

InstAlarm : Smart Accident Detection System

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Abstract: One of the alarming situations of India today is due to the increase in death rate caused by the accidents happening every minute. As per reports on an average one life is ended every minute in vehicle collision. There is a loss of life due to lack of immediate help from the people around. Reason for the research in this area is increasing life risk and technology advancement in this field. This project gives insight on how technology can prevent the human life loss.

The system will detect the frequency, force and pressure of collision automatically with the help of sensors and microcontroller attached will generate the SMS through the GSM to the users device which fetches the GPS location and sends an alert message to get help from hospitals and police stations through Third Party and further informs the registered family member of the user.

Keywords: Accidents, Microcontroller, GSM, GPS, Third Party

Introduction:

The Road accidents in India are increasing day by day resulting in life risk and financial loss of property due to collision because non-usage of persisting advances technology. Car accidents are a leading cause of death [4]. India was number 9 in year 1990 in the world is expected to emerge number 3 in 2020.

According to our research, we found that number of accidents took place in recent years, resulting heavy loss of life and property. In India, the vehicle population is growing at a faster rate. India accounts for about 10% of road accident fatalities worldwide. Road accidents are one of the leading causes of deaths in country[6].

The proposed system and android application (InstAlarm) will sense the accident caused and will pass the message to android phone of the user , the application will fetch GPS location and sends message to Third-Party and family member[5].

When accident gets detected with the help of sensors. GSM sends a message to the user's device from where android app (InstAlarm) will pick his location through GPS and forwards that message automatically to registered family member and to the call center which will further informs Hospitals and Police Station.

Existing System:

No system is persisting currently which can sense the accident and automate the actions such as calling the police or hospital and informing the family member of the victim. The victim lives on the mercy and humanity of the crowd around at the time of accident. There may be the times when no one is there to notice and help the victim call the ambulance or police which will risk the human life.

The only system that exists is of the combination of electronic device which can sense that accident is occurred using various sensors such as vibration sensor, speed sensor and passes the SMS to police station via GSM and alcoholic sensor which senses the consumption of alcohol and alerts the driver.

Proposed System:

The New system is implemented which will detect the accident automatically using various sensors, GSM and GPS in Android Device. By this we will be informing the nearest hospitals and police station to reach the exact spot of accident as soon as possible with the help of Third Party[6]. Further more we will be informing the first family member of the person who met with an accident as he will be registering these details while registration. By this, the person will be able to get help/medical care as soon as possible by these services without depending on other people.



Figure 1 Workflow of the application

Material:

Figure 3 Sensors activating GSM Module



Figure 2 GSM sending SMS to Police & Hospital

Product Used	Description
Ultrasonic Sensor	Ultrasonic sensor is used for measuring distance via time frames.
Piezo Sensor	Piezo sensor is used for sensing the pressure put on while accident
Xlero Sensor	Xlero sensor detects the angle of deviation in car when it topples down.
GSM 900A Module	It is used to send the SMS when accident will be detected.
LCD	It displays the distance of ground to the base of the car.
Android Device	Version 4.2 above.

Working: **Ultrasonic Sensor, Piezo Sensor and Xlero Sensor** are implemented in the car[1]. These sensors are connected to the Microcontroller. These sensors detect the impact of the accident. If the impact is above the threshold value assigned to the sensors then **Microcontroller** passes the command to **GSM module** installed in the car to send the message to the user's device.

Instalarm (Android Application) is installed in the user's mobile device. This application captures the location, latitude and longitude through **GPS** when the message is received from **GSM**. This location is sent to the Third Party and to registered Family Member. Third Party, further informs- the nearest police station and hospitals of that location to provide the medications as early as possible to the person who met with the accident.

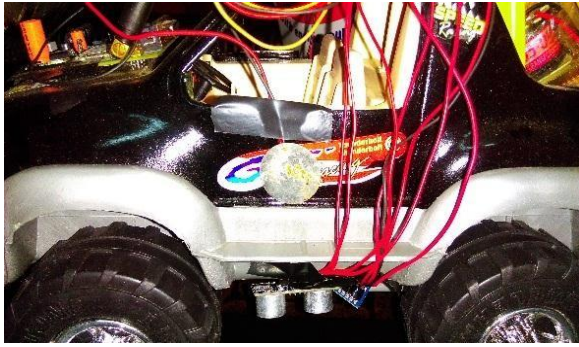


Figure 4 Piezo Sensor



Figure 5 Car Model With sensors

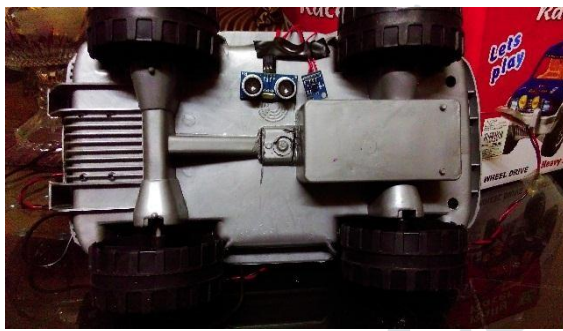


Figure 5 UltraSonic Sensor and Xlero Sensor

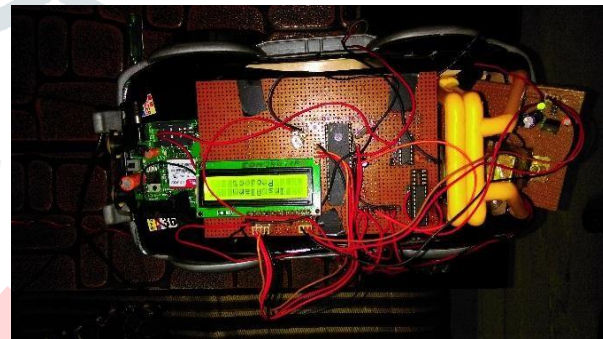


Figure 4 LCD displaying InstAlarm Project

Results and Discussion

Scenario 1: In our first test with the car, we used Ultrasonic sensor which will help in detecting the accident if the car rolls over or collapses, the distance from the ground level to the base of the car will change dramatically which will mean that the car has occurred with an accident.

Actual Distance (in cm)	Minimum Threshold Value	Measured Value after accident
100	150	2000

Scenario 2: In our second test with the car, we used Piezoelectric Pressure Sensor which helps in detecting the impact of pressure. It is implemented on all the sides of the car as impact can be occur at any part of the car. If a car clashes with other, the impact will be huge. If that pressure is above 50kg then it is a major accident. So this will help in detecting the accident.

Current Pressure(in kg)	Minimum Threshold Value	Measured Value after accident
0	50kg	57kg

Scenario 3: In our third test with the car, we used Xlero sensor which helps the detection of change in angles. It will help with the combination of Ultrasonic Sensor. If the car collides and roles over above

the defined angle. Then it will mean that the car has toppled. So it means that accident has happened.

Current angle (in degree)	Minimum Threshold Angle	Measured Angle after Accident
180	100	90

This means if these accident occurs the sensors will detect the accident and pass on the SMS with the help of GSM to the android device.

Conclusion:

This project (InstAlarm) presents vehicle accident detection with help of Android mobile phone. The proposed Vehicle accident detection system can detect accident and sends geographical information along with alert SMS regarding accident to pre-stored contact and to Third-party. Experimental work has been carried out carefully. The system will even be proactive in the overcrowded regions. The efficiency of the system is enhanced with pre-stored contacts.

The mortality rate is decreased in developing and crowded countries like India. The smart system (Android based OS) enables us to use the advanced technologies in collaboration to build secure and intelligent application.

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