

An Intelligent Safety System in Automobile-A Review

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ABSTRACT

An accident is unplanned event or circumstance which occurs due to lack of intention or necessity which results in negative outcome generally. It can be avoided or prevented if circumstances leading up to the accident been recognized and acted upon before incident happens. This paper contains literature review of intelligent safety system in automobile proposed by various researchers to avoid accidental collision. Safety system in automobile sights into the future of automotive safety and provides the advanced ways for avoiding accidents and protects the human. Safety concept car provides a glimpse into the future of automotive safety, and how much more advanced these individual systems can be for avoiding accidents and protecting vehicle occupants when they are integrated into one system.

Keywords : Automobile, Road Safety, Intelligent System, Sensors

I. INTRODUCTION

Every year the lives of approximately 1.35 million people are cut short as a result of a road traffic crash as per report mentioned by World Health Organisation. Road traffic injuries cause considerable economic losses to individuals, their families, and to nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. Road traffic crashes cost most countries 3% of their gross domestic product. More than 90% of road traffic deaths occur in low- and middle-income countries. Even within high-income countries, people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes. Road traffic injuries are the leading cause of death for children and young adults aged 5-29 years. About 73% of all road traffic deaths occur among young males under the age of 25 years who are almost 3 times as

likely to be killed in a road traffic crash as young females. An increase in average speed is directly related both to the likelihood of a crash occurring and to the severity of the consequences of the crash. Every 1% increase in mean speed produces a 4% increase in the fatal crash risk and a 3% increase in the serious crash risk the death risk for pedestrians hit by car fronts rises rapidly (4.5 times from 50 km/h to 65 km/h). In car-to-car side impacts the fatality risk for car occupants is 85% at 65 km/h. Road traffic injuries can be prevented. This requires involvement from multiple sectors such as transport, police, health, education, and actions that address the safety of roads, vehicles, and road users. Effective measures include designing safer infrastructure and incorporating road safety features into land-use and transport planning, improving the safety features of vehicles, improving post-crash care for victims of road crashes, setting and enforcing laws relating to key risks, and raising public awareness.

This project is designed to develop a new system that can solve problem of vehicle crashing where vehicle will stop automatically due to obstacle thus minimising the chances of collision. An intelligent safety system is proposed incorporating bumper operated by pneumatic system assisted by electronic sensor.

II. LITERATURE REVIEW

A study is carried out to know the initiatives carried out by researchers in the area of automobile to ensure the safety while driving. Most researchers as well as academic researchers contributed to develop the intelligent safety system along with braking system. The review of the research work carried out in this area is as follows:

Abhay Bendekar, Abhijit Samanta, Arif Upletawala, Anup Chavan [1], designed and developed a control system based on intelligent electronically controlled automotive braking system which they named as 'Intelligent Reverse Braking System'. They enhanced the facility by using the intelligent braking system that has altered alarm system so that the car brakes automatically when an obstacle is close by. In their system they make use of sensor operated pneumatic brake consists of opto transmitter and receiver circuit, control unit, pneumatic breaking system. The opto sensor is used to detect the obstacle. In case of any obstacle in the path, the opto sensor senses the obstacle and gives the control signal to the breaking system. The pneumatic breaking system is used to break the system and car brakes on its own by determining the distance from the object. As basic electronics components are used the power consumption of the whole system quite less. Even if the driver is less skilled system is sufficient to operate which is benefitted to the driver as well as on road people.

Tejsinh Pisal, Akshay Patil, Sanyukta Chaudhari, Utkarsha Khomane, Ashish Umbarkar [2], designed and developed a control system based an intelligent electronically controlled automotive bumper activation system which named as 'automatic pneumatic bumper' which is aimed to improve the technique of prevention of accidents and also reducing the hazard from accidents. This system consisted of ultrasonic transmitter and Receiver ultrasonic circuit, Control Unit, Pneumatic bumper system. The ultrasonic sensor is used to detect the obstacle. There is any obstacle closer to the vehicle (within 2 feet), the control signal is given to the bumper activation system.

M. Rajyalakshmi, B. Kranthi Kumar, A. Krishna Vaibhav, Md Arief Khan, B. V. V. Siva Sai [3], proposed a safety system with the use of ultrasonic sensors for controlling the speed of a vehicle which they called 'intelligent mechatronic braking system'. It included an ultrasonic wave emitter and receiver provided on the front portion of a car emitting and receiving ultrasonic waves frontward in a predetermined distance. To control the speed of the vehicle a microcontroller is used based on the detection pulse information to push the brake pedal and apply brake to the car stupendously for safety purpose.

