



# Design & Fabrication of Intelligent Bumper and Braking System

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## ABSTRACT

In today's world automation is increasing day by day which includes Pneumatic technology, it had gained tremendous importance from old age & coal mining to modern machines like heavy machinery's & even in space robot's. to surf along with the study or market research one should must have knowledge in pneumatic system. The main course of this project is to study on pneumatics' and to relate the topic in the project. In that case we designed and fabricated Intelligent electronically controlled automotive bumper activation called "PNEUMATIC BUMPER & BRAKING SYSTEM". This system has a ARDUINO UNO as a micro controller, IR transmitter & Receiver circuit & Pneumatic actuators used as braking & bumper system. Now a day's accident is a huge problem especially in INDIA due to improper construction of road and tracks. To overcome this problem this project helps in minimizing the accidents & greatest damage to the person if accident takes place.

## INTRODUCTION

Over the years, automotive safety has gained an increasing amount of interest from the general public, governments, and the car industry. Traffic accident statistics more than justify this focus, as each year around 1.2 million people dies due to road traffic accidents.

An automobile has been used to move human beings or something since the automobile was invented and the automobile technology has been developed within the last few years. Recently, the automobile is thought as daily necessities because we spend much time in an automobile and enjoyed the entertainment such as game, e-mail, DVD, mp3, and internet etc. in the car. Car makers in Europe and Japan are developing for safety such as both collision safety and preventive safety and new car technology for intelligent car such as intelligent transport system (ITS), rear view camera

system, Road-to-vehicle and Inter-vehicle Communication Systems, auto-parking system, hybrid car, electric car, and hydrogen fuel car. Car makers are beginning to develop equipment for high-end vehicles with systems to sense roadway conditions using cameras, radar, sensors and such in an effort to avoid accidents. The traffic accident is increasing as automobile production has been increasing. It is important to prevent accidents and to protect the driver and pedestrian when accidents were occurred. Therefore, pre-crashing system will be demanded. The pre-crash system is to prevent front-end, rear-end, right-turn and left-turn accidents on roads with poor visibility by using sensor network to find invisible vehicles, which are to be detected by autonomous on-vehicle sensors. The pre-crashing system is processing the sensor data and controlling the vehicle to prevent front-end, rear-end accidents and accidents

caused by careless driving. The development of such systems to automatically control vehicles and avoid accidents will accelerate in the future. The important thing in auto-braking system is detect the distance and speed of front vehicle to prevent a traffic accident. In conventional vehicles there are different mechanism operated for braking system like hydraulic, pneumatic, air, mechanical, etc. But all these braking mechanisms receive the signal or input power directly from the driver so it totally manual operated. When the driver saw the obstacle or any vehicle in front of his driving vehicle, he was irritated or becomes mazy. Due to this the driver fails to give the proper input to braking system and proper working is not occurs. Also, the driver may not able to pay the full attention during night travelling so there are many chances to accidents. After the accident occurs, there is no any provision to minimize the damages of vehicles. 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 bumpers are fails and this force transferred towards the passengers. So, this system never reduces the damage of both vehicle and passengers. To overcome these unwanted effects, we have to design the Automatic Braking System with Pneumatic Bumpers which have following objectives.

### **PROBLEM DEFINATION**

In conventional vehicles there are many different mechanisms involved for operating braking system like hydraulic, pneumatic, air, mechanical, etc. But from all these braking mechanisms they receive signal or input power directly from the driving force so it becomes totally manual operated. When the driver figures the obstacle or any vehicle in front of his driving vehicle, he gets irritated or becomes mazy. Due to this the driver fails to give the proper input to braking system and proper working does not occur. Also the driving force might not ready to pay the complete attention during night travelling so there are many chances to accidents. So this technique never reduces the damage of both vehicle and passengers. To overcome these unwanted effects, we have to design the Automatic Braking and bumper System.

### **OBJECTIVES**

- To increase the sureness of braking Application.
- To increase the response time of braking system.
- To improve the pre-crash safety.
- To avoid the percentage of passenger injury by using external vehicle safety.
- To reduce the requirement of internal safety devices like air bags.
- Development of improved ABS control systems
- Development and assessment of an electro-hydraulic- BBW (EH-BBW) system
- Individual wheel braking combined with traction control

### **LITERATURE REVIEW**

#### **By Sanjay Kumar Singh\*\* Ashish Misra\*\*\* Road Accident Analysis: A Case Study of Patna City**

As you would expect, one of India's poorest and densely populated states, Bihar's capital, Patna, is noisy, crowded, polluted, and typically chaotic. The roads in the city are congested and encroached by other activities. Bus services in particular have deteriorated, and their efficiency and quality of service have been declining thus inducing passengers to turn to personalized modes and IPTs. This results not only in restricting the traffic flow, but also putting the road users' life at a great risk. The total number of fatal accidents as well as related fatality in the city is increasing over the years. Persons killed per 100 accidents are alarmingly high, as high as 45 during the year 2000. Pedestrian deaths as a percentage of all road fatalities are also extremely high. During the recent years, they constitute more than 90% of all road fatalities. Also, the adult working age group (18 to 60 years) accounted for more than 80 percent of all casualties. New bypass road on national highway (NH - 38) is the most accidents prone location in the city where around 15% of all accidents occurred during the year 2000. We believe that individual road safety audit for this location should be carried out by a multi-disciplinary team of experts to suggest correctivemeasures.

