To prevent accidents from nearby approaching vehicles using alarm and object detection system.

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ABSTRACT:

This paper represents to prevent accidents from nearby approaching vehicles using alarm an object detection sensor using ultrasonic sensor, GPS Module, GSM Module and Vibration Sensor. During the driving of vehicle whenever there is any obstacle or moving object the ultrasonic sensor system detects it and immediately send the signals to the embedded board. As soon as the embedded board receives the signal it alerts the driver by using an alarm. The GSM module will give the information in the form of message to the registered mobile number. Now a days many accidents were occurring on highways and many of the people are dead because of the coming late of emergency services to the accident detected spot. So, this paper will help us to provide an alternate solution for this type of issues.

Index Terms: -Global system for mobile communication, Global Positioning System, Vibration sensor, Ultrasonic sensor, ARDUINO.

Introduction:

In 2017 a survey has been conducted approximately total of 2076 people died in road accident [1]. Becaues of absence of crisis factilies in our country this project will detect the accident and sent the message to mobile phone. They can contact nearby hospital.

Road accidents occurred in many countries was characterized by human powered land vehicles by violating the traffic resources. The main reason for the leading deaths is predicted to be the road accidents. As these Mishap are not typical so the surmised measure are to be created and the required action is to be taken. The uncontrolled event of an individual ends up in personal injury.

The following paper focuses on preventing the accidents and if any accident has occurred then it reports to the Emergency Contact Number. This project is a prototype of the actual automobile which can make the transportation a safer way to travel. This project uses of Ultrasonic sensor, Vibration sensor, GPS Module for location tracking, GSM Module for interfacing hardware with mobile, ARDUINO UNO to synchronize all the components together.

The Ultrasonic Sensor senses a vehicle approaching from behind the vehicle and gives an alarm to the driver that to be careful while changing lanes on highways, applying brakes, overtaking vehicles, etc. It has got a transmitter and receiver which calculates the distance of the approaching vehicle. Unfortunately, if any accident has occurred then the Vibration Sensor gets activated and it will detect the accident and then immediately it sends the reports to the Emergency Services. The Emergency Services can locate the accident spot by the latitude and longitude position of the GPS and GSM Modules.

Related work:

According to a Statistical Report (ind, 2016) published by the Department of Roads and Highways Transport on Vehicle Mishaps in the country in 2016, the country has recorded 4,60,852 accidents in the year resulting in 1,45,685 deaths. Approximately 423 people died in 1,227 vehicle accidents every day. The data also states that at least 16 deaths occurring in vehicle mishaps out of 55 accidents in every hour in a particular period were primarily because victims were unable to receive suitable treatment within time. Thus, if an alert system is made and an alarm is raised, it might become possible to save many lives.

There has been prior work in the area of using GSM and GPS along with microcontrollers [2]developed a similar tracking system using an Embedded Linux board namely Raspberry Pi and a GSM SIM900A module. The objective of their tracker was to raise an alert whenever the vehicle deviated from the predefined route which was set in the Raspberry Pi by the user. It also had features for sending notifications when the vehicle exceeded a set speed limit. [3] implemented a vehicle location finder using a similar combination of GSM and GPS systems particularly for the task of vehicle thefts.

The use of panic buttons in vehicles is an idea which hasn't been deployed in real-life applications yet. According to the newspaper article [4], the Parliament of India will make it compulsory from 1st of April 2018 for all public transport vehicles which include buses and cabs to have a location tracker device and one or more panic buttons to alert the authorities in case of an emergency. Although, the government has not made the installation of cameras in these vehicles mandatory, primarily citing privacy concerns and due to the factor, that it will generate tremendous amounts of data every

second. The technology to process such huge Nowadays, a large population of people chooses to travel by cabs and hence, keeping in mind the safety of the commuters, it is the need of the hour for developing such products.

Another study by [5] mentions that according to National Crime Records Bureau (NCRB) report, drunk driving was a major factor in road accidents. 99 per cent of the fatal accidents that occur on the Highways are due to drunk driving and there is no check on this. Majority of these accidents involved trucks since the truck drivers drive irresponsibly when they are fully drunk. Until and unless the nation starts a new system of checking drunk driving on the highways, these fatalities cannot be reduced, as mentioned by a Joint Commissioner of Police. The current system of Drunk driver checking requires traffic police to make people blow into the breath-analyzers. However, it is not sufficient to check every instance of drunk driving cases due to the presence of an enormous number of vehicles on roads and especially outside cities and highways. Thus, an automatic monitoring system is needed to tackle this problem.

