

Automatic Braking With Pneumatic Bumper

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ABSTRACT : The number of accidents taking place are increasing very rapidly in India, Which is due to the inefficiency or inability of driver to apply brakes at the right time or it may also cause due to the unwanted parameters in the environment like dust, Smog, low light etc. Therefore we have designed and developed an electronically operated automatic braking system, Which will sense the obstacle in the way and apply the brakes Automatically and vehicle will stop. Simultaneously, the Bumpers will also be extended. This system is very useful to avoid the accident and eliminates the chances of Injuries, It also provides external safety to the vehicle with the help of Pneumatic Bumpers.

Key Words: Automatic Braking, Pneumatic Bumper, Ultrasonic Sensor, Electronically Controlled System, External Safety.

1. INTRODUCTION

Today India is one of the most important country in the world in terms of development. The automobile companies in india have also progressed on a large scale and the demand of vehicle are increasing day by day with the increase in Population. But Due to the lack of resources for running vehicles like quality of roads, Environmental Parameters, Unavailability of New Technologies etc. Accidents are taking place on a regular basis. The Number of people being dead every year due to accident are rapidly increasing, Accidents also damages the vehicle.

In Todays Generation, with the improved technology latest braking systems are available like Antilock Braking System(ABS), Brake-by-Brake Wire (BBW) etc. But these improved braking systems are of no use Unless a proper implementation of braking system is done at right time.

So, for the correct and accurate implementation of the latest braking System at the right time We have designed and developed an "Automatic Braking System with Pneumatic Bumper". It is a project which is fully designed for Automobiles.

Sometimes Environmental impacts like fogg ,Smog ,Low light can also be the causes for the Accident. Hence, there are No provision to minimize the human errors or to eliminate environmental impacts which are the major causes for the accidents leading to a death of peoples. Thus, Our Current project is suitable to reduce the human errors and minimize the chances of accidents and also gives external safety to the vehicle with the use of pneumatic bumper.

1.1 Pneumatics

Pneumatics is the Science and Technology of Pressurized air, Compressed air to transmit force and Energy. Pneumatic Machines run on five basic components to make, store, control, move, and use compressed air.

- 1) A Compressor – Makes Air
- 2) Reservoir – Store air
- 3) One or More Valves – Control Air
- 4) A Circuit – Moves air between Components
- 5) An Actuator or motor – Use air to perform Operation.

Pneumatic Device get all their power from the energy in the compressed air they use, so you can probably see straight away that they need two components : Compressor to compress the air and actuator to lift, move or hold on object.

1.2 Ultrasonic Sensors

An Ultrasonic sensor transmit ultrasonic waves into the air and detects reflected waves from an object. There are many application for ultrasonic sensor such as In Intrusion alarm system, Automatic Door Openers and backup sensors for the automobile.

This Sensors uses Sound instead of light for the detection of the obstacles. Hence, this sensors have more advantages over other types of detection sensors.

