller output is about 5V when wave); the port is at logic one. As a result, a

●Wait for the echo line to go high; resistor is required to be linked in series
●Time the length of the pulse that with the LED.

Hence, there may be a stays high. necessity to calculate a current limiting The length of the pulse is directly resistor value. Hence, if the output voltage of the port is 5V, to have a voltage drop of proportional to distance. The range is then calculated using the following formula: 2V, we need to drop 3V across the resistor. If we anticipate the current thru the LED to Distance in centimeters = µs/58 be 20mA, the resistance value may be determined as:

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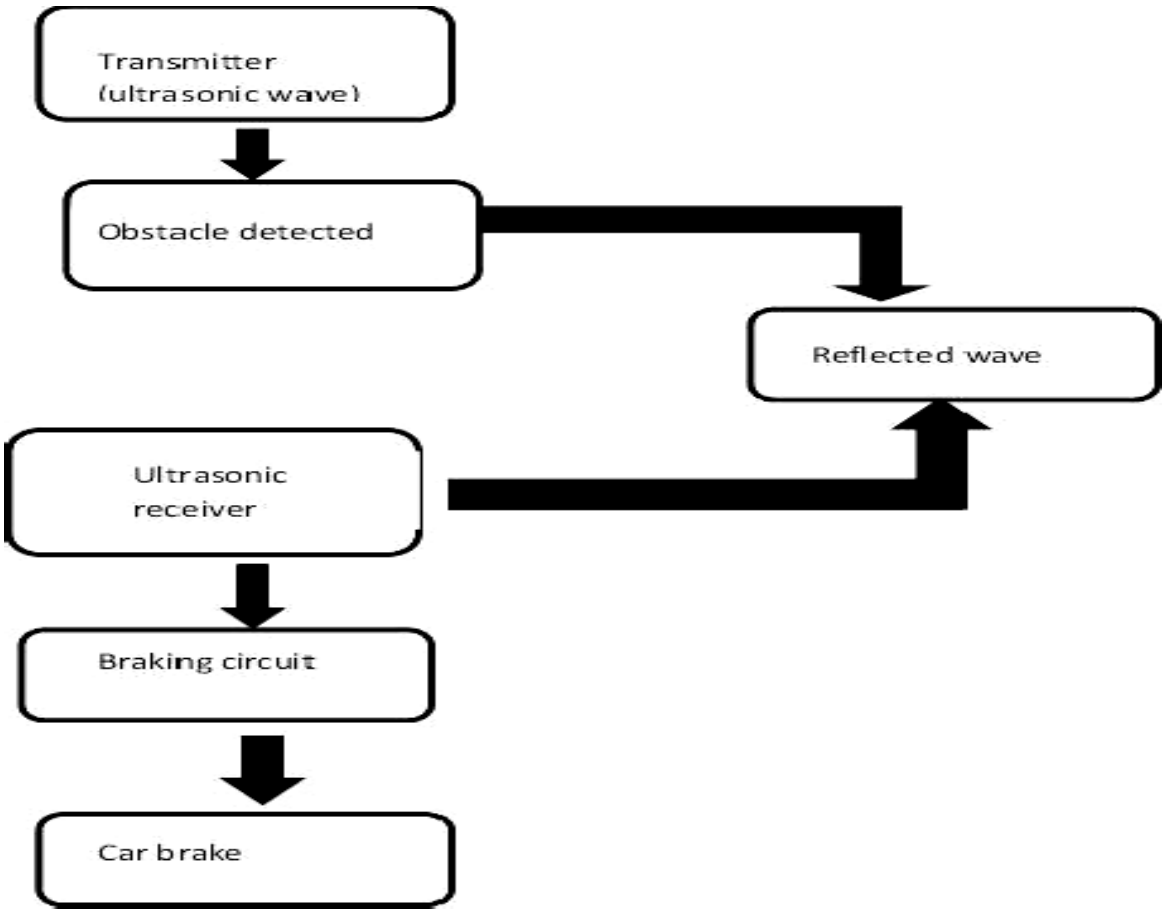

The buzzer is used for the low level distance warning. It is connected directly to the microcontroller output pin. 2.5. Software Design The software should be able to acquire data from the sensor, analyze the data and send the data to the peripheral devices. The software should be integrated into the microcontroller. The language used to program the microcontroller is C++. The program is written in AVR Studio

2.5.1. Programming Environment

The programmer of choice is AVRISPmkII. This programmer is easy to use and very effective. Figure no. 5 shows the AVRISPmkII. This is the programmer that is used to load the program file to the microcontroller. Figure no. 6 shows the pinout of AVRISPmkII. The AVRISPmkII pins are connected to the corresponding pins in the ATMEGA328P microcontroller.

