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Intelligent Braking System

Ashutosh Raut[1], Vinit Poojary[2], Jayesh Vanarse[3], Adarsh Raut[4], Iqbal Mansuri[5]
[1, 2, 3, 4] *Student,* [5]*Assistant Professor, Department of Mechanical Engineering, Theem College of Engineering, Boisar*

Abstract: ***The braking system was designed and applied on a car to make the driving process safety using embedded system design. Most of the accident occurs due to the delay of the driver to hit the brake, so in this project work braking system is developed such that when it is active it can apply brake depending upon the object sensed by the ultrasonic sensor and speed of vehicle. Currently, vehicles are often equipped with active safety systems to reduce the risk of accidents, many of which occur in the urban environments. The most popular include Antilock Braking Systems (ABS), Traction Control and Stability Control. All these systems employ different types of sensors to constantly monitor the conditions of the vehicle, and respond in an emergency situation. An intelligent breaking system includes an ultrasonic wave emitter provided on the front portion of a car producing and emitting ultrasonic waves frontward in a predetermined distance. An ultrasonic receiver is also placed on the front portion of the car operatively receiving a reflective ultrasonic wave signal. The reflected wave detected pulse) gives the distance between the obstacle and the vehicle and RPM counter gives speed of vehicle. The microcontroller is used to control the braking of the vehicle based on the detection pulse information to push the brake pedal and apply brake to the car stupendously for safety purpose.***

Keywords: safety breaking, ultrasonic sensor, microcontroller, solenoid valve

I. INTODUCTION

Braking systems of commercial vehicles were always given the highest importance concerning safety issues and in particular active safety. Inappropriate braking of these vehicles may cause heavy accidents due to relatively longer stopping distances and higher energy output of brakes particularly in the case of vehicle combinations. The traditional medium used for brake system (compressed air) can be now controlled with the speed and precision offered by modern electronic abilities. “Intelligent Braking System (IBS)” introduced in commercial vehicles providing rapid brake response and release for every single wheel therefore ensuring safety. The extremely rapid response time provided by the electronic control can be used for crucially shortening the braking distance by introducing advanced control of braking system operation. Such a complex task imposed to the control of braking system cannot be based on the driver abilities and need to be done independently of the driver. An improved IBS braking forces management would certainly enable to reach the given task. The advanced strategy for the braking force management, proposed here, is based on intelligent controlling of the braking forces distribution between the front and rear axle of power-driven vehicle and/or between towing/trailer combination and/or between tractor/semitrailer. Intelligent braking system has a lot of potential applications especially in developed countries where research on smart vehicle and intelligent highway are receiving ample attention. The system when integrated with other subsystems like automatic traction control system, intelligent throttle system, and auto cruise system, etc. will result in smart vehicle maneuver. The driver at the end of the day will become the passenger, safety accorded the highest priority and the journey will be optimized in term of time duration, cost, efficiency and comfortability. The impact of such design development will cater for the need of contemporary society that aspires quality drive as well as to accommodate the advancement of technology especially in the area of smart sensor and actuator. The emergence of digital signal processor enhances the capacity and features of universal microcontroller. The overall system is designed so that the value of inter-vehicle distance from infrared laser sensor and speed of follower car from speedometer are fed into the DSP for processing, resulting in the DSP issuing commands to actuator to function appropriately. The most popular systems like “Antilock Braking Systems (ABS)”, Traction Control and Stability Control employ different types of sensors to constantly monitor the conditions of the vehicle, and respond in an emergency situation. An intelligent mechatronic system includes an ultrasonic wave emitter provided on the front portion of a car producing and emitting ultrasonic waves frontward in a predetermined distance.

An ultrasonic receiver is also placed on the front portion of the car operatively receiving a reflective ultrasonic wave signal. The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle. Then a microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply brake.

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II. PROBLEM STATEMENT

Now-a-days, accident prevention is the major sector of research. We are seeing the most of accidents, occurred due to drivers mistake. To avoid that mistake, some arrangements are needed to help driver in critical condition. So, Intelligent Braking System is such type of system which applies brake without the permission of driver by sensing the obstacle in the given path and helps to avoid accidents. Intelligent Braking System is introduced for providing safety and comfort to driver during driving. The main aim of the system is avoid damage of life and property.

III. METHODOLOGY

1) The Intelligent braking system uses ultrasonic sensor mounted on the front end of the automobile to detect the distances of obstructions from the automobile.

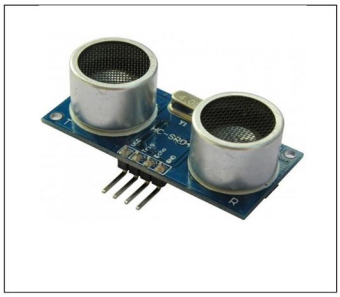

Fig 1. Ultrasonic sensor

2) This signal input along with the speedometer input is send to the microcontroller. Microcontroller uses the algorithm provided and the two information signals to decide whether to take braking action or not if the driver does not apply.