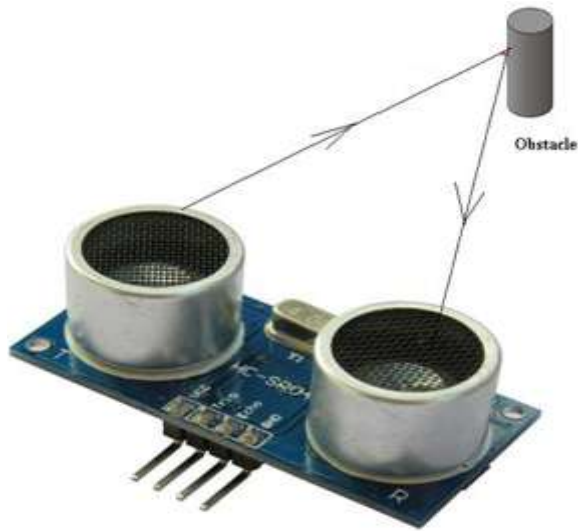


Fig. 1 Ultrasonic Sensor

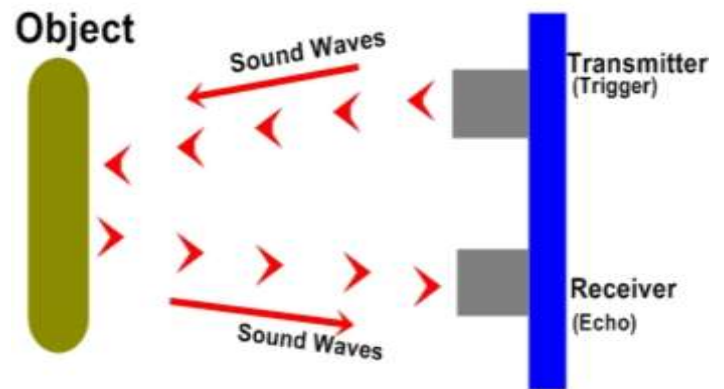


Fig. 2 Ultrasonic Sensor Working

2. OBJECTIVES

In this Project, Our aim is to reduce the Human Errors and avoid the accidents that takes place due to the mistake of the Drivers. This project mainly ensures safety to the 4-wheeler automobile and the passenger inside it. The Extractable Bumpers will give external safety to the vehicle. By this Project, We will reduce the number of accident, Save more lives, and will also decrease the medical cost to the Society.

Our Objectives can be listed as follows :

- 1) To Eliminate the Human Errors
- 2) To reduce the Chances of Accidents
- 3) To Increase the Crashing Distance during Accidents
- 4) To Increase the Safety Level of Passenger
- 5) To reduce the Requirement of Airbags
- 6) To Provide External Safety to Vehicle

3. COMPONENTS

- 1) Double Acting Pneumatic Cylinder
- 2) Flow Control Valve
- 3) Wheel
- 4) Solenoid Valve
- 5) Ultrasonic Sensors
- 6) Frame

- 7) Compressor
- 8) Brake
- 9) Single Phase Induction Motor
- 10) Battery(power Source)

4. METHODOLOGY

The project mainly consists of the four wheel prototype which driven by using a motor. The frontal area is covered by the bumper, which is connected to the one pneumatic cylinder. The Ultrasonic sensor is placed just below the bumper. When any obstacle, humans, animals or vehicle came in front of the vehicle then the installed ultrasonic sensor senses that obstacle. The range of distance between the vehicle and obstacle is variable. This range is varied according to the density of vehicles or humans on road. The received signal by Ultrasonic sensor is provided to the control unit. This control unit operates the relay according to the input signal.

At the same time, Ultrasonic sensor activates solenoid which applies the brake as well as extend the pneumatic bumper.