3.Components:

1. Arduino (UNO)

2. GSM Module

3. GPS module

4. Ultrasonic Sensor

5. LCD

6. Vibration Sensor

(i) ARDUINO UNO:

This is one of important components in designing of prototype and it is simple so anyone can understand it easily It is an advancement board depends on a dual inline package ATmega328P AVR micro controller [7]. As shown in fig(i)a. ARDUINO has 14 digital input/output pins, in which six of them are pulse width modulated (PWM) [6] output and 6 analog input pins. Arduino has an 16MHz crystal, USB Port, an ICSP header, programs can be uploaded onto it from the Arduino IDE. It has good environmental software which make easy to code and compile and upload to hardware. Fig(i)b. represents Arduino IDE software

Fig(i)a Arduino   Fig (i)b Arduino IDE

(ii)GSM Module:

A GSM Module is an integrated chip or circuit that it will be used for establishing the communication between a mobile or an information processing system and a GSM system. It consists of a GSM Module powered by a circuit power supply and communication interfaces for computer. The figure of GSM is as shown below in fig(ii).
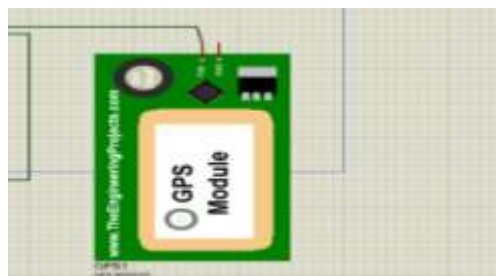
Fig(ii) GSM module

(iii)GPS Module:

By using the GPS device anyone can easily get the position coordinates of the device present anywhere on the globe. To process this, what all required is to associate the Transmitter pin of the GPS to the receiver pin on the micro controller as shown in fig(iii)
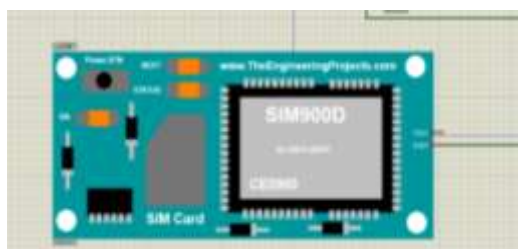
Fig(iii) GPS Module

(iv)Ultra-sonic sensor:

It is an electronic gadget which estimates the distance of the focused on object by the emanation of Ultrasonic sound waves and afterward it changes over the reflected sound waves into an electrical sign, essentially the ultrasonic waves travel with a speed that of higher than the discernible sound. It comprises of two primary parts i.e., the transmitter and the beneficiary.

To calculate the distance between the object and the sensor is

$$a=1/2(b*s)$$

a=Distance

b=Time

s=Speed of Sound


Fig(iv) Ultrasonic Sensor

(v)LCD Display:

It is a level plane showcase, it normally doesn't produce light sign straightforwardly, rather it utilizes a backdrop illumination or reflector to give picture in shading or monochrome. They are accessible to show subjective or fixed pictures with uninformed substance, which can be shown, as in an advanced clock fig(v).Its screen can be made up of 2 lines which consists of 16 characters each.

Fig(v) LCD Display

(vi)Vibration sensor:

