

Accident Prevention and Detection Using GSM/GPS

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Abstract - Car accidents cause a large number of deaths and disabilities every day, a certain proportion of which result from untimely treatment and secondary accidents. To some extent, automatic car accident detection can shorten response time of rescue agencies and vehicles around accidents to improve rescue efficiency and traffic safety level. In this system helps to detecting car accidents and notifying them immediately. This can be achieved by integrating smart sensors with a microcontroller within the car that can trigger at the time of an accident. The other modules like GPS and GSM are integrated with the system to obtain the location coordinates of the accidents and sending it to registered numbers and nearby ambulance to notify them about the accident to obtain immediate help at the location. These include accident detection using smartphones, GSM and GPS technologies, vehicular ad-hoc networks and mobile applications. The implementation of an automatic road accident detection and information communication system in every vehicle is very crucial. This paper presents a brief review on automatic road accident detection techniques used to save affected persons. An automatic road accident detection technique based on low-cost ultrasonic sensors is also proposed.

Keywords: accident detection, accident prevention, GSM, GPS AT-Mega 328, alcohol sensor, limit switch.

I. INTRODUCTION

According to the World Health Organization, there are about 1.35 million deaths and 20-50 million injuries as a result of the car accident globally every year. Especially, a certain proportion of deaths and injuries are due to untimely treatment and secondary accidents which results from that rescue agency and vehicles around accident cannot obtain quick response about the accident. Therefore, it is vital important to develop an efficient accident detection method, which can significantly reduce both the number of deaths and injuries as well as the impact and severity of accidents.

There are many reasons for road accident happenings like improper construction and maintenance of the roads, overcrowding and increasing count of vehicles. Apart from this, the lack of road sense by the drivers and other users of the road have further complicated the matters. Mostly the

youngsters are losing their lives on roads because of rash driving, drunken driving and other reasons, which is a great loss for our nation.

Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces an optimum solution.

Arduino is the heart of the system which helps in transferring the message to different devices in the system. Limit switch 1 will be detect the seat belt, and limit switch 2 will detect the accident will be activated when the accident occurs and information is transferred to the registered number through GSM module. GPS system will help in finding the location of the accident spot. The proposed system will check whether an accident has occurred and notifies to nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through tracking system to cover the geographical coordinates over the area.

II. LITERATURE REVIEW

Accident Detection and Reporting System Using GPS, GPRS and GSM Technology (@2012 IEEE): This paper proposes to utilize the capability of a GPS receiver to monitor the speed of a vehicle and detect an accident basing on the monitored speed and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre. At high speeds the distance between starting to brake and a complete stand still is longer. The braking distance is proportional to the square of speed. Therefore, the possibility to avoid a collision becomes smaller. There is a tabular column for predicting the maximum speed after considering the deceleration factors. As such, if the speed is less than these maximum speeds, than it would be assumed that some other deceleration force worked on the vehicle to reduce the speed and an accident has occurred. Speedometer can also be used to find the speed drops in vehicles, but an analogue to digital converter is required to acquire speed from it. So, a GPS is used to track the speed of vehicle every instance. The vehicle speed is

calculated at every instance by GPS. If there is decrease in new speed values, then it raises an ALARM for accident detection. Then 5 secs will be given to abort the emergency. Else the emergency is sent to Alert Service Centre and plot the location of accident by the GSM number received. There after rescuing the individual.

