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Smart Car Collision Detection & Prevention Reporting System

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Abstract- The Rapid growth of technology and new inventions has made our lives easier and made it convenient to travel longer distances in less time. But this has increased the road accidents which results in loss of life. The accidents occur due to various reasons such as untrained drivers, lack of driving institutes, drowsiness of drivers, inferior government facilities. According to National Highway Traffic Safety administration (NHTSA) analysis data indicates that drowsiness while driving is a contributing factor for road accidents and results in 4-6 times higher crash risk relatives to alert drivers[1]. Our paper provides the solution for the same. It prevents occurrence of the road accidents and also detects if occurred. We are using Seat belt buckle sensor and automatic speed controller unit for prevention measures and accident detection unit for collision detection purpose. It uses GPS to trace the vehicle and the GPS co-ordinates are sent using GSM unit.

Index Terms *–GPs, GSM, Microcontroller, Seat belt sensor, Speed Controller Unit.*

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I. INTRODUCTION

The people's standard of living has improved the transportation facilities, but on contrary it leads to huge road accidents. It is necessary to prevent this accidents by some means. The proposed paper 'SmartCar Collision Detection And Prevention Reporting System' states that the occurrence of accident can be prevented and if the accident has been occurred it can be easily detected. The very first step towards prevention of accident is done by using Seat belt Buckle sensors. Once the driver sits in a driver seat, the sensor detects if the seat belt is buckled. The next prevention measure is to speed down the vehicle in particular zones such as school, market, kids play area, etc. we are using RF module here. When the vehicle enters this zone it should lower its speed, if not so it alarms a beeping sound for 5sec and the automatic speed controller unit speeds down the vehicle and regains its speed once it leaves that zone. This paper also provides the detection unit. If the accident has occurred the GPS, Microcontroller & GSM gets initialised and it sends the message information along with the latitude and longitude values of car accident.

II. WORKING PRINCIPLE

1. The design layout of the paper is provided.
2. The Seat belt sensor senses for buckled belt and if not so it will not ignite the car engine.
3. The automatic speed controller makes use of RF Module and speeds down the vehicle in assigned zones such as School, kids play area, market etc.
4. If the accident has occurred, the signals are given to microcontroller.
5. The GPS traces the latitude and longitude coordinates.
6. This information is sent via GSM module to the Emergency service number saved in the memory.

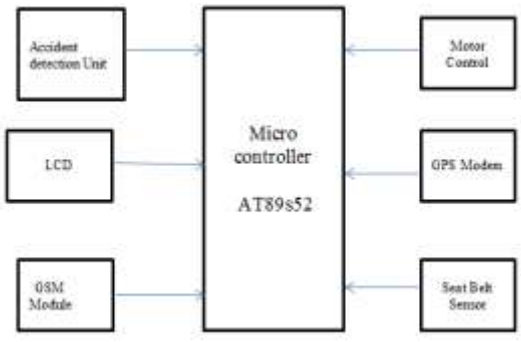

Fig.1 Schematic Diagram of the system

The microcontroller used here is AT89s52. This is insystem programmable microcontroller. When the key is inserted and person sits on driver seat then it first checks for buckled seat belt. If the seat belt is not used the microcontroller send the signal to relay and it turns off the car ignition. The seat belt buckle sensor has a spring mounted on seat belt latch. And if the car gets started it checks for desired zones such as school, market, kids play area etc. if the vehicle is detected in such areas it alerts the person at driver seat to lower its speed by giving a beeping sound for 5secs. If the person doesn't lower its speed within the allotted time, the automatic speed controller unit sends the signal to microcontroller informing to speed down the vehicle to 15kmph. The speed controller uses RF transmitter and receiver circuitry. This RF module has encoder and decoder at transmitter and receiver respectively. Despite of this if any accidents occurs, the GPS tracks the location and sends the latitude and longitude values to desired contact numbers saved in the memory.

III. WORK FLOW

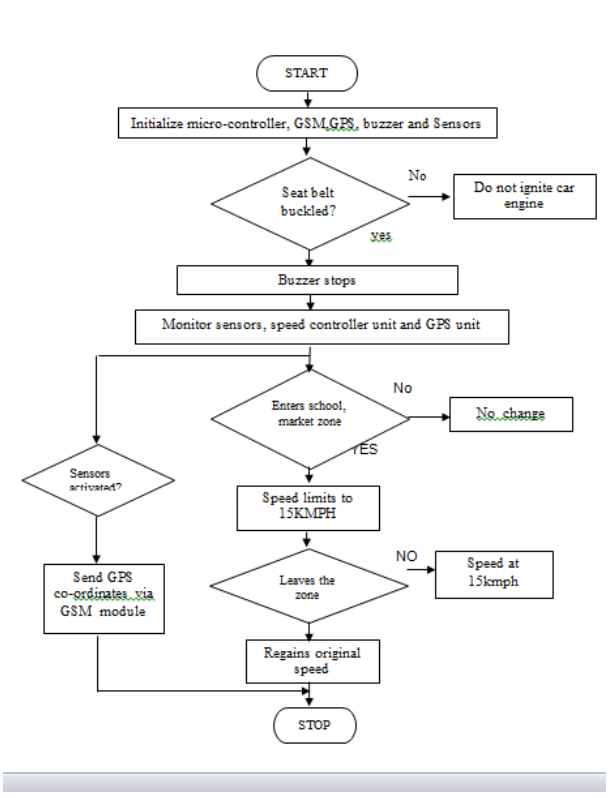

Fig 2. Flow Design

IV. HARDWARE UNIT

A. GSM Module

The GSM that is Global System for Mobile Communication is used world wide. Over 80% mobile users have GSM standards. More than 690 mobile networks provides GSM service across 213 countries and GSM represents 82.4% of all global mobile network[3]. The GSM digitizes the data and also compresses it. It makes use of one out of two frequency bands, either 900 or 1800MHz. This GSM module is interfaced with microcontroller port 3 pin. The GSM module used here SIM300. It provides messaging facilities. It has the transmission rate of 270kbps. It is used in applications such as security, sensor monitoring, SMS based remote control.

Fig 3. GSM SIM300 Module

B. GPS Modem

The GPS (Global Positioning System) is most popular technology which was developed by American department of defence (DOD) for military use. And later it was available for civilian use[5]

Fig 4. GPS-001 Modem

C. LCD

The LCD used here is 16*2 display. It has 16 characters and 2 lines. It displays the operating instructions and output status. It is a dot matrix liquid crystal display . LCD display two 8 characters lines. The LCD here used is in 8 bit mode.

Fig 5. 16*2 LCD display

D. Seat belt Buckle Sensor

The seat belt sensor ha a spring that is mounted on the latch. The latch gets connected with tongue of seat belt, and moves it against the spring to respond to the tension loaded by the belt. This sensor is mounted on the latch. The sensor monitors the position of the latch. This position determines the loading of tongue and belt tension. This belt sensor determines whether the seat belt has been buckled. It provides security to the drivers. This sensor should accurately sense the information of sensor latch.

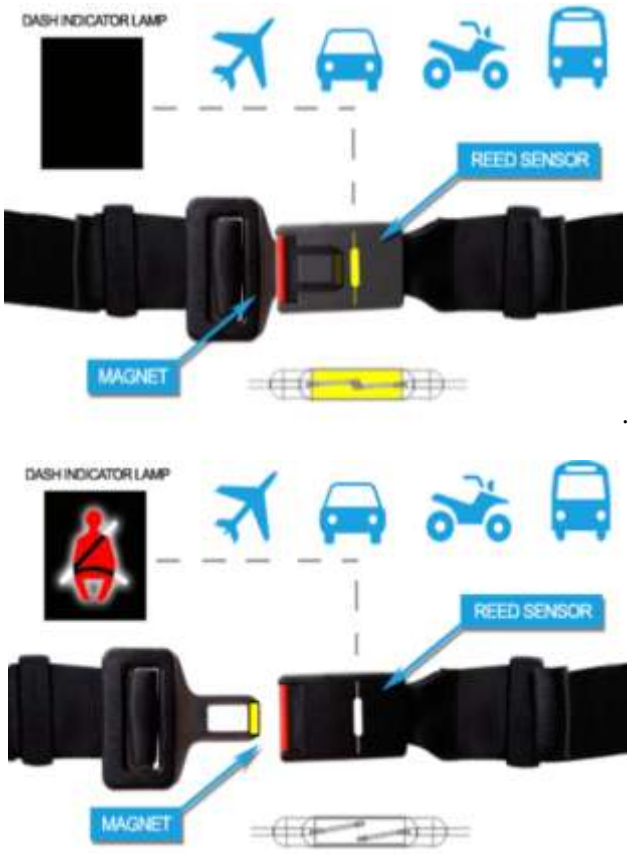

Fig 6. Seat belt buckle sensors

E. Microcontroller

The microcontroller used here is AT89s52. This is Atmel cooperate this is low power high performance architecture. It uses RISC architecture and has 8 bit CMOS controller and in system programmable flash memory of 8kbytes. Its endurance is 1000write/erase cycles. Operating range is 4 to 5.5V. it has 8 interrupt sources and three 16 bit timers/counters. The fig shown below is the pin diagram of microcontroller AT89s52.

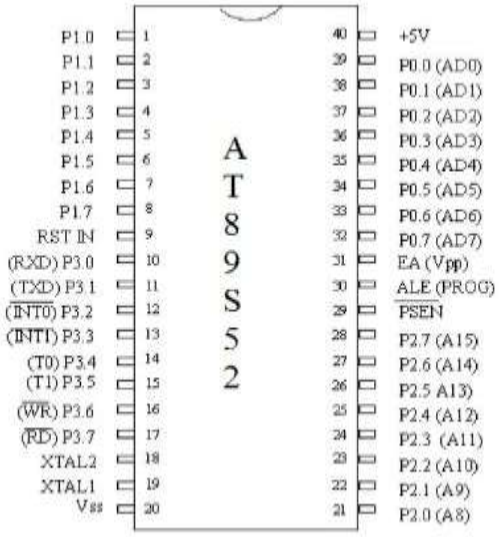

Fig 7. AT89s52 Micro controller

V. CONCLUSION

A working model of Smart Car Collision Detection and Prevention Reporting System has been implemented successfully.The advantage of our research paper is, when the seat belt sensor is activated it will check for seat belt and when the RF module gets activated it will speed down the vehicle or in case if accident has been detected we can receive an immediate acknowledgement from GSM modem to the mobile numbers stored in EEPROM, in less time. Our system indicates the accident spot accurately. And it provides us with safe and secure journey preventing from accidents thus saving human lives.

Fig 8. Project Setup

ACKNOWLEDGEMENT

It is a great pleasure and proud privilege to present this paper, titled as Smart Car Collision Detection and Prevention Reporting System. We would like to tender sincere thanks and gratitude to our project guide Prof G Sonawane for his invaluable guidance to this paper.

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