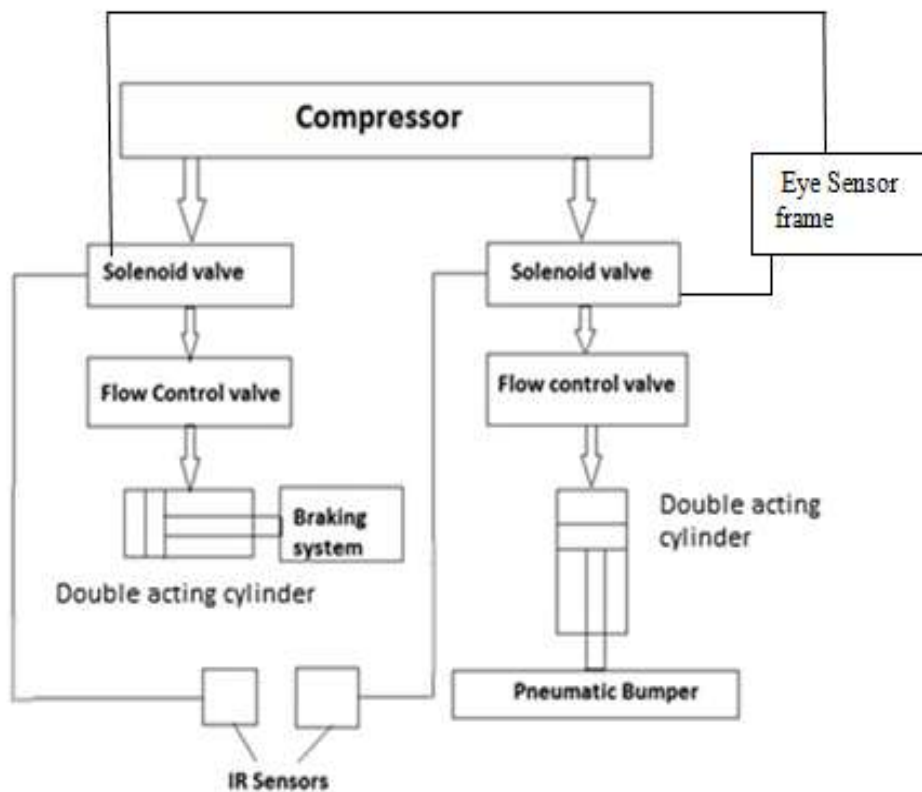


Fig. 3 Flow Diagram

5. ADVANTAGES

- 1) It provides safety of driver and vehicle.
- 2) This system improves the response time of vehicle braking to keep safe distance between two vehicles.
- 3) Increases the External Safety of Vehicle.
- 4) Eliminates Human Errors.
- 5) Ultrasonic Sensors do not get affected by smog, fogg, brightness, low light etc.

6. DISADVANTAGES

- 1) Cost is high because of use of compressor.
- 2) Comparatively higher cost of Ultrasonic sensor than IR Sensor.
- 3) Only useful for front side protection.
- 4) Not useful when vehicle will be coming from back side.

7. CONCLUSION

Behind the designing of this system, our main aim is to improve the prevention technique of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. We observed that our work is able to achieve all the objectives which are necessary.

Initial cost of cars with air bags is always high. Usually air bags are given to high end cars. By implementing this project we can reduce cost of high end cars by giving similar kind of safety. Air bags are helpful to provide internal safety to people sitting in vehicle, whereas in our project we will be giving internal plus external safety to car from damage.

Thus we will reduce initial cost of cars and also provide better safety.

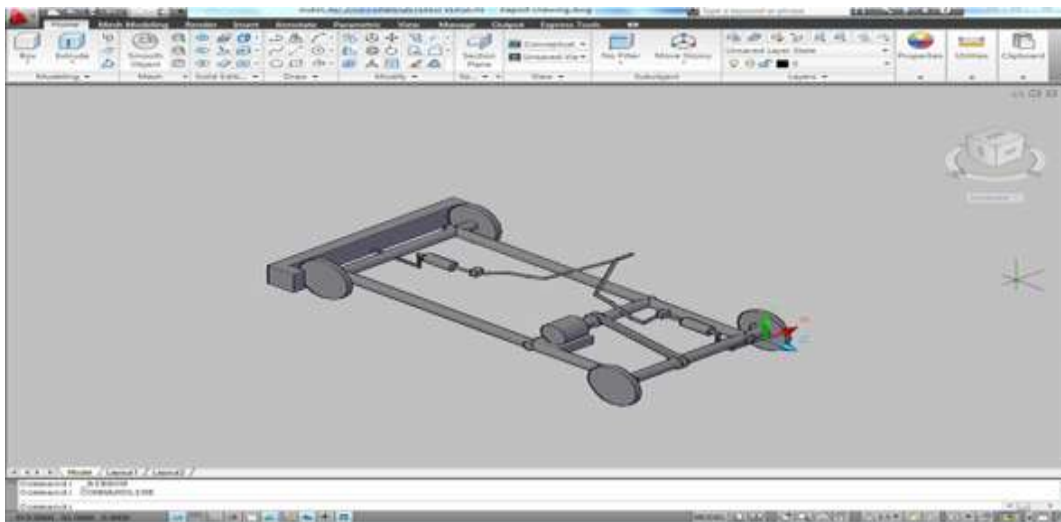


Fig. 4 CAD Model

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