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# Microcontroller Based Accident Detection System

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***Abstract:*** ***The always advancing technology has made human beings day to day lives easier. Since every coin has two sides similarly technology has its benefits as well as demerits. Transportation has great role in human life. Numbers of vehicles are increasing day by day. Development in the field of transportation makes our travelling difficulties much easy. But it can cause disaster to us and even can kill us in the form of accidents. Thus accident detection system has gained major attention in human lives. This system uses GPS modem and GSM module. When accident occurs, GPS identify the location of vehicle and sends the message via GSM to the predefined user mobile number. Message contains the latitude and longitude of the location. Numbers of accidents are more and large number of people is losing their lives due to accidents. The poor emergency facilities available in some of the countries just to add this problem. These accidents are creating lots of traffic problem. This work will provide an optimum solution to this. With signals from accelerometer, a severe accident can be recognized. According to this work, when a vehicle meets with an accident immediately, vibration sensor will detect the signals and sends the alert message through the GSM modem including the location to the predefined mobile number or to control room. So the police can immediately trace the location through the GPS modem, after receiving information. Then after confirming the location necessary action will be taken.***
***Keywords: GSM module, GPS system, accident detection.***

## I. INTRODUCTION

Now a days accidents are increasing. The number of vehicles on the road is increasing day by day. The fast growth of infrastructure has made our lives easier. Increase in the technology also makes the high demand of vehicles. It will increase the traffic hazards and the road accidents take place frequently. It will cause huge loss of life because of the poor emergency facilities. If the accident happens at an isolated area it will results in more risk to save the person's life since the emergency facilities are very less. Automatic accident detection system will helps to overcome this problems. In this system an accelerometer is used in a car alarm application so that dangerous driving can be detected. It can be used as a crash or rollover detector of the vehicle during and after a crash. With the signals from the accelerometer, a severe accident can be detected. This design is a system which can detect accidents insignificantly less time and sends the basic information to the id center within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident occurred. This alert message is then suddenly send to the rescue team in a short time, which will help in saving the valuable lives. Also provided a switch for terminating the sending of message in rare cases where there is no emergency, this will help to save the precious time of the rescue team. Whenever the accident is happened anywhere the message is sending with all these details to the rescue team and also to the police station. The message is sent through the GSM module and the location of the accident is detected with the help of the GPS module. Both are present for getting the information correctly and easily to the rescue team and the police station. The accident can be detected precisely with the help of both micro electro mechanical system sensors and vibration sensor. The angle of the rolls over of the car can also be known by the message through the MEMS sensors.

The accident detection system consist of GPS module, GSM module and an accelerometer. GPS module is inserted and is used for the detection of the exact location, is; latitude and longitude. Accelerometer is placed in this for detecting that accidents has occurred by observing the variations in three axes. If there is any variation in these axes, accelerometer will detect it. GSM is also there to send message with the details of that places where the accident is takes place. With the help of GSM, system will send message to the number that preprogrammed in which the exact location will be indicated. Here it will be better to provide numbers of ambulance, police etc. So that victims can be saved easily. By giving this numbers of ambulance and all they can quickly identify the place where the accident is happened and they can reach as soon as possible. As we discussed that the number of vehicles on the road will increasingly at a great extent. The problems related to this is also increased like traffic hazards etc.. Now a days it is a common scene that if accident occurs even if there are people, no one will try to help victims. Everyone in this society is so busy with their own works. So even if they see accidents also they will not help because of the busy or the fear that this will make more

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complicated issues to them. So they not even noticed that person who got accident. *[1]*As per the road accident statistics in India over 1,37,000 people were killed in road accident in 2013 alone, this is more than the number of people killed in all our wars put together. That much people loss their leaves in accidents because of not getting emergency casualty. This application provides the optimum solution to poor emergency facilities provided to the road accidents in the most feasible way. This system plays a great role when people who saw the accident will not help to save the victims. If accidents occur at isolated places or at late nights also this system will help to a great extent. We hope this will be a great success and also many lives could be saved with this.