Real Time Detection and Reporting of Vehicle Collision (@2017 IEEE): This paper proposes to utilize the capability of Accelerometer and Gyroscope to obtain the data and detect an accident basing on the orientation angle and orientation. Then send the location of the accident from GPS data processed by a microcontroller by using the GSM network to the nearest hospital provided over the network and alerts their family members too. The accelerometer detects the direction of vehicle collision by bi-directional axis and an axis towards gravitational force with full scale $\pm 8g$. The collision of a vehicle leads to a drastic change in vehicle speed and shows a direct impact on acceleration force along that axis of crash. As the Z-axis is oriented along the gravitational force direction, only X-axis and Y-axis of accelerometer is required to determine the happening and direction of vehicle collision. The gyroscope is used to calculate the tilt of collision vehicle and is given a full range of ± 500 degree/sec. Angle greater above 46 degrees and below -46-degree results in rollover of car. Other than the threshold of rolls and pitch values, the weight and center of gravity of vehicle plays an important role in rollover. Once the threshold is reached, the notification system will be activated informing the family and nearby hospital about the occurrence of vehicle rollover. In addition, they use GPS tracker too for recording false assumptions from the GPS data acquired. The notification system notifies the information to family emergency contacts and nearest hospital. Notification system is activated once the threshold for detection is reached. Location is identified by GPS.

Vehicle Accident Detection System By Using GSM, GPS and Sensors (@2019, IRJET): This paper proposes to utilize the capability of a Piezoelectric sensor to detect an accident basing on the voltage produced by collision and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre. The Piezoelectric sensor produces a DC voltage proportional to impacts on collision on vehicle. When the voltage increases above threshold value the sensors get triggered. The Latitude and Longitude are detected using GPS and it is sent as message to rescue team through GSM module. The message is received by another GSM module. Google Map Module: It displays Google map shows you exact location of accident and its details. It gets detail SMS from accident location. Hence there is small variation in co-ordinates. An OFF switch is also provided at times of need to avoid false message.

III. PROBLEM STATEMENT

This project is motivated from the fact that accidents in India are majorly due to drink and drive cases. Many times, after the accident occurs the culprits ran away, so they are not traced. Also the victims are not getting the immediate treatment and the accidental death cases are increasing day by day.

IV. OBJECTIVES

- The objective is to overcome accidents by monitoring any change in the speed of the vehicle whereas the accelerometer can detect the fall.
- The Arduino is the major control unit to detect or alert when an accident occurs. It collects the data from the accelerometer, GPS, GSM modules and reflects the output.
- This will reach the rescue service in time and save lives.
- To detect the drunk driver using alcohol sensor.
- To track the detailed information, the of vehicle using GPS and send message via GSM.
- Alerting the system when seat belt not wears.

V. METHODOLOGY

The system uses an Arduino as the microcontroller to control all of the components. It is using software Arduino IDE as a platform to make the coding.

In this system AT-Mega 328 Microcontroller retrieves the data from various sensors and transmits. In this system AT-Mega 328 Microcontroller retrieves the data from various sensors. In this system, for detection of rules violation an alcohol sensor to detect driver drunk, limit switch 2 for detection of accident and on for seatbelt detection. LED will be ON indicating that the power is supplied to the circuit.

When the sensor senses any obstacle, they send interrupt to Controller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through message. This message will give the information of longitude and latitude values. Using these values, the position of the vehicle can be estimated. The received data is given to the controller. Correspondingly it gives an acknowledgement in the form of a message to the mobile phone. LED used in the circuit displays the reception of messages.

The methodology is divided into three parts.

The first part is on the design structure, followed by hardware description and the finally on the programming design.

All these three parts were assembled together and experiments were then performed to build a system.

VI. SYSTEM DESIGN

ATmega328P microcontroller and is the major control unit to detect or alert when an accident occurs. It collects the data from sensor, GPS and GSM modules and reflects the output either in display system or through a message.

