

Accident Detection Using Raspberry Pi

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ABSTRACT: Road accidents are one of the major reasons of fatality. The time between the occurrence of accident and the emergency medical facility provided to the accident location is the important factor in the survival rates after the accident. By reducing the time between the accident and medical facility provided to the scene decreases mortality rates so that more lives can be saved. One approach to eliminate that delay is to use Accident Detection Using Raspberry Pi, which gives alert if the accident occurred and immediately notify to the emergency responders. The system is described the main application of which is to recognize the accident using the vibration sensor and give alert message to the respective places. Alert message includes location of the accident, alcohol percentage, disposal of seat belt, speed, number of members in the vehicle. In this system, initially GPS continuously takes input from the satellite and stores the latitude and longitude values[1]. To track the vehicle, we need to send the message to GSM device, so that it gets activated. It also gets activated by detecting the accident on the vibration sensor connected to the raspberry pi controller. Once the GSM is activated it receives the last latitude and longitude position value and send message to the emergency server which is predefined in the program.

Keywords: Accident alert, CO sensor, GSM, GPS, LCD, Limit switch, Raspberry pi, Vibration Sensor.

I. INTRODUCTION

The high demands of vehicle have also increased the traffic problems and the road accidents. Due to driver's carelessness there occur to demand chief road accidents with the cities, but also outside the city, accident mostly occur due to drunken driving. Not only drunken drive, but also driving rudely without wearing seat belts causes a loss of lives. Due to this the life of public is at high risk. The reason behind this is the lack of best emergency facilities available in our country[2]. An automatic alert system with maximum information of the accident is introduced in this paper. The proposed system which can detect accidents in significantly less time and sends the information to emergency centre with a few seconds which covers the exact location where the accident has been occurred and also the information such as the speed, alcohol percentage, has put the seat belt or not, number of members in the vehicle. This alert message is been sent to the emergency server which will inform the ambulance, police station near to that location and also to the insurance office, which will help to save the valuable lives. A switch is also provided near diver seat in order to terminate the sending of message in rare case where there is no casualty, this can save the precious time of ambulance, police. When the accident occurs the alert message is been sent automatically to emergency server. The message is sent through the GSM module and the location is been detected with the help of GPS module. The accident can be detected precisely using

vibration sensor. This application provides the excellent solution to the poor emergency facilities which are provided to the road accidents in most possible ways.

II. SYSTEM ARCHITECTURE

The main essential component of the proposed system is "vibration sensor". If the accident occur, then it gets detected and the alert message goes to the respective numbers. In which the vibration sensor senses the accident occurrence and initializes the GSM module through which the alert message is sent to emergency server. Alcohol sensor is used to detect weather driver was drunken or not. Limit switch is used to know that seat has been put or not. CO sensor is used give the alert about the fire if vehicle is burned. IR pairs and motor is used to know the speed of the vehicle.

GPS is used to track the vehicle i.e. to send the location. Message is been sent automatically to the GSM device through which it gets activated and then sends the alert message to the emergency numbers of near by ambulance, police station and insurance office. The output from all the sensors is been passed to the raspberry pi controller. When the output is been send to the controller it gives the signal to GSM, which activates and sends alert message. The output of the GPS is linked with the GPS modem, so that whenever the GSM sends an alert SMS to the emergency contacts it sends the location details along with other details.

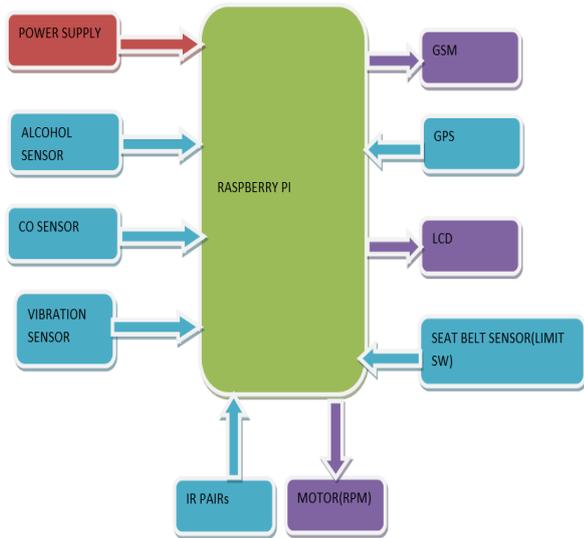


Fig 1. Block Diagram

III. COMPONENTS

A. Raspberry Pi

Raspberry Pi is a mini computer. The Raspberry Pi Zero is super low cost and smaller than its other module, the Raspberry Pi 3. The Raspberry Pi Zero now includes a camera port. Using the new Raspberry Pi Zero Camera Adapter, now its possible to connect a Raspberry Pi camera to your Zero.