## II. LITERATURE REVIEW

A group has created an accident detection system using navigation devices such as GSM, GPS etc. In this, they have used microcontroller instead of arduino UNO. Using impact sensor they detected that the accident has occurred by detecting the vibrations. Then with the help of GPS, GSM etc. it sent message to server side and then to toll side. From toll side server gets message of location of accident *[2]*. Another group has developed an automatic vehicle detection and messaging system using GPS and GSM modem. The reason for opting this paper was that, the existing accident detection systems will detect accident but will not provide exact location. As in the previous paper, GPS is used for detecting the location and GSM for sending message. They have used ARM controller for saving the mobile number to which the message has to be sent. Main limitation of this project was it will not work if there is no network. Easy operation, sophisticated security, simple and reliable design etc. are some of the advantages of this system *[3]*. At present, we cannot detect where the accident has occurred and hence no information related to it. This will lead to the death of that person, because of lack of the emergency casualty. The research are going on to find a solution for this and also for tracking the position of the vehicle even in dark clumsy areas and other isolated places, where there is no network for receiving the signals.The ARM controller is used for saving the mobile number in the EEPROM and sends the message to it whenever an accident has been detected.

## III. SYSTEM DESIGN

### *A. Arduino Uno*

Arduino UNO is an open-source microcontroller board based on the Microchip *[4]*. ATmega328P microcontroller and developed by Arduino.cc. The board consists of sets of digital and analog input/output (I/O) pins that can be interfaced to various expansion boards and other circuits. It has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. The ATmega328 on the Arduino Uno allows uploading new code to it without the use of any external hardware programmer.


Fig:1:ARDUINO UNO

### *B. GSM module*

GSM is used as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. Hence *[5]*.GSM is used to monitor and control the DC motor, Stepper motor, Temperature sensor and Solid State Relay by sending a message through GSM modem. Hence no need to waste time by manual operation and transportation. It is considered as highly efficient communication through the mobile which will be useful in industrial controls, automobiles, and appliances which would be controlled from anywhere else. It is also highly economic and less expensive.

Fig:2: GSM module

*C. GPS Module*

GPS is used in vehicles for tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver. When an accident occurred in any place then GPS system tracks the position of the vehicle and sends information to the particular person through SMS.


Fig:3: GPS module

## IV. BLOCK DIAGRAM

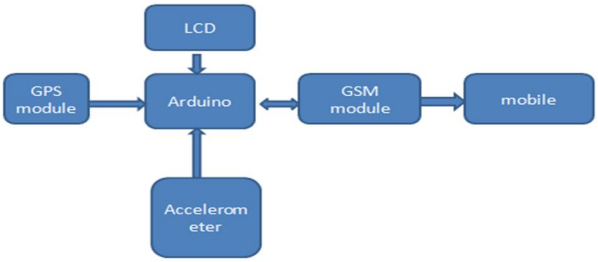


Fig:4: Block diagram

Arduino is used for controlling the whole process with the help of GPS and GSM module.*[6]*GPS is used for detecting the coordinates of vehicle, GSM module is used for sending the alert SMS with the coordinates and the link to Google Map. Accelerometer namely ADXL335 is used for detecting accident or sudden change in any axis. A 16x2 LCD is used for displaying status messages or coordinates. We have used GPS Module SIM28ML and GSM Module SIM900A.

When the hardware is ready after programming, system can be installed in our vehicle and power it up. Now whenever there is an accident, the car gets tilt and accelerometer changes it's axis values. These values are read by Arduino and checks if any change occurs in any of the three axis. If any change occurs then Arduino reads coordinates by extracting $GPGGA String from GPS module data and send SMS to the predefined number to the police or ambulance or family member with the location coordinates of accident place