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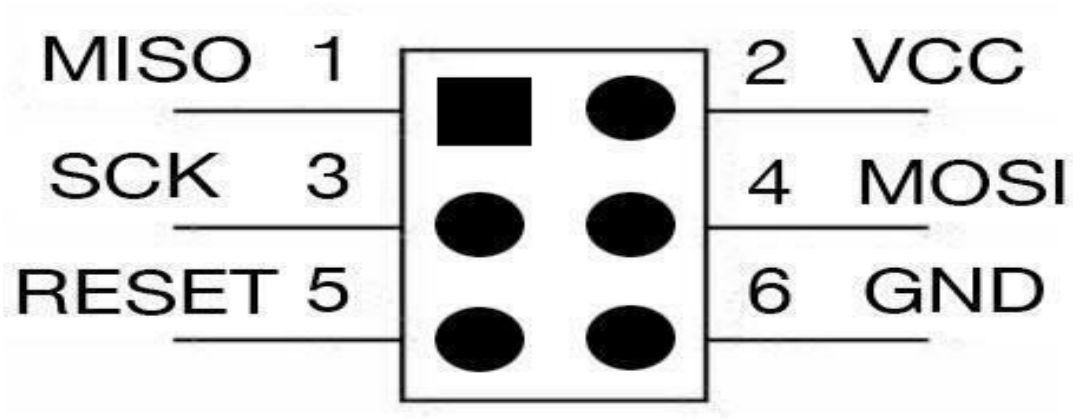
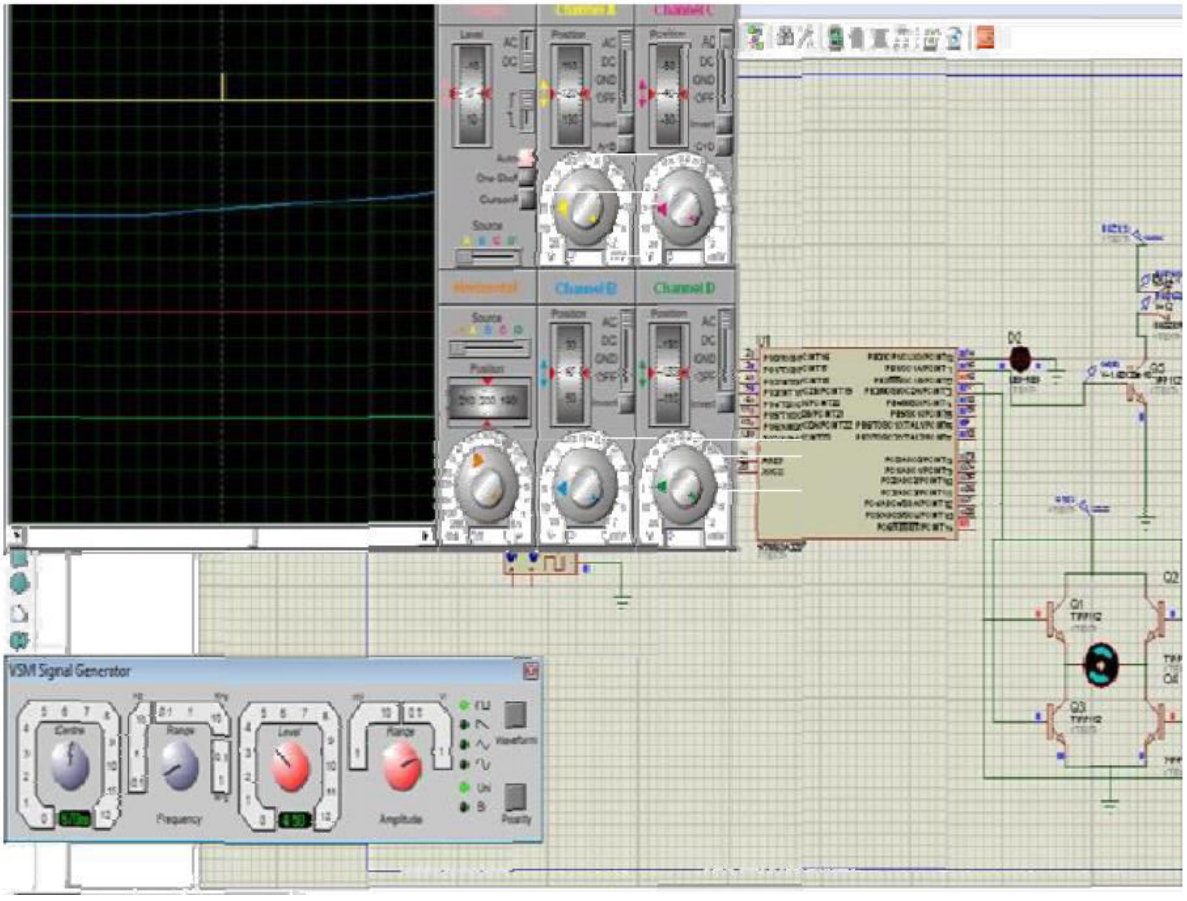


III.RESULTS

Echo pin are observed in the oscilloscope.

3.1. Simulation of the Obstacle

At the beginning, when the frequency is Sensor high, the motor rotated clockwise as the The ultrasonic sensor is simulated by frequency is increased slowly, the LED using a digital oscilloscope and a signal goes ON simulating the top distance generator as shown in Figure no. 9. warning. As the frequency is continued to The signal generator simulator simulates be increased, the buzzer goes ON the incoming square wave that the echo pin simulating low level distance warning. will receive



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. The incoming square wave Finally the motor stops rotating at high that comes into the microcontroller is about 5V. The waves entering the trigger pin and frequency simulating the distance less than 20 cm.

IV.CONCLUSION

A rear end anti-collision warning system was constructed and mounted on a very simple and easily understandable model constructed to demonstrate the system and it was found functional. The sensor was able to read distances that are at shorter range accurately. The system was not real time because there were incidences were the microcontroller didn't receive any feedback. This is due to noise from the environment. A distance sensor that detects objects at long distances is needed to apply on a real vehicle. Hence, if the right materials are collected, it is possible to enhance its features so that it can be used in vehicles. This model is also a good tool to use for demonstration for anti-collision warning system research.

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