#### **By Zhiqiang Xu Talking about the Automobile Braking System**

With the continuous progress of society, the continuous development of the times, people's

living standards continue to improve, people continue to improve the pursuit. With the rapid development of automobile manufacturing, the car will be all over the tens of thousands of households, the increase in car traffic, a direct result of the incidence of traffic accidents. Brake system is the guarantee of the safety of the car, its technical condition is good or bad, directly affect the operational safety and transportation efficiency, so the brake system is absolutely reliable. The requirements of the car on the braking system is to have a certain braking force to ensure reliable work in all cases, light and flexible operation. Normal braking should be good performance, in addition to a foot sensitive, the emergency brake four rounds cannot be too long, not partial, not ring.

#### **By Bilal Abdullah BaigHakimuddin. A. Hussain Study of Impact on Car Bumper**

India has a high number of deaths due to road accidents. India has the world's sixth-largest car market, but is still the only country among the global top ten car markets without proper new car safety regulation or testing programs. It is estimated that vehicles in India will cost 8-15% more resulting from compliance with these norms. However, harmonizing India's vehicle safety standards with global standards is expected to help automakers export locally produced cars globally. Since 2006, India has been having more road deaths per year than any other nation, with 230,000 dying annually. Bumpers play an important role in preventing the impact energy from being transferred to the automobile and passengers. Saving the impact energy in the bumper to be released in the environment reduces the damages of the automobile and passengers.

#### **Accident Prevention System by Automatic Pneumatic Bumper**

In today's world vehicle accident is a major problem. To avoid this, we have developed an automatic impact reducing system in our project. The system is based on intelligent electronically control system known as "Automatic pneumatic-bumper system". Automatic pneumatic bumper system uses infrared sensor (IR), which is used to sense the vehicle coming is front of our vehicle which is responsible for an accident. As soon as any object or vehicle is sensed by the sensor the sensor sends feedback signal to engine

through the relay control to activate the Solenoid Valve which allows the flow of compressed air to the cylinder. During the working of Automatic Pneumatic Bumper system simultaneously the driver also tries to stop the vehicle by applying brake pedal which somewhat slows down the engine. The compressed gas flowing through the solenoid valve will activate the cylinder which in turn activates the Bumper. This system provides pre-crash safety to the vehicle. As well as it improves the response time of vehicle braking to keep safe distance between the vehicles. By using this system, we can obtain control over the speed of vehicle in short distance.

#### **Automatic Braking System Using Ultrasonic Sensor**

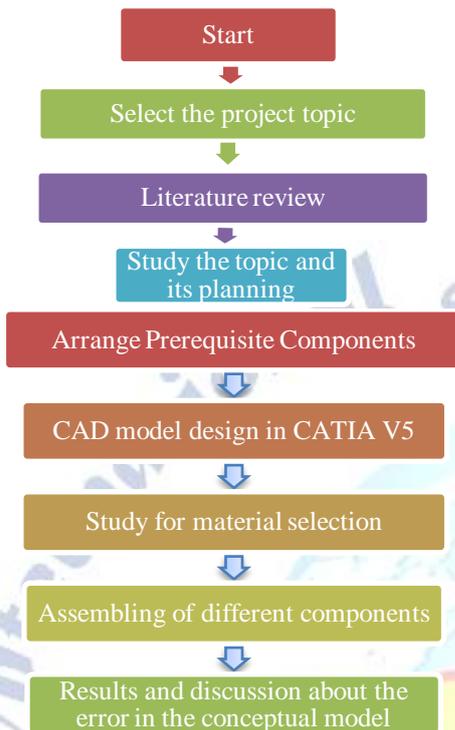
When compared with olden days' life span of human is reduced. Death rate due to accident is drastically increased because vehicles usage is increasing by day by day. Due to brake failure so many accidents are occurring so when we control the brake by automatically we can reduce the effect of accident. An Ultrasonic setup is placed in front of vehicle and that setup consists of an emitter and a receiver. Ultrasonic emitter always emits the ultrasonic waves, whenever a obstacle is detected then wave gets reflected and receiver receives the signal. Reflected wave sends the signal to the Arduino Nano from that based upon distance of object it actuates the buzzer or brakes. Brakes are actuated by using Solenoid valve. Solenoid valve operated by electrical signal and it actuates brakes by using pneumatics. UBS car provides the glimpse into the future of automotive safety. By UBS system we can prevent more accidents and save more lives.

#### **METHODOLOGY**

- started the work of this project with literature survey. gathered many research papers which are relevant to this topic.
- After the components which are required for Theproject are decided.
- en the 3D Model and drafting will be done with the help of CATIA software.
- The experimental observations was taken.
- Result and conclusion was drawn after making the experimental observations

## Process Description

The following diagram makes it easier to understand how we proceed.



## FUTURE SCOPE AND CONCLUSION

The project is combination of the mechanical and Electronics, which is fairly known as the Mechatronics. The upcoming world is full of Automation so we need to develop 'a system which is fully automatic. So, we develop this project for handicapped people to go smart across the world using "Intelligent Wheel Chair". Now a day vehicle accident is the major problem. It is the project which has been fully equipped and designed for auto vehicles. The technology of Mechatronics plays a major role in the field of automation and modern machine shops and space robots.

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