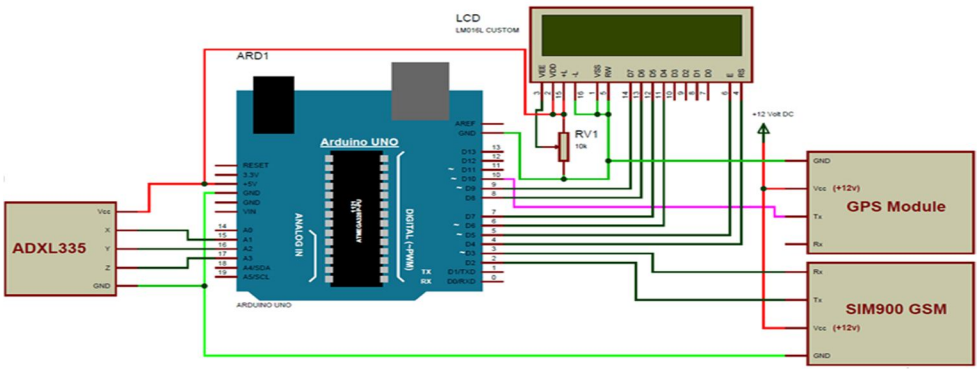


Fig:5: Connection diagram

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## V. RESULTS AND DISCUSSION

This work gives a different way of approaching to the accidental problems. By using this system the accident location can be located easily and the detection of accident is precise unlike the prior approaches , where the detection is done by using two sensors. The accident is detected by using the accelerometer sensor or gyroscope sensors can be used and there is also an alternative way to stop the whole process of messaging through a switch on the Arduino. In case of accident, MEMS sensor recognizes the vehicle's vibration and sends electric signal to controller. *[7]*. The controller utilize GPS to locate specific area where accident happens, and simultaneously GSM module send message to ICE e.g. relatives, emergency vehicle, police etc. At that instant, black box record the voice from inside the damaged vehicle victim voice for further investigation. The rescue team reaches at the spot of accident on time and can rescue the victims. The police can gather the recorded confirmation. The proposed system reduces the time of arriving rescue team. Furthermore activity can be cleared effectively. Automatic vehicle accident detection and reporting System using black box is proposed in this paper. The framework in the proposed system is placed in moving vehicle to detect accident and report to In Case of Emergency (ICE). The first responder is getting notice through GSM and in addition to that the vehicle accident zone longitude
and latitude information is obtained through GPS and GPRS. The proposed work can save life as the ICE team reaches the spot on time, take care of the victim and give medical treatment on time.The black box will records the voice of victim after the accident occurs which will be used for further investigation
When the accident occurs message is send to the predefined numbers. When the accelerometer senses an acceleration it sends the signal to Arduino microcontroller *[8]*. The microcontroller will send an alert to the predefined numbers. After the message is send the LCD display on the accident alert system will show message sent alert. Then the

