IR BASED BRAKING SYSTEM

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ABSTRACT

The technology of pneumatics has gained tremendous importance in the field of workplace rationalization and automation. The aim is to design and develop a control system based an intelligent electronically controlled automotive vibration system called "Eye blinking system with seat vibration." The pneumatic cylinder system is used to provide safety to the man and vehicle. This system improve the response time of driver to avoid accident by receiving single from pneumatic actuators.

I. INTRODUCTION

Today India is the most important under developed country in the world. India is the largest country in the use of various types of vehicles. As the available resources to run these vehicles like quality of roads, and unavailability of new technologies in vehicles are causes for accidents. The number of peoples which are dead during the vehicle accidents is also very large as compared to the other causes of death. Though there are different causes for these accidents but proper technology of braking system and technology to reduce the damage during accident are mainly affects on the accident rates. So today implementation of proper braking system to prevent the accidents and pneumatic bumper system to reduce the damage is must for vehicles. To achieve this system modification goal, we design this Automatic Braking with Pneumatic Bumper system. It is the project which has been fully equipped and designed for auto vehicles.

II. 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 internal vehicle safety.
- ➢ To reduce the requirement of external safety devices like bumper.

III. 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 IR sensor is placed on specs. When object come across the sensor, the sensor finds obstacle in their path, it sends the signal towards object and receive signal. This output signal sends to the control unit. This control unit operates the relay according to the input signal.

At the same time, IR sensor activates solenoid which applies the brake as well as the pneumatic bumper. We must have to calculate the braking force for stoppage of vehicle and force acting on bumper in the case of collision. Also, we have to calculate the cylinder dimensions for the calculation of the force applied.

IV. DESIGN OF THE SYSTEM

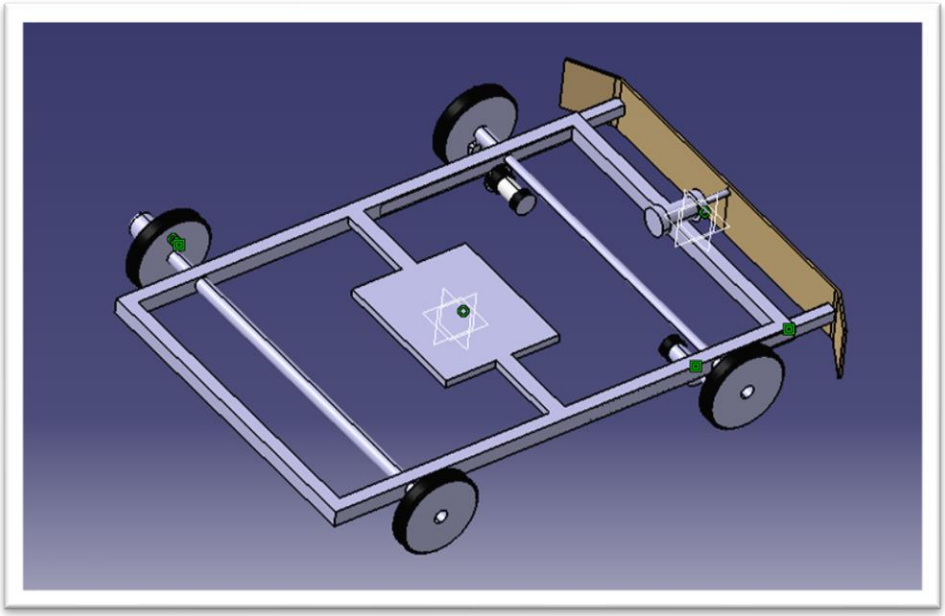


Figure 1: 3D view of building.

V. LITERATURE SURVEY

[1] "Design of Accident Prevention System Using QRD 1114 and CNY70 Sensors" by Apeksha S. Chavan1, Dipali D. Pansare, Swapnil P. Kadam, Naval K. Mayekar, Kavita V.Jha, Poonam R. Bhagwat

Here, usually the upper dipper lights are in upper mode. So, when the driver fails to change the mode of the light and at the same time when the car comes Sleep related accidents tend to be more severe, possibly because of the higher speeds involved and because the driver is unable to take any avoiding action, or even brake, prior to the collision. Horne describes typical sleep related accidents as ones where the driver runs off the road or collides with another vehicle or an object, without any sign of hard braking before the impact. Accidents are also caused when street lights are out specially on highways from the opposite side.it causes the opposite driver to miss the judgement and gives rise to accident. Accidents are also caused due to the intruders coming

suddenly in either side of the vehicle i.e. front, left or right. Due to which the driver misses the judgement and meets with an accident.