The sensor acclimated recognize mishap is stun sensor. It's regularly one phase stun sensor, it distinguishes any hard effect followed up on it. The yield from sensor after sway are +5v and associated with INT of processor. These sensors are fixed on all sides of the vehicle to recognize sway happened subsequently. These yields from sensors are send into entryway to identify at least one effect. it's incorporated inside the circuit framework by interfacing every one of the sensors to entryway whose yield is associated with the int pin of miniature regulator.
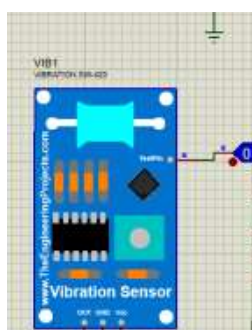
Fig(vi) vibration sensor
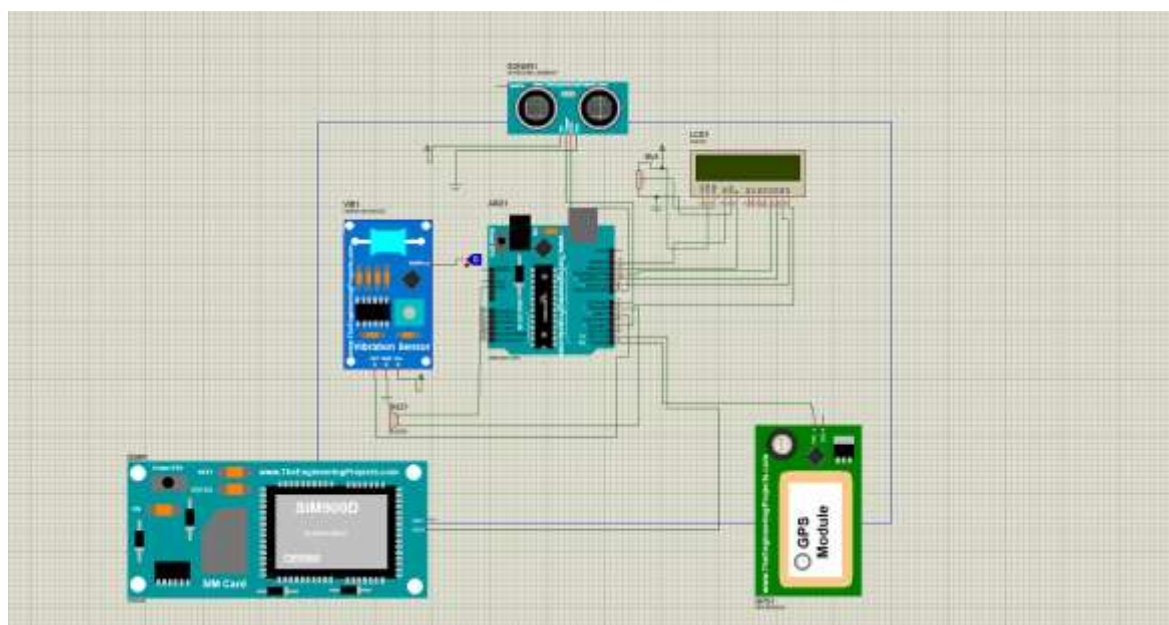
4.Circuit diagram:

Fig vii represents the simulation of prototype.

The circuit is designed in the proteus software for getting good results. The circuit has shown in fig vii. The PROTEUS is easy to design a circuit by importing the libraries. In this circuit sim 900D has been used.

5.Working:

The Ultrasonic Sensor senses a vehicle approaching from behind the vehicle and gives an alarm to be Careful while changing lanes on highways, applying brakes, overtaking Vehicles, etc. It has got an Ultrasonic sound wave Transmitter and receiver which is used to calculate the distance of the Moving toward vehicle. Lamentably, on the off chance that any mishap has happened, the Vibration Sensor will distinguish the mishap and send the report to The Emergency Contact Nos. utilizing the GPS Module and GSM Module alongside the area's scope and longitude. A LCD show is likewise appended with the circuit for showing the notice for the client. In Normal condition LCD will show the scope, longitude and Distance safe. Be that as it may, in the event of crash LCD Display will show the message "would you say you are safe?????? Press Reset" on the off chance that client will press the reset button, System will run typical condition else it will hang tight for 10 secs then it will send a mishap ready SMS with the area to the given telephone number. Also, it Will hold the keep going scope and longitude in plain view. In the event that some vehicle is drawing closer towards the User's vehicle from posterior and assuming the distance between two items will be under 30 centimeters, an admonition message will have shown on the LCD screen with the distance and ringer will be enacted.

Entire framework might be partitioned into 2 sections one is Vehicle Accident Alert System and another is Collision Detection framework.Vehicle accident alert system consists of circuit connections which can be made directly. Here 'TX' pin of the GPS module is straightforwardly connected to the 'RX' pin of Arduino board.By utilizing default Serial pins here, we have dispensed sequential interface on TX & RX pins of GPS and Arduino left the 'RX' pin of the open GPS Module open. As a matter Pin 0 and 1 of Arduino are utilized for Serial correspondence yet by utilizing the library of the software serial, we can also permit the continuous correspondence on other computerized pins of the Arduino.To control the GPS Module it utilizes the 5 Volt supply. GSM modules 'RX' pin is straightforwardly associated with 'TX' pin of the Arduino. In case of GSM interfacing it additionally uses the default subsequent pins and with the help of 9 Volts stock pile the GSM

Module also gets fueled. Furthermore, another could be a vibration sensor is added during this framework for recognizing a mishap and its D0 yield Pin is straightforwardly Connected to stick no 5 of Arduino Uno.

6. Result and Discussion:

The System recognizes the mishap from the vehicle and sends the message through GSM module. Another GSM module gets the message and the google maps us the specific area of the mishap spot as demonstrated in fig viii. It gets the subtleties through SMS from the mishap area. Consequently there is little variety inside the directions, so beginning estimation of scope and longitude will be same however there will partially esteem changes with little contrast.