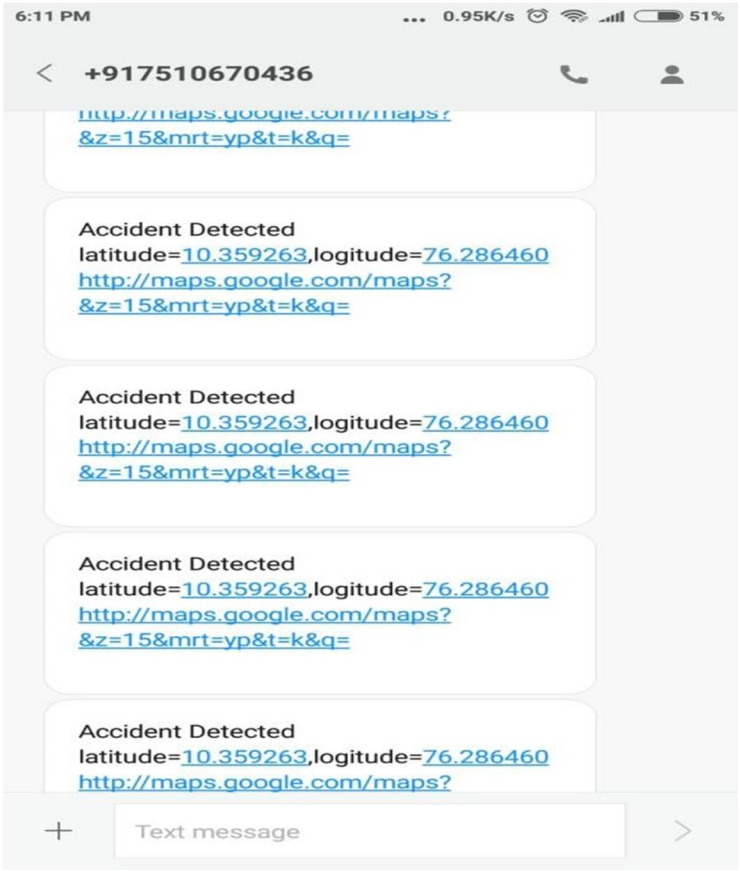


Fig:6:Received message

LCD screen will show a message as message sent. This message is sent only after the message has been successfullysent to the predefined number.

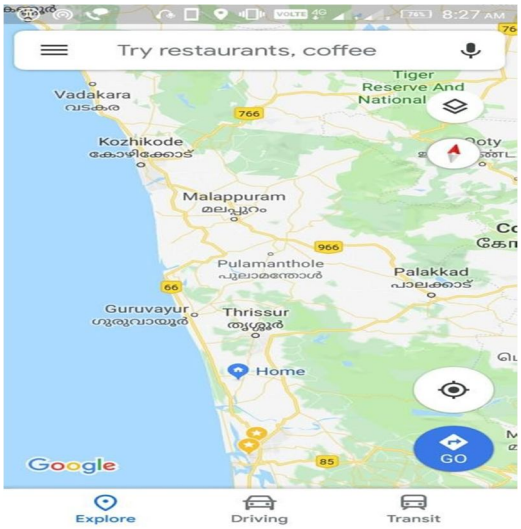


Fig:7:google map

Figure shows the screenshot of the application which contains the location. This shows the location which the system is present at that time. Map is shown in the application which will help in identifying the location very easily. In every 3 seconds the location will be updated as per the latitude and longitude getting from cloud showing a settings option which is provided in the application for set the device ID. It will show the location as per the latitude and longitude given by the GPS. When accident occurs the system will sent the location to cloud and the application uses the cloud data to locate the vehicle. Using the data the application will show the location in map.

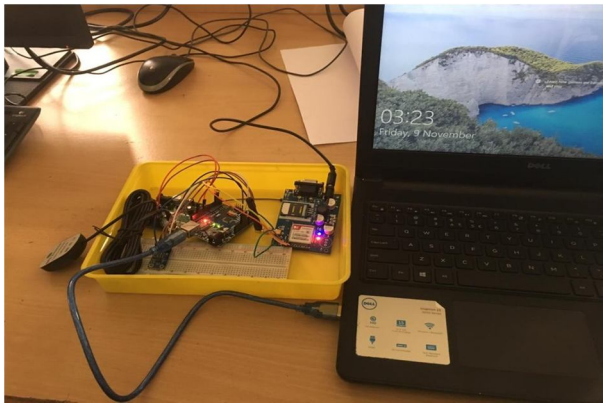


Fig:8: Implemented system

## VI. FUTURE SCOPE AND CONCLUSION

In future, accident detection system can be developed or modified by interconnecting cameras to the system that takes photographs of accident spot.it helps to find the vehicle quickly. Also this can be extended with alcoholic detection. If the person took alcohol who is driving, then the vehicle will be stopped immediately by giving alarm and sending the message to control room. Then police can identify the location of vehicle and the person who is driving. A scanning system can be added to vehicle. License is scanned firstly then only the person can take the vehicle. It also checks the license is out of date or not. It helps to identify the persons during severe accidents. Theft detection becomes easier. The main motto of this work is to reduce the number of death rate occurring due to accidents. This is done by using GPS modem which track the vehicle and send SMS via GSM module to the predefined number. SMS contain the geographical information of the location including longitude and latitude of that place will send automatically. Mobile number is stored permanently. So in the coming years, it is going to play a major role in day to day living. Whenever the accident is alerted the paramedics are reached to the particular location to increase the chance of life. This project is more user-friendly and reliable. By implementing this system, cost of vehicle will be increased. At a time, our life will be more safe and secure.