Venkatesh Babu, R. Hariharan [4], presented a control system based an intelligent electronically controlled automotive braking system termed as 'automatic reverse braking system'. This Braking system consisted of IR transmitter and Receiver circuit, Control Unit, Pneumatic breaking system. The IR sensor is used to detect the obstacle. There is any obstacle in the path, the IR sensor senses the obstacle and giving the control signal to the breaking system. The pneumatic breaking system is used to break the system.

Kiran K. P, Shithin N.T, Ajay M. A, Akhilesh T.R, Prof. George Mathew [5], presented a intelligent mechatronic system uses a pneumatic brake system which is aided by an ultrasonic sensor system provided on the front portion of a car emitting ultrasonic waves. The ultrasonic sensor receives the reflected ultrasonic 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 this information. Under required conditions microcontroller sends an electrical signal to the solenoid valves which actuates the pneumatic piston resulting in braking action. They fabricated a prototype which uses proximity sensors and performed the structural analysis of it.

S. Ruthara Kumar, K. Saravana Kumar [6], presented the development and implementation of a digital driving system for a semi-autonomous vehicle to improve the efficiency of driver-vehicle interface. System included PIC based data acquisition system that uses ADC to control data from analog to digital format and visualize through LCD. Their work focused the development of distance measurement by using ultrasonic sensors which denotes that vehicle's position from obstacles. The vehicle detects the speed breaker and also some primary zones before certain limitation by tags using Universal Asynchronous Receiver/Transmitter (UART) module for introducing the new invention of priority based Intelligent Braking System (IBS).

Rajanikantha. M. A, Basavaraj. G. Kudamble [7], proposed an Advanced Adaptive Cruise Control System for an automobile for the control speeds and distances typical in city traffic. This provides support to the driver in the task of longitudinal control of their vehicle during motorway driving by using ultrasonic sensor. In this paper, the implementation of hardware procedure and the results obtained had

been discussed. The study also included vehicle tracking system typically GPS (Global Positioning System) for providing longitude and latitude information of the location of vehicle, and GSM modem which is used to transmit warning message to the predefined number of the user when the vehicle reaches the preset distance set by the driver.

Ashwin Francis, Abel Antoo, Jerald John, Augustin Sagar, Sreejith [8], K proposed 'intelligent braking system' for automobiles to reduce the number of accidents by a simple solution of governing the speed of the vehicles. This system uses GPS coordinates to locate the present zones that are the most accident prone like schools and hospital areas. The vehicle entering to these zones will acquire the assigned speed limit by the activation of brakes. The system was consisted of Electronic Brake Control Module (EBCM), Arduino (microcontroller), Bluetooth module, and a GPS module.

Arun Chand [9], analysed the road accidents from 2010 to 2016 in Kerala state, India and collected the year wise and district wise data. His study focused on today's accident rates and fetches the number of persons died or injured. Even though persons are having awareness of the road accidents, the number is increasing day by day. He depicted that more persons are died in road accident because of not following road rules and regulations. Further analysed the degrees of accidents on different roads in the state. This study reveals that more than 12 persons are killed per 100 accidents in 2016. Furthermore controlling road traffic accidents and switching the safety management of urban and rural road traffic to be digital and its perspective to inculcate this process regards with road safety development in the economy.

III. PROPOSED WORK

The purpose of present study is to develop the prototype model such that it will reduce the chances

of collision with obstacle and thus ensure the safety of individual. A CAD model is developed considering parameters such that

1. Type of vehicle
2. Width of vehicle
3. Velocity of vehicle coming from opposite direction
4. Impact load
5. Length of guard
6. Cross section of guard member

System will be implemented by use of pneumatic cylinder and infrared sensor for the working of system. The proposed prototype 3D model is as follows:

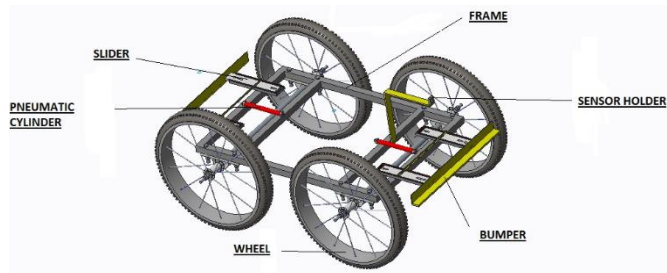


Fig. 1 Prototype 3D model

IV. CONCLUSION

From this review, lot of research has been done to ensure the safety of passengers in automobile system. One can proposed an optimal design to minimize cost and maintain quality fulfilling the core purpose and thus we are focussing on proposed model. With the conclusion, the prototype incorporating intelligent safety system is to be aimed. The Intelligent safety system is an automatic braking system which can be incorporated in a wide range of automobiles. This system can avoid vehicle accident by reducing collision rates.

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