

# International Journal of Innovative Research in Science, Engineering and Technology

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## Advanced Safety System for Four Wheelers

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**ABSTRACT:** The number of accidents increasing day by day, which is both affecting health and wealth. It is mainly due to restless driving which make driver tired, lack of proper medical assistant in case of accident and over speed which is more than allowable limit in that specific area. This work aims to design and develop a system based on intelligent electronically controlled automotive braking and speed control system. This setup also constitute a GSM and GPS based system, which can able to send information to the responsible people at the next instant of an accident. If we implement this system to our conventional vehicles, we can reduce the impact of accidents and can able to give fast medical assistant if any problem occurs.

**KEYWORDS:** Eye blink sensor, Solenoid Valve, PU connector, Vibration sensor

### I. INTRODUCTION

By analysing road accidents statistics in our location, it is observed that the number of accidents is very high and also the accident rate during night time is large in numbers when compared to the day time. It is found that most of the death due to accident occur because of the failure in giving proper and faster medical assistance when it occurs. Thus, we decide to design a system to reduce accidents and also capable of sending information to the responsible person at the very next instant when it occurs.

In our work, the setup consists of Eye blink sensor operated pneumatic brake and bumper system, control unit, Vibration sensor, GSM unit, speed control unit, etc. Eye blink sensor consist of IR transmitter and IR receiver which works based on the blinking of eye. Braking and bumper system which works by high pressure air. Control unit will control the whole system. Vibration sensor is used to detect the accident and by receiving a signal from it the GSM system will activate and send accident information to relatives, nearby hospitals and police station. Speed control unit will automatically reduce the vehicle speed to allowable speed limit corresponding to that area.

The programming is done in a microcontroller which is the controlling unit of the whole system. The time of working of different components are according to the program which is programmed in the microcontroller. The speed limit zone is identified by giving signals through FM transmitter to the system, then the speed will be reduced by receiving the signal in the FM transmitter.

The system performs three functions 1) Braking when driver fall into sleep 2) Informing responsible person at the very next instant of accident occurs and 3) Automatic speed control when the vehicle enters speed limited areas like school, hospital etc.

### II. RELATED WORK

Sonali Shankar Chalwad et al [1] proposed the idea of accident prevention using the Eye Blink sensor and its working. In their work a car simulator study was designed to collect physiological data.

Prof. Pramod Shelke et al [2] proposed the idea of immediate accident information passing through GSM. In their work they used IR sensor and MQ-3 sensor.

A. Vengadesh et al [5] proposed the idea about automatic speed control in speed restricted areas. In their work they use RF to indicate the speed limit areas and is placed at the front and back of the restricted zone. The RF receiver is placed with in the vehicle.

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D.Narendar Singh and Ravi tejach.v [6] proposed a system to monitor vehicle speed and crash alert which can run on embedded system. In their work they used a GSM based system which can able a send messages to traffic police if the driver violate the speed limit.

M Hemamalini et al [7] in their work developed a system for preventing accident due to drowsy and drunken drive. If the driver is drunken, then a buzzer will activate and prevent the driver from starting the vehicle.

### III.COMPONENTS

The major components are Eye blink sensor,Control unit,Vibratory motor, Pneumatic systems,Vibration Sensor, GSM Unit, Speed Limit Signal Unit and Circuit board.

#### A. *Eye blink sensor*

The eye blink sensor is an IR sensor works based on the blinking of eyes. It has IR transmitter and receiver. IR transmitter transmit Infrared rays to the eyes and it will reflect back and is received by IR receiver. If the eye gets closed i.e. an obstacle is in between the transmitter and receiver, it will detect it.

#### B. *Control Unit*

The control unit of the whole system is a microcontroller. Here we use AT89C52. It is programmed according to the working of the whole system.

#### C. *Vibratory motor*

This type of motor will produce vibration when they rotating. This is used for giving vibration under the seat of driver when he falls into sleep.

#### D. *Pneumatic Systems*

The pneumatic system consists of pneumatic single acting cylinder, solenoid valve, flow control valve, brake arrangement, PU connector. The air is supplied to the whole system with the help of air compressor. The brake and bumper system will work with the help of this air. Here we use a single-phase induction motor to provide drive and is coupled to the wheel by using a belt and pulley arrangement.

#### E. *Vibration Sensor*

Vibration sensor is used to detect the accident. It is a type of piezoelectric sensor, when an impact or vibration is affected on this sensor it will convert it into corresponding voltage, thus the impact is sensed by control unit.

