

Ambulatory Services for Safety of Victims affected by Accidents



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ABSTRACT

This paper focuses on providing an emergency or ambulatory service for the people travelling by road. When an accident occurs, the time component plays a major role in saving the life of the injured. Therefore, in order to facilitate the emergency services to reach the place of accident occurred at a faster rate by the analysis on sensor data. Depending on the readings obtained from the sensor the message is transmitted to the emergency services with the destination point. This information helps the emergency service provider to reach the destination within less time.

Key words: Accidents, Automobile, Death, Emergency Services, Hospital, Safety.

1. INTRODUCTION

Improvement in Technology is a boon to mankind, in the automobile industry the vehicles are manufactured incorporating the latest technology that increases the speed and power of the vehicle. Vehicles have become a necessity in the day to day activities of humans. Nowadays in every home, vehicles of different kinds are owned so that it helps people to travel from one place to another. As the vehicles manufactured in recent times are having high engine capacity, the drivers are tempted to ride the vehicle at a faster pace [4]. This is one of the main reason of accidents, that too accidents frequently occur in National Highway [8][1]. The other reason for accident rate is due to stress or the mental state of the driver while riding the vehicle.

In day to day life, many lives are in a danger while travelling. Many accident precautions are there, but the solution after accident is less. Automobiles are important to go to workplaces, meet family & friends and to deliver goods. Every hour, a huge number of deaths have been reported, irrespective of age. The most occurring reason for the death is accident [7][8][12] and the time taken to reach the Hospital

for treatment. Large number of accident deaths happen because of the delay in the medical assistance [9][10].

When an accident has occurred the most crucial factor is time taken for the information to reach the nearest ambulatory service and the time taken for the ambulance to reach the accident destination [2]. If the time taken by the information to reach the emergency service can be reduced [3], atleast the probability of saving the victims can be increased [5].

This work presents the time efficient system in saving human life prone to accident. After the occurrence of accident, the proposed system sends a message with location coordinates and an emergency call to their loved ones or ambulatory service.

2. SYSTEM COMPONENTS

The following are the components utilized for the proposed work.

2.1 Force Sensor

Force sensors are helpful in detecting the applied force and gives an electrical output voltage signal. It converts the applied load into electrical signal. It consists of a strain gauge or a force sensitive resistor shown in Figure 1, when it is subjected to a strain or force, its physical dimension changes and causes the resistance to change. The change in resistance results in change in output electrical voltage.



Figure 1 Force Sensitive Resistor

2.2 GPS neo 6m Module

The GPS module shown in Figure 2, gives a strong satellite search ability and helps to check the status of the module with the power and signal indicators. It provides the exact data of the location so that the emergency services can reach the victim's location without much time delay.



Figure 2 GPS neo 6m Module

2.3 GSM Module SIM800C

The GSM Module consists of a modulator demodulator to produce communication between devices. This technology helps in sending the location data to the emergency service so that it can reach the specified location.

2.4 Arduino UNO

The Arduino UNO is the controller used for taking the information from the force sensor and location from the GPS module for further processing and gives the signal through the GSM module to the emergency services. The LCD is also integrated to the Arduino for displaying the data from the force sensor.

2.5 LCD Display

The LCD display helps in displaying the force exerted on the vehicle when it is subjected to a hit. The data given out from the force sensor is displayed using the LCD display.

3. SYSTEM OVERVIEW

The accident detection system is shown in Figure. 3. In this system the force sensor is placed in front of the bumper of the vehicle [4]. The vehicle chosen for the prototype implementation is a Toy car. When a hit is detected by the force sensor, it causes the variation in the resistance and thereby the output electrical voltage changes.

The GPS module gives the current location of the accident occurred place. The location co-ordinates given by the GPS module [2] is given to the microcontroller. The GSM module which is connected to the microcontroller, takes the accident

occurred location data & transmits to the preset mobile number and the ambulatory service.

The readings from the force sensor is given to the Arduino UNO microcontroller for further processing. Based on the readings obtained from the force sensor, programming is done in microcontroller to display the amount of force exerted on the vehicle. The force values are displayed by the LCD display which is connected to the microcontroller.

4. RESULTS & DISCUSSIONS

The Accident Detection System gives the information of the location co-ordinates of the victim which represents the latitude and longitude from the GPS module. It also indicates the force exerted on the vehicle when it is subjected to a hit or it experiences a collision with another vehicle[13]. The data given by the GPS module and the force sensor is displayed in the LCD Display.

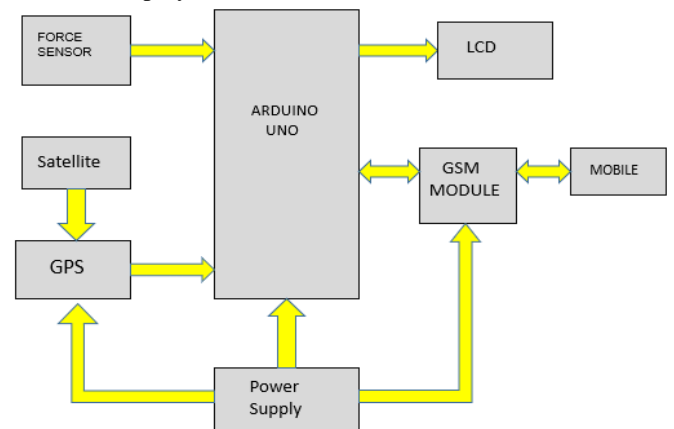


Figure 3 Accident Detection System

Figure 4. shows the Prototype of the Accident Detection System. Initially when the vehicle does not experience any crash or hit, there will be no force exerted on the vehicle. Therefore, in the Figure 2, the force sensor reading is shown as "Force_Value=0".



Figure 4 Prototype of the Accident Detection System in Car

The latitude and longitude coordinates obtained from the GPS Module is shown in Figure 5. Table 1 shows the Force Sensor Data. In order to test the Accident Detection System [12], the prototype is experimented by applying force in terms of weight. Different values of weights were applied to exert force on the vehicle which is similar to crash test in the automobile industry. Programming was done to initiate the air bag when the vehicle experiences a force of 1.9 Newton which is generated by applying a weight of 200 gms.



Figure 5 GPS Location

Table 1: Force Sensor Data

S.No.	Weight (in gms)	Force Exerted (in Newtons)	Force Sensor Output (in Volts)	Output Electrical Voltage in LCD Display (in Volts)
1	200	1.96	3.20	3.2
2	400	3.92	3.76	3.8
3	600	5.88	3.93	4.0
4	800	7.84	4.05	4.1
5	1000	9.8	4.25	4.2

5. CONCLUSION

The Accident Detection System helps the information of the accident location to the reach the emergency service within seconds. Based on the message received with the location co-ordinates, the emergency services reach the accident spot. Thus, the system increases the possibility to save the life of victims.

In future, a mobile application can be designed so that the personal information along with the accident information can be sent to the emergency service which can be utilized by the Hospital for better accessibility and to provide swift treatment for the victims.

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