[2] "Prevention of Accident Due To Drowsy" by Using Eye Blink B.Praveen kumar, K.Mahendrakan

In this article its Accident due to drowsy is prevented and controlled when the vehicle is out of control. And also, the drunken drive also prevented by installing alcohol detector in the vehicle. The term used here for the reorganisation that the driver is drowsy is by using eye blink of the driver. In recent times drowsiness is one of the major causes for highway accidents. These types of accidents occurred due to drowsy and driver can't able to control the vehicle, when he/she wakes. The drowsiness is identified by the eye blink closure and blinking frequency through infrared sensor worn by driver by means of spectacles frame. The alcohol consumption is also verified during the starting process of the vehicle using alcohol detector. If the driver is drunk then the buzzer indicates and the vehicle doesn't allow the driver to start the vehicle. If the driver is drowsy, then the system will give buzzer signal and the speed of the vehicle is reduced and the obstacle sensor will senses the adjacent vehicle to avoid collision with that, and if there is no vehicle in left adjacent side then the vehicle move to the left end of the road by auto steering and controlling and vehicle will be parked with prior indications.

[3] "Automatic Braking With Pneumatic Bumper System" by Srinivasa Chari.V, Dr.venkatesh P.R, Dr.PrasannaRao N.S, Adil Ahmed S

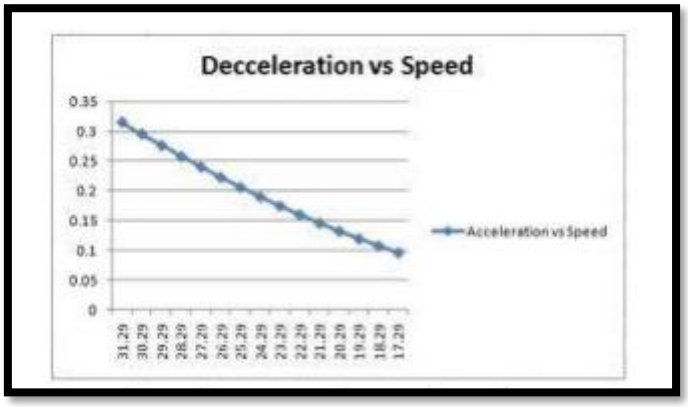
The technology of pneumatics plays a major role in the field of automation and modern machine shops and space robots. The aim is to design and develop a control system based intelligent electronically controlled automotive bumper activation and automatic braking system is called automatic pneumatic bumper and break actuation before collision. This project consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system and pneumatic braking system. The IR sensor senses the obstacle. There is any obstacle closer to the vehicle (within 3-4 feet), the control signal is given to the bumper activation system and also pneumatic braking system simultaneously. The pneumatic bumper and braking system are used to product the man and vehicle. This bumper and braking activation system is only activated the vehicle speed above 30-40 km per hour. This vehicle speed is sensed by the proximity sensor and this signal is given to the control unit and pneumatic bumper and braking activation system.

[4] "Automatic Safety System for Automobiles" by Dr. P. Poongodi PPG, P. Dineshkumar, Karpagam

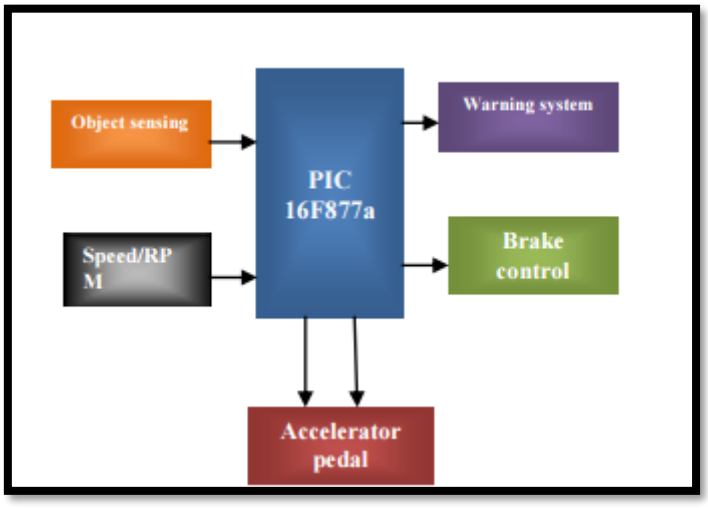
In this paper, the need for safety of vehicles by reducing the impact of crash by applying a smooth or partial braking with the help PIC 16F877a micro controller is proposed. The driver's risk of measuring a

certain object from a particular distance and failing to notice within the critical limit such conditions are met while designing this work. Once a similar situation is faced the acceleration of the automobile will be directly controlled without disturbing the safe throttle (actual throttle mechanism) of the automobile, the designed machine itself takes the control of acceleration pedal if the brake is not applied within the critical distance. The method is proposed in such a way to be applied to both low cost and existing vehicles as these were already build for the Indian roads.