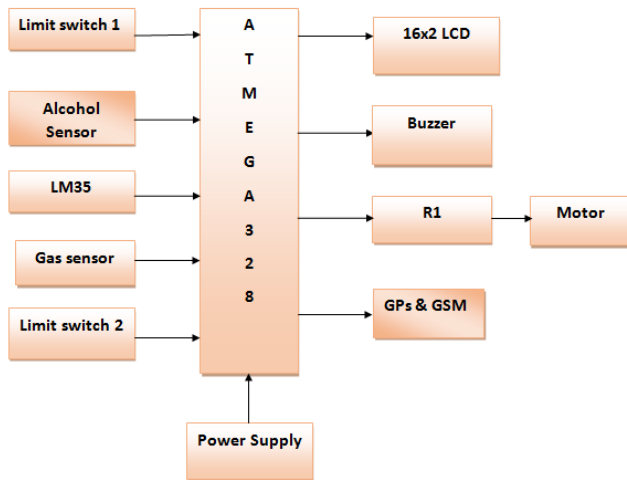


Figure 1: Block Diagram

The system starts using Adapter 12 v which is connected to the microcontroller. Two limit switches are use fist limit 1 use for the detection of seat belt and second one for the accident detection. First this Limit switch1 is use check the seat belt inserted or not. if seat belt is not worn then stop the motor automatically using relay. Here we use Alcohol MQ3 sensor detection of the driver is drunk or not. Temperature sensor is LM35 which is check the temperature of the any person. Here we use MQ2 Gas sensor for the check the any gases like LPG, co₂ form the surrounding. Limit switch 2 is use for the detection of the if any Accident.

If any sensor detected, then relay receive the data and stop the motor which connected to vehicle and alert the system with Buzzer then stop the vehicle. They also two major parts other than controller is GPS module and receiver other module is GSM. If any accident accoutered the GPS take the location of the victim. GPS module is used GSM will send the received coordinates to the user through SMS. There is an additional LCD which is used for displaying status message or coordinates. And buzzer will be alert the system.

VII. RESULT AND DISCUSSIONS

This project presents Accident Detection and Prevention System using GSM/GPS and it is designed and implemented with ATMEGA 328 Microcontroller in embedded system domain.

Experimental work has been carried out carefully.

The result shows that higher efficiency is indeed achieved using the embedded system.

When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.

Thus, collected information is then fed to arduino uno. Necessary processing is completed and therefore the information is passed to the LCD and GSM modem. 3. The GSM modem collects the information for arduino uno and then transfer it to the concerned mobile phone of Traffic police control room through the SMS which is in text format.

We observe the sensor data characteristics for several simulated test cases or possible emergency scenarios. We recorded the responses of sensors and categorized the severity level as low-risk, minimum risk, and high-risk range values. Afterwards, based on these severity levels of emergency situations, we will notify the emergency responder or emergency contacts

The System also displays the message on LCD.

The Following figure shows the hardware setup of the proposed system:

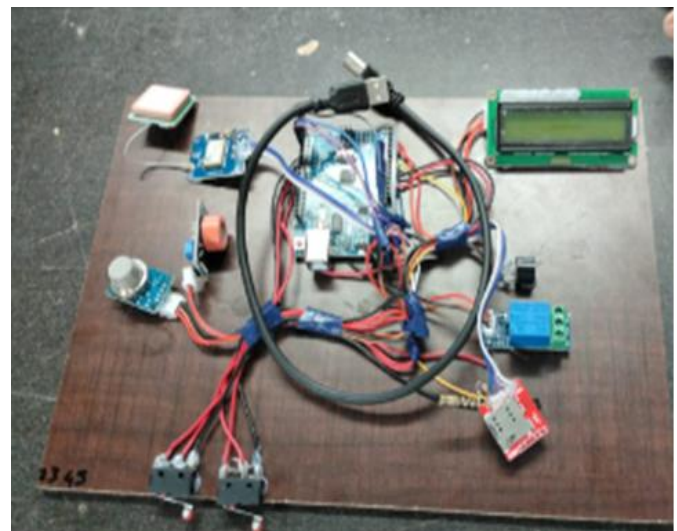


Figure 2: Result of Hardware

VIII. CONCLUSION

This project a smart automated system, with very little human interact. The proposed system deals with the accident alerting and detection. These techniques include smart phones, GSM and GPS technologies, if an accident occurs, the chances of saving the victim's life are greatly increased by calling the nearest ambulance using through GSM module.

Using GPS, the location can be sent through tracking system to cover the geographical coordinates over the area. It can resolve most of the accident scenarios by detecting accidents on time and triggering immediate help from emergency services without wasting any time. The technology will automatically detect when a driver is intoxicated with a blood alcohol concentration.

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