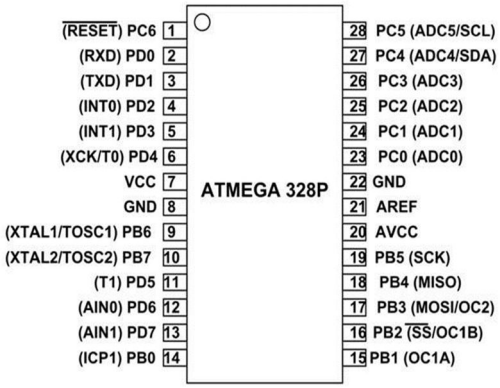

Fig 2. Microcontroller

3) Brakes are applied by controlling a solenoid valve.

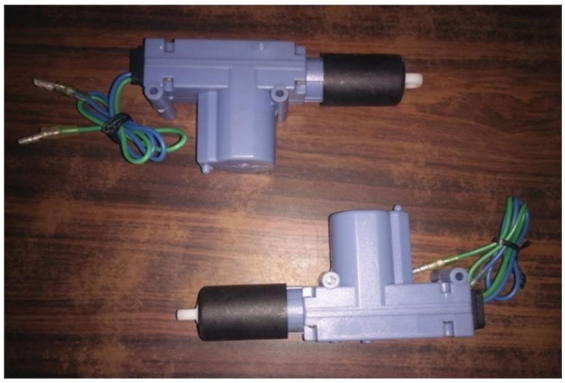

Fig 3. Solenoid valve

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4) The whole system consists of a prototype of a vehicle which consists of a chassis made of Aluminium angle.

Fig 4. Aluminium angle

5) Wheels we have used is of rubber and plastic which is easy to mount durable and cheap

Fig 5 .wheels

6) 12v motor of 100 rpm drives the system consists of

Fig 6.motor

7) Power supply is used to convert 230V/7A power supply to 12V/5A power which is required for solenoid piston and dc motors and then12V supply is the converted into 5V Power with the help of the regulator IC's which is required for controller and Ultrasonic sensor working

Fig no 7 SMPS

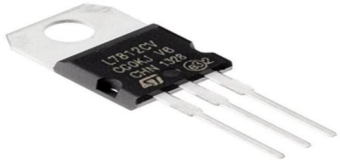

Fig no 7.1 regulator IC'S

8) PVC angles can be used on external or internal corners to conceal fixings and edges. Low maintenance will not rust. Can be fixed using screws, nails or adhesives.

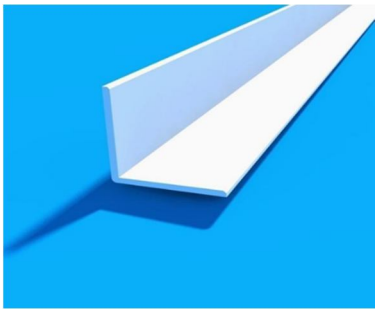

Fig no 8.PVC Angle

Fig no 8.1. nut bolts

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IV. RESULT

A. *Time and Stooping Analysis*

Table no 1

Brake Time (milli second)	Speed	Stop Time (Milli Second)	Dynamic Weight Transfer
200ms	50 rpm	300ms	0.5m
200ms	60 rpm	400ms	0.5m
200ms	90 rpm	500ms	0.5m
200ms	100 rpm	600ms	0.5m
200ms	120 rpm	800ms	0.5m
200ms	150 rpm	1000ms	0.5m

B. *Speed vs Stooping Graph*

Graph no 1. Speed vs stooping

We have Successfully designed a Intelligent Braking System Project. Which is able to perform the operations as detection of the obstacle located in front of the vehicle when it comes in certain range of the sensor. After detection of the obstacle in the front then our system is able to take necessary steps to stop the vehicle before collision and that step is braking of the vehicle using Solenoid Pistons. This all system works with very synchronization and the responses to the obstacle within fraction of second.

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V. CONCLUSION

The prototype incorporating intelligent braking system is designed and fabricated. On testing prototype applies brake automatically when an obstruction comes in front of the range of sensors and avoid an imminent collision. This is an innovative project on modern and advanced braking system The Intelligent braking system is an automatic braking system which can be incorporated in a wide range of automobiles. This braking system can be mainly used to avoid vehicle accident that occurs due to the absent mindedness of drivers or due to lack of sleep for long distance drivers and it also offers efficient vehicle speed control on inclined roads.