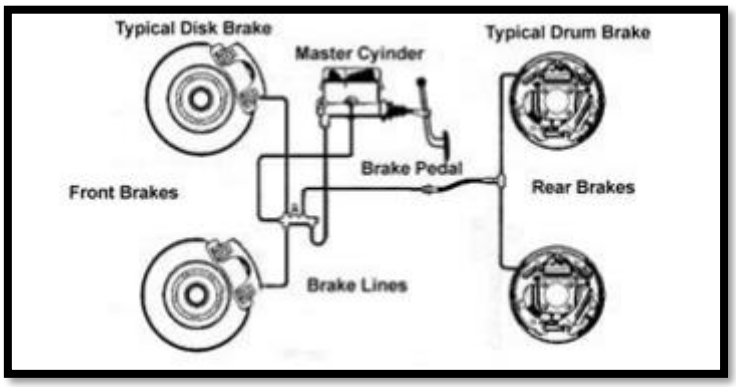
The deceleration is said to be negative acceleration. You are driving your car and the traffic light ahead turns red. You apply the brakes for 3.59 s, and the velocity of the car decreases to +4.99 m/s.If the car's deceleration has a magnitude of 2.53 m/s2. Average passenger car deceleration rate from coasting on level terrain with Auto Tran., from 60-70 mph speed range.



The microcontroller used is the PIC 16F877A, which provides a safe and reliable method for controlling. The system needs to be attached to the existing method in which cars are designed so flexibility is a major need. The method is shown in Figure



In the Figure, the object sensed using any of the object sensor is given as input along with speed obtained from the RPM counter which will be sent to the controller based on the commands provided it will calculate the speed that's need to be controlled based on the PID algorithm



The above Figure is the proposed braking method the controlling of the rear brake will adjust the torque of the wheel enabling the system to control the application of brakes. The speed control will be only applied if the distance is below 45% to collide or else the driver will only have control after he applies the brake. The system will take over if it is too close this will make the brakes and accelerator pedals to be cut from the drivers control and the system will apply the brake and here the algorithm provides a smooth operation of the vehicle and sudden jerks will not be realized.

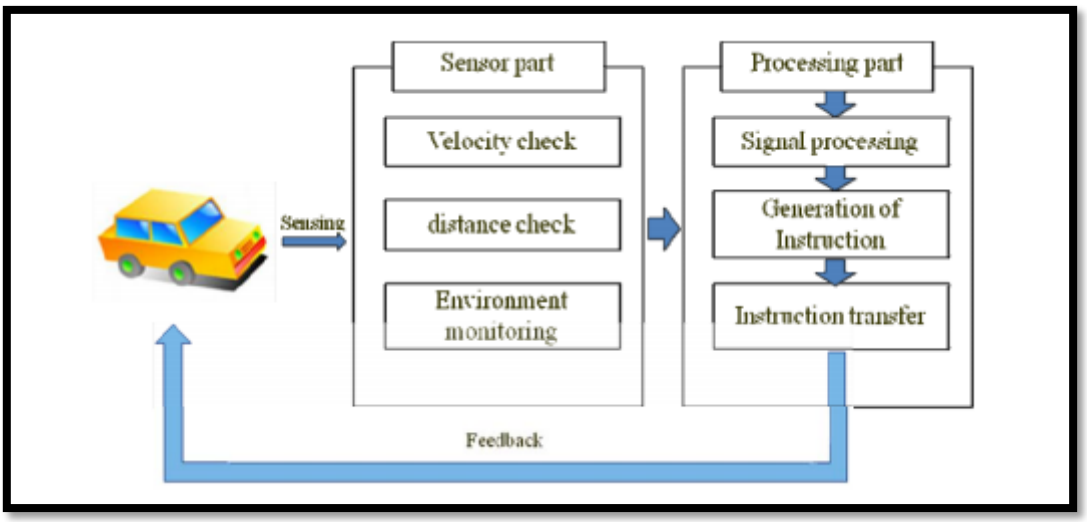
The method was simulated, the results were verified through MATLAB 2009R and the graphs are plotted. Safety and automation is the main trend of future vehicle development. In the future authors believe that safety and warning measurement will be the basic all existing vehicles. The warning and smooth braking system will not only prevent accidents but ensures comfortable travelling at the highways also. When the driver cannot operate the car effectively or vehicle unrestrained or driver doze off, it can help the vehicle slowing down on braking

