

Development of Accident Preventive Bumper

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ABSTRACT

Now-a-days, accidents taking place are very frequent in India which occur mainly due to the inefficiency of driver to apply brakes at the right time. To prevent the accident, there is no provision to apply brakes when the driver fails. Also, In currently used vehicles generally bumpers used are of rigid types. These bumpers have specific capacity and when the range of the accidental force is very high then the bumper fails and the force is transferred towards the passengers. So the current system never reduces the damage of both vehicle and passengers. To overcome these two problems development of automatic bumper and braking is important. Therefore, the aim is to design and develop an electronically intelligent braking system which can automatically sense the objects ahead of the vehicle and applies brakes itself to avoid collision. The system also activates extractable bumper which may extract and reduces the damage to the vehicle's body. This bumper may extract or retract with the help of using Pneumatics technology which is much easier to implement and is readily available easily. Automatic braking system use the infrared sensor (IR), which is used to sense the vehicle coming from front of our vehicle and which is responsible for accident. Then sensor sends feedback signal to the control unit and activates the solenoid valve. When the solenoid valve gets actuated, the compressed air goes to the pneumatic cylinder and actuates it. During the working of Automatic braking system simultaneously the control unit activates the pneumatic bumper system to reduce the damage to vehicle which occurs in accidents. This system provides pre-crash safety to the vehicle.

Keyword Keyword - Accident Preventive, brakes, control, vehicle, bumper.

1. INTRODUCTION

Automobile vehicles have become integral part of our lives. With growing number of vehicles on road, the numbers of traffic accidents are also increasing. It is important to prevent the chances of accidents and to protect the passengers when accidents occur. Air bags provide safety, but they are costly. Safety, being a matter of prime importance, cannot be compromised for cost. Hence our attempt is to provide a reliable and safe system at low cost. Though there are different causes for these accidents but proper technology of braking system and technology to reduce the damage during accident can be effective on the accident rates. So, in today's world, implementation of proper (automatic) braking system to prevent the accidents is a must for vehicles. Therefore, pre-crashing system is demanded. Such a system will prevent accidents on roads.



In conventional vehicles there are different mechanism operated for braking system like use of hydraulic, pneumatic, or mechanical system. But all these braking mechanisms receive the input signal directly from the driver by application of force on brake pedal. Thus, braking of vehicles is totally manual operated. So, if the driver fails to see the obstacle in front of his driving vehicle or fails to apply proper braking force on the brake pedal, he may lose the control of his vehicle, leading to accident. Also the driver may not able to pay complete attention when driving at night. So there are many chances of accidents. Hence, there is no provision to minimize the damage of vehicles. Thus, the current designed system only fairly reduces the damage of vehicle and/or passengers.

2. LITURATURE SURVEY

A research paper on “Automatic Pneumatic Bumper And Break Actuation Before Collision” Srinivasa Chari.VI, Dr.Venkatesh P.R2, Dr.Prasanna Rao N.S3, Adil Ahmed S 4 04 | July-2015 (IRJET)tells thatWe have pleasure in introducing our project “AUTOMATIC PNEUMATIC BUMPER AND BREAK ACTUATION BEFORE COLLISION”. Which is fully equipped by IR sensors circuit and Pneumatic bumper and braking activation circuit? It is the project which has been fully equipped and designed for auto vehicles.

The technology of pneumatics plays a major role in the field of automation and modern machine shops and space robots. The aim is to design and develop a control system based on intelligent electronically controlled automotive bumper activation system is called “automatic pneumatic bumper and break actuation before collision”. The project consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system. The IR sensor senses the obstacle.

There is any obstacle closer to the vehicle (within 1feet), the control signal is given to the bumper and break activation system. This bumper activation system is activated when the vehicle speed above 40-50 km per hour. The speed is sensed by the proximity sensor and this signal is transfer to the control unit and pneumatic bumper activation system.

The aim is to design and develop a control system based on pneumatic braking system of an intelligent electronically controlled automotive braking system. for comparison of iterative technologies / techniques. The final phase of the new modern vehicle shall include: • Development of improved ABS control systems •Development and assessment of an electro-hydraulic- BBW (EH-BBW) system

• Individual wheel braking combined with traction control •Assessing sensor failure and fault tolerant control system design • Preliminary studies into an electrically actuated system • Re-engineering using simplified models.

Accidents can be happened in various factors such as drunk driving, texting while driving, speeding, distractions, sleeping on the vehicle, etc. Accidents due to drowsiness are more inclined and need to be controlled. This results in reduced vehicle the major causes of road accidents. Techniques for identify and observe the persons of deprivation and overall health into practices. Drivers with sleep liability have risks in being involved with the accident. While driving at the speed of 100km/hr., if the person falls sleepy not more than 4 seconds the buzzer will enable.