VI. ACKNOLEDGEMENTS

We would like to express our deep sense of respect and gratitude toward our guide, prof. Iqbal Mansuri, who didn't only guide the academic project work but also stood as a teacher and philosopher in realizing the imagination in pragmatic way, we want to thank him for introducing us to the field of Optimization and giving the opportunity to work under him. His optimism has provided an invaluable influence on my career and outlook for the future. We consider it our good fortune to have got an opportunity to work with such a wonderful person. He has been great source of inspiration to us and we thank him from bottom of our heart .We like to express our gratitude to our workshop staff, our head of the department, Prof. M.A. Gulbarga and our Principal Dr. Aqueel Ahmed Shah for their valuable advice and permission for carrying out project work inside the college premises. We are especially indebted to our parents for their love, sacrifices and Support. They are our teachers after we came to this world and have set great example for us about how to live, study and work.

VII. CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article

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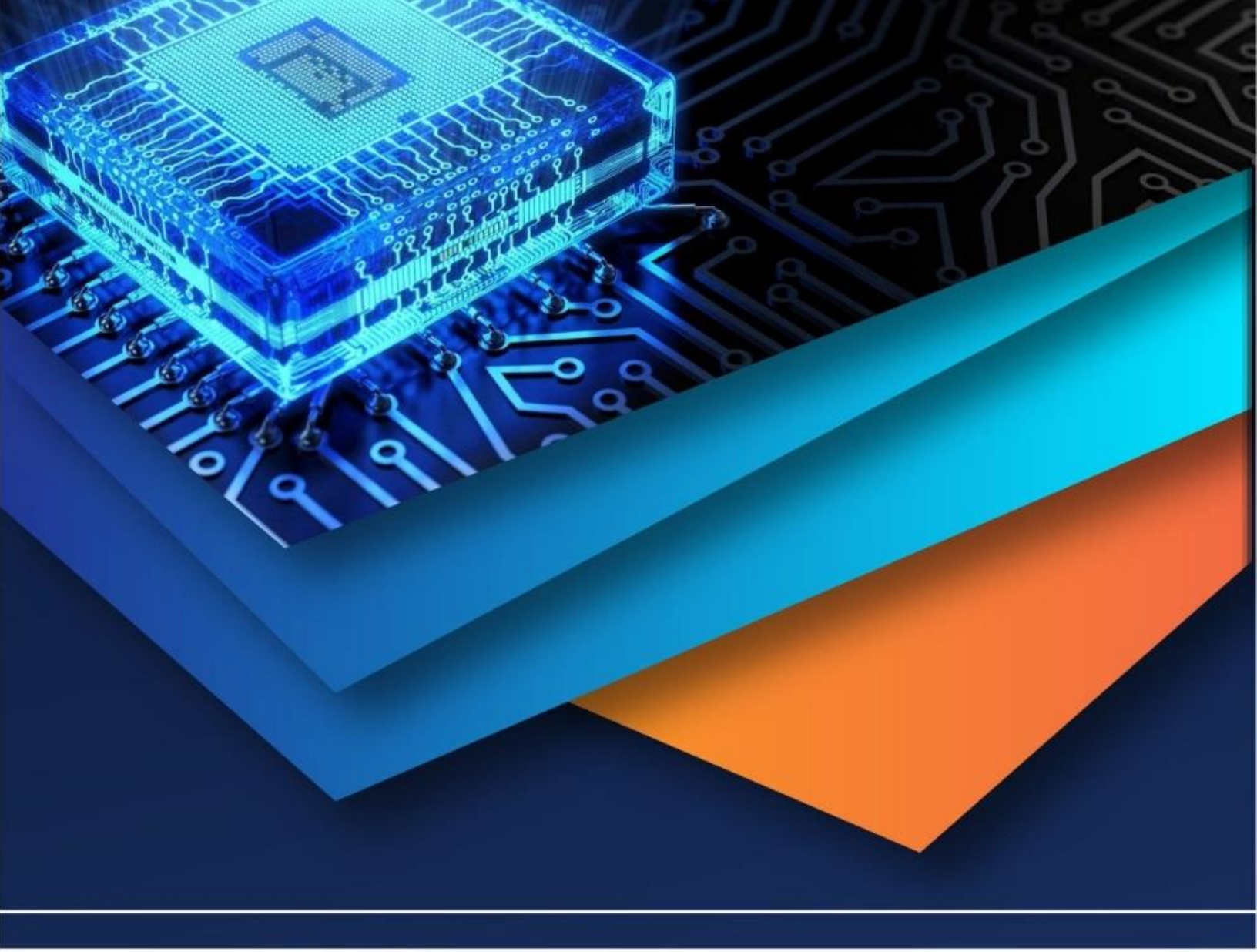

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