[5] "Fabrication of Auto-Braking System for Pre-Crash Safety Using Sensor" by Eung Soo Kim

In this literature they represented how, the Auto-Braking System was designed by VHDL and fabricated to keep a distance between two cars. It provides PreCrash Safety System for Intelligent Car. This module can detect the distance between front vehicle and driver's vehicle to keep a constant distance using a sensor and operate the brake system forcibly if the driver does not decrease the speed of car. The system displays the distance between the two vehicles and the speed of your vehicle. The performance of the system was good.

The fabricated auto-braking system has the sensor part and signal processing part to prevent an accident as shown in Figure 1. It performed monitoring the environment and sensor signal processing. The sensor

embedded in vehicle will detect the road environment, such as self-velocity, distance from front vehicle, and surroundings vehicles, using infrared sensor and ultrasonic sensor. These sensors were operated all the time during driving. The processing part accepted the signal from sensors and processed the signals and generated the instructions and transferred the generated instruction to control unit of transmission and brake of vehicle. There are three cases occurred in real situations. One case is that the distance between the front car and driver's car is far enough to defend crashing and self-velocity is the same velocity of front car or slower than that of front car. In this case, the driver's car is continuously running without changing its velocity. Another case is that the distance between the front car and driver's car is near and self-velocity is slower than that of front car. In this case, the driver's car is also continuously running without changing its velocity. Another case is that the distance between the front car and driver's car is near and self-velocity is faster than that of front car. In this case, the driver's car is continuously running only when the driver reduce speed. But if the driver does not reduce speed, the auto-braking system may forcibly reduce the speed of driver's car to protect an accident. The reason is that if the driver does not reduce speed, the accident will be occurred and the driver will be hurt.



The auto-braking system was designed by VHDL and fabricated using FPGA to prevent accident. The system was mounted on a miniature car and tested. When the distance was getting closer, the auto-braking system was working and the speed will slow down if a driver does not reduce the speed of automobile. We also fabricated the auto-braking system using LabVIEW. We will replace an ultrasonic sensor with a radar sensor as the auto-braking system is mounted on a real automobile.

[6] "A Deceleration control method of automobile for collision avoidance based on driver perceptual risk" by Takahiro Wada

To reduce rear-end crash of automobiles, it is important to judge necessity of deceleration assistance as earlier as possible and initiate the assistance naturally. On the other hand, we have derived a mathematical

model of driver's perceptual risk of proximity in car following situation and successfully derived driver deceleration model to describe deceleration patterns and brake initiation timing of expert driver. In this research, an automatic braking system for collision avoidance will be proposed based on the formulated brake profile model and brake initiation model of expert driver to realize smooth, secure brake assistance naturally. It will be shown that the proposed control method can generate smooth profile for various conditions. In addition, experimental results using a driving simulator will show validity of the proposed system based on subjective evaluation

VI. 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.

VII. REFERENCES

[1] Apeksha S. Chavan1, Dipali D. Pansare, Swapnil P. Kadam, Naval K. Mayekar, Kavita V.Jha, Poonam R. Bhagwat “Design of Accident Prevention System Using QRD 1114 and CNY70 Sensors”

[2] B.Praveen kumar, K.Mahendrakan “Prevention of Accident Due To Drowsy” by Using Eye Blink

[3] Srinivasa chari.v, dr. Venkatesh p. R, dr.prasanna rao n.s, adil ahmed s “automatic pneumatic bumper and break actuation before collision”, 2015, international research journal of engineering and technology (irjet) volume: 02 issue: 04, pp1015-1023

[4] Dr. P. Poongodi. Mr. P. Dineshkumar, “Automatic Safety System for Automobiles”

[5] Dr.eung soo kim,”fabrication of auto braking system using sensor”, international journal of control and automation, vol-2, and no1.

[6] Takahiro Wada, “A Deceleration control method of automobile for collision avoidance based on driver perceptual risk”

IEEE international Conference on Intelligent Robots and Systems, Oct 4881-4886.

[7] Lee,“A Theory of Visual Control of Braking Based on Information About Time to Collision”, Perception, Vol 5, pp 437-459

[8] Erik Coelingh, LottaJakobsson, Henrik Lind, Magdalena Lindman, "Collision Warning with Auto Brake - A Real-Life Safety Perspective", Volvo Car Corporation Sweden Paper Number 07-0450

[9] J. T. Wang, "An Extendable and Retractable Bumper"