Many pedestrian crashes involve a forward moving car (as opposed to buses and other vehicles with a vertical hood/bonnet). In such a crash, a standing or walking pedestrian is struck and accelerated to the speed of the car and then continues forward as the car brakes to a halt. The pedestrian is impacted twice, first by the car and then by the ground, but most of the fatal injuries occur due to interaction with the car. Vehicle designers usually focus on understanding the car-pedestrian interaction, which is characterized by the following sequence of events: the vehicle bumper first contacts the lower limbs of the pedestrian, the leading edge of the hood hits the upper thigh or pelvis, and the head and upper torso are struck by the top surface of the hood and/or windshield.[2]

3. CONSTRUCTION & WORKING

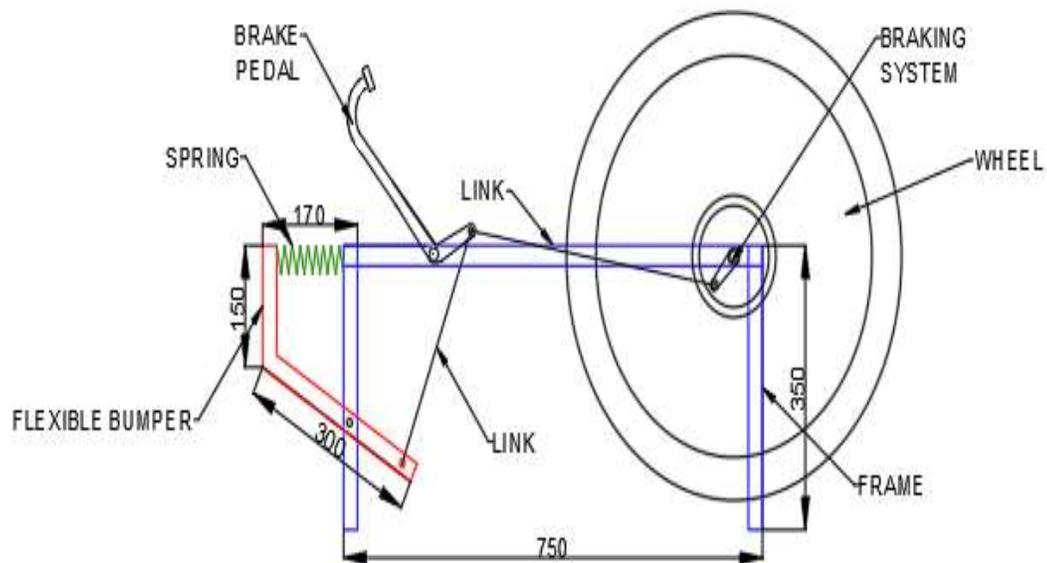


Figure shows actual diagram of project here flexible bumper is attached to the chassis of the vehicle by means of spring. Hence bumper gets compressed against spring force on the application of External force. Hence, we called this Bumper as Flexible bumper because it gets pressed under the application of external force. Hence this bumper is pressed due to any obstacle coming front of the vehicle.

A link is used which is pivoted to the chassis and connected to flexible bumper and link of brake pedal.