## VII. ACKNOWLEDGEMENT

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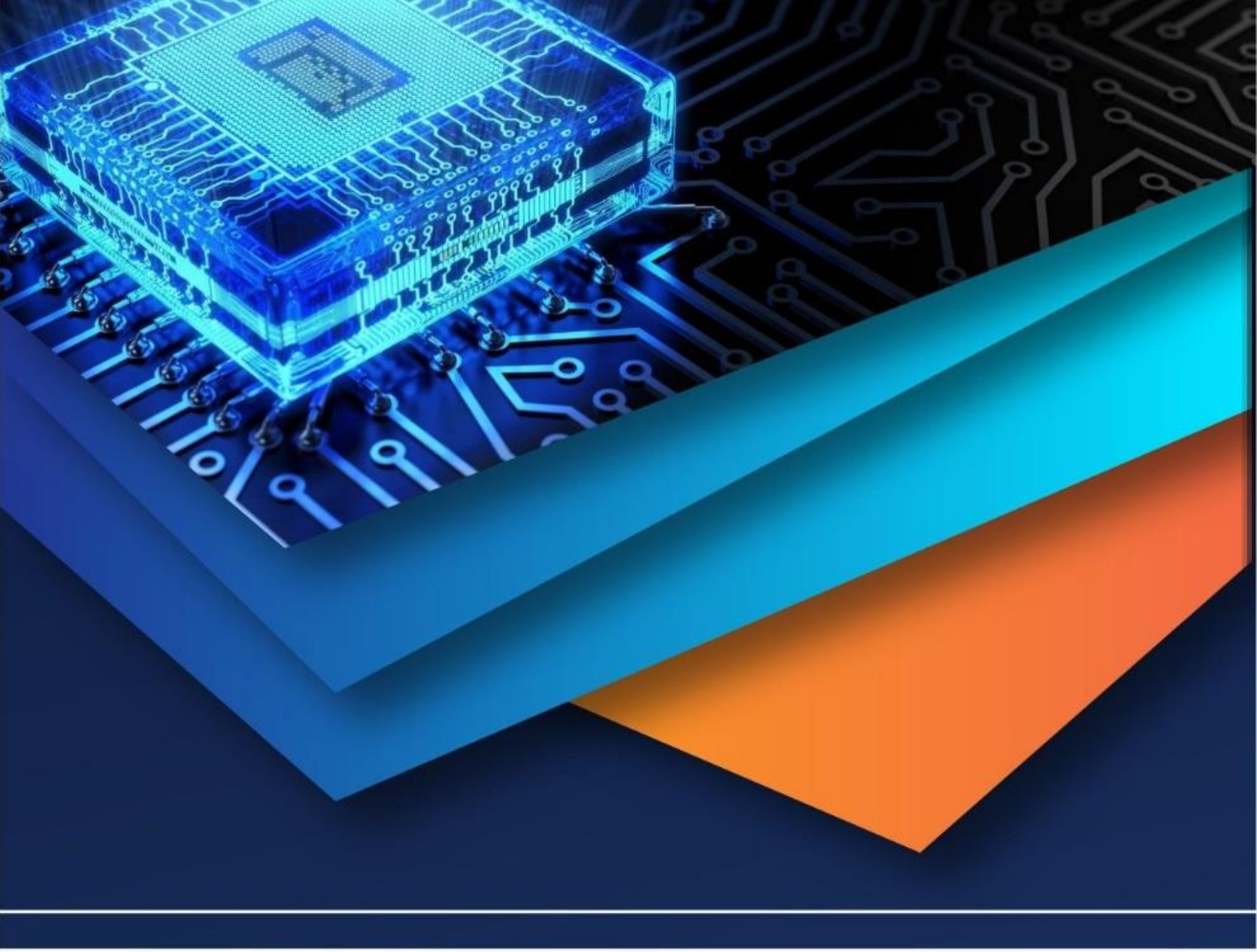

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