#### F. *GSM Unit*

Global System for Mobile Communication is used for sending information to the relatives, hospital and police station when the accident occurs. The message is send at the very next instant of accident.

#### G. *Speed limit unit*

We use FM signals to identify the entry to school zone areas, the control unit sense it and the speed will reduce to the allowable limited speed in that specific area. i.e.the vehicle will automatically reduce its speed and will not accelerate more than the limited speed.

#### H. *Circuit board*

The circuit board consist of Power supply, transformer, alarm unit, eye blink receiving unit, FM signal receiving unit, speed regulator, microcontroller unit, vibration sensor, vibration sensor transformer, etc.

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## IV. WORKING

The layout of the setup is shown in fig.1, all the components are assembled on a metal frame. The eye-blink sensor in this system is used to sense the eye blinking of driver. If the person falls to sleep the eye blink sensor senses it and send the signal to the control unit and an alarm will activate. Thus, a beep sound will be produced by the control system. The driver can wake up and off the alarm or otherwise the vibrator will activate and it will give a small vibration to the driver seat. If the person didn't wake up, then the control unit will actuate the solenoid valve.

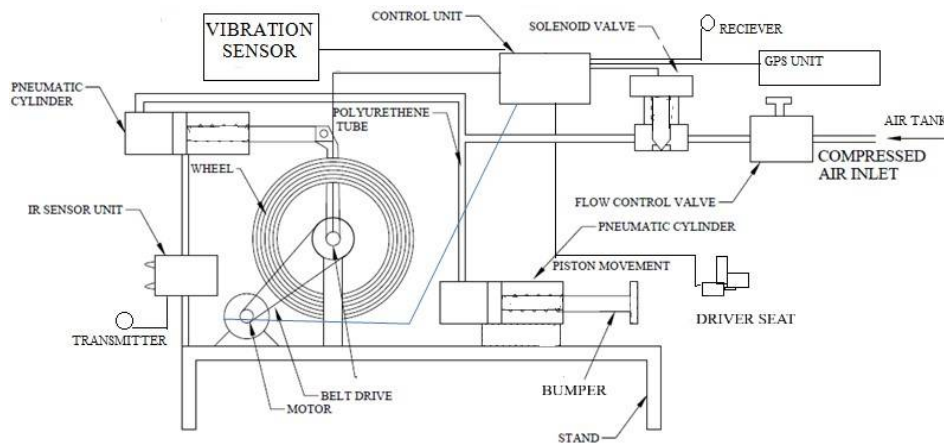


Fig1 Schematic layout of the whole system

If the solenoid valve is activated by the control unit compressed air from the compressor at a pressure of 5 bar passes to the Single Acting Pneumatic Cylinder and the piston in the cylinder will move by this compressed air. If the piston moves forward, then the braking system will be activated. The braking system is used to brake the wheel suddenly or gradually due to the movement of the piston and the braking speed is varied by adjusting the flow control valve. The solenoid valve is also connected to another single acting piston arrangement, which is used to absorb the shock in the bumper there by reducing the impact in the case of an accident. Fig.2 shows the image of the experimental setup of the system.



Fig2Image of the setup

As per the road accident statistics it was observed that death due to accident is very high during night time. It is caused due to the failure in giving proper and fast medical assistance to the victim. Our setup also incorporate a GSM based

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system to send information to responsible person in case of any accident. If an accident occurs in the vehicle the vibration sensor will detect it and activate GSM unit and it will send immediate information to the relatives, hospital and police station. Thus, the passengers will get fast medical assistance. The vibration sensor is a piezoelectric crystal it will produce a proportional electric voltage during an impact and is sent to the control system for further processing. In order to limit the speed of the vehicle in areas like school zones and some accident-prone areas our setup incorporates an automatic speed control system. When this vehicle enters the speed limit zone a radio frequency signal is sent to the control system thereby activating the speed control system. Thus, the vehicle is decelerated and the speed of the vehicle is reduced to the set speed.

### V. CONCLUSION

By implementing this system, the number of accidents can be reduced to some extent. In case of any accident, the driver will get a proper medical assistant, thus the death due to this can also be reduced. The maximum speed of the vehicle will not increase more than the allowable speed of that specific area. Thus, we can improve the safety during driving. Additional modification can be made to this according to the convenience of the driver and vehicle.

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