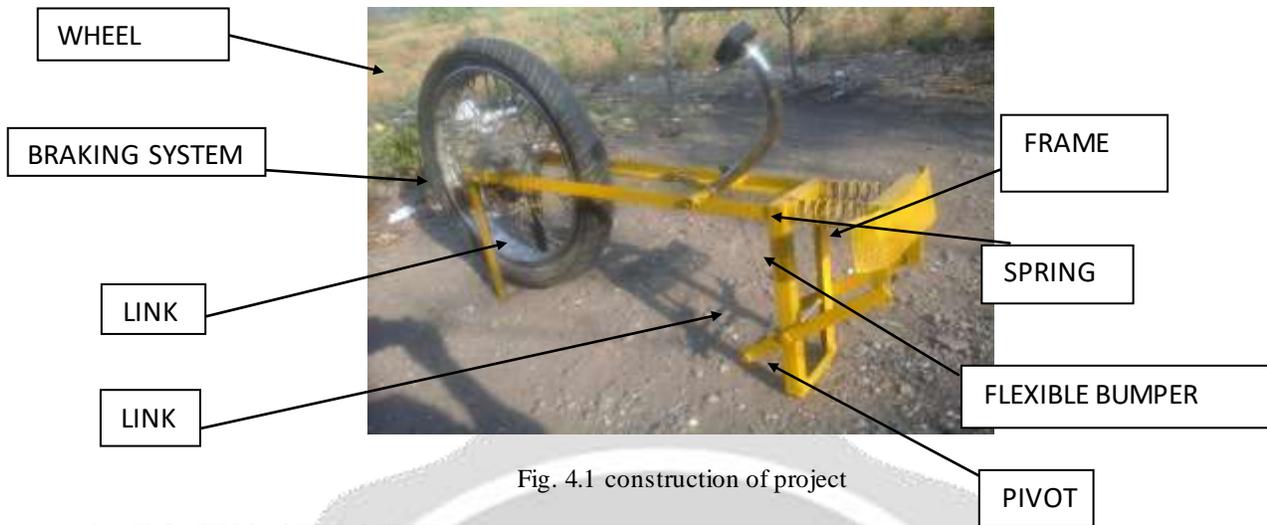


Fig. 4.1 construction of project

4. WORKING OF PROJECT

In this project we replace the sensor, pneumatic bumper system and intelligent braking system.

When obstacle comes in front of vehicle then first it compresses the spring loaded flexible bumper first and take some time to reach the actual chassis of vehicle.

During this time interval flexible bumper rod drags the brake and clutch pedal by means of spring and it actuate clutch and brake of the vehicle.

Hence in that way vehicle stops without actual contact with chassis. In that way collision is reduced by stopping the vehicle & collision is avoided if same system is apply for front side of vehicle. Crumple zones are designed to increase the time over which the total force from the change in momentum is applied to an occupant, as the average force applied to the occupants is inversely related to the time over which it is applied.

In this type of system totally use of mechanical system and they are working at the when accident are happens on the road.

Typically, crumple zones are located in the front part of the vehicle, to absorb the impact of a head-on collision, but they may be found on other parts of the vehicle as well. According to a British Motor Insurance Repair Research Centre study of where on the vehicle impact damage occurs, 65% were front impacts, 25% rear impacts, 5% left-side, and 5% right-side.[6] Some racing cars use aluminium, composite/carbon fibre honeycomb, or energy absorbing foam[7][8] to form an impact attenuator that dissipates crash energy using a much smaller volume and lower weight than road car crumple zones.

Impact attenuators have also been introduced on highway maintenance vehicles in some countries.

On September 10, 2009, the ABC News programs Good Morning America and World News showed a U.S. Insurance Institute for Highway Safety crash test of a 2009 Chevrolet Malibu in an offset head-on collision with a 1959 Chevrolet Bel Air sedan. It dramatically demonstrated the effectiveness of modern car safety design over 1950s design, particularly of rigid passenger safety cells and crumple zones.[9] [10]

5. COST ESTIMATION

Table - Brought Out Material Cost

Sr.No.	Name of component	Specification	QTY.	Cost
01	Wheel with Drum	325 mm dia.	01	450

02	Tyre	330 mm dia.	01	120
03	Brake shoe with link		01	350
04	Axle	200mm long	01	80
05	Bearing for wheel hub		02	160
06	L channel (Angle)	1" and 15 feet	01	420
07	Sheet metal	0.5 mm thick perforated	01	40
08	Pivot rod	200mm long	02	80
TOTAL				1700

6. MANUFACTURING COST

Table 8.2 MANUFACTURING COST

Sr.No.	Manufacturing	Time	Cost
01	Frame	80 min.	510
02	Bumper	40 min.	230
03	Assembly	10 min.	30
TOTAL			770

7. FEATURES

Advantages

1. It activate only obstacle compresses the flexible bumper of vehicle. Hence avoid unnecessary movement of bumper.
1. It does not require any proximity sensor which is costly.
2. It does not require any require intelligent braking system to stop the vehicle when bumper is activated.
4. Overall cost & size becomes low due to absence of sensor, intelligence braking system, pneumatic system with compressor.

Limitations

1. For avoid total accident then this system require for both the vehicle.
2. Time interval require for obstacle to compress flexible bumper and chassis must be as high as poss

Applications

1. 3 wheelers & 4 wheelers can use this to avoid damage of vehicle body & human due to accident from obstacle coming from the front of vehicle.
2. If this system applied for both vehicle which striking front to front then accident chances is totally eliminated.

7. Conclusion

In that way here we introduced such a system which is totally mechanical and apply the clutch and brake when obstacle compress the spring-loaded flexible bumper. Here we lower the Overall cost & size due to absence of sensor, intelligence braking system, pneumatic system with compressor.

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are able to understand the difficulties in maintaining the tolerances and also quality.

We have done to our ability and skill making maximum use of available facilities. There is lot of scope for future development in vehicle. The technology of pneumatics has gained tremendous importance in the field of workplace rationalization and automation from old- fashioned timber works and coal mines to modern machine shops and space robots. It is therefore important that technicians and engineers should have a good knowledge of pneumatic system, air operated valves and accessories.

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