Fig 2. Raspberry Pi Zero

B. Alcohol Sensor

An alcohol sensor detects the level of alcohol gas in the air and gives the analog output reading. The sensor gets activated at temperatures ranging from -10 to 50° C with a power supply which is less than 150 Ma to 5V. It is long life, high compassion and faster.



Fig 3. Alcohol Sensor

C. CO Sensor

It is used to know weather in the accident the vehicle is burned. It is easy-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can recognize CO-gas concentrations anywhere ranges from 20 to 2000ppm.[2] It has a high sensitivity and response time is faster. The CO sensor's output is an analog resistance.



Fig 4. CO Sensor

D. Vibration Sensor

These vibration switches induced trigger switches which are medium sensitivity non-directional vibrat. Inside is a medium hardness spring coiled with a long metal pin. When the switch is moved, the spring touches the centre pole which makes contact. Hence, when there's movement, the two pins will react as a closed switch and when everything is still, the switch is open[3].



Fig 5. Vibration Sensor

E. GSM

GSM is Global System for Mobile communication i.e. it is a digital mobile telephone system that is widely used in many parts of the world. GSM uses a variation of TDMA and is the most widely used of the three digital technologies TDMA, GSM, and CDMA. GSM converts and compresses data, then sends it down a channel with two other streams of user data. GSM receives the message and gets activated and sends the alert message. It is connected to the raspberry pi controller. It allows broadcast message in TEXT format.



Fig 6. GSM module

F. LCD:

LCD is generally used for interfacing between control system and user for human visual. It is a flat panel electronics display. Here, we have used 16*2 LCD display.



Fig 7. LCD 16*2

G. IR PAIR:

The IR pairs is used by the DC motor for speed in pulses and whether the seat belt slot is locked or not.



Fig 8. IR Pairs

H. GPS Module:

A Global Positioning System (GPS) is a exploration device or GPS receiver, or simply we can say GPS is a device which is capable of receiving information from GPS satellites and then to enclose the geographical position of vehicle or any moving device.



Fig 9. GPS Module

IV. SYSTEM SOFTWARE DESIGN AND RESULT

The development environment is done by merely a set of python functions that can be called for code. The flow chart of the system is shown in figure 10. At the first we have to initialize the system i.e. Raspberry pi module, GSM and GPS module with the basic values that alcohol is not detected and seat belt is not put up, and speed is zero. So, when the system gets started GPS gets initialized which receives the signal from the

satellite and transfer the latitude and longitude value to the receiver. GSM receives the message and then it gets started through which the message is been send to emergency server numbers. While travelling if the accident occurs then it is been sensed by the vibration sensor, which gives indication to the system to send the alert message to the nearby ambulance, police station and insurance office numbers given in the program. The alert message includes seat belt is put on or not, alcohol presence, speed of the vehicle and also whether there is fire extinguisher. A threshold value is been set to which if the value goes beyond the threshold value then the alert message is been send. Therefore, the details of the car like spot, time, seat belt put on are updated from the GPS to the users or the server via GSM.

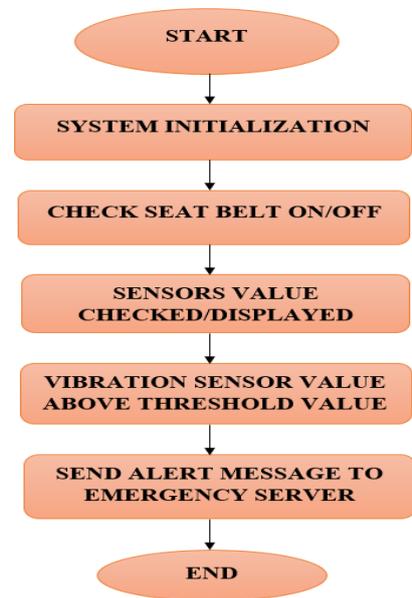


Fig 10. Flow Chart

V. FUTURE SCOPE

This system can be further implemented with mishap impediment scheme. That is to identify and avoid accidents before it happens. We can also add a camera that might serve as a black box like the one in aeroplane, so that we can capture the snap of the events so that we know the reason behind the accident. The one who is driving has consume alcohol then by giving alarm the vehicle can be stopped.

VI. CONCLUSION

The proposed system provides the emergency medical service as soon as possible and to avoid the mortality. It is to provide the details of the accident occurred and area of the accident with other information. It helps to easily provide facility and help to the victim of the accident. GSM is used to provide information regarding the accident and GPS module is used to traces the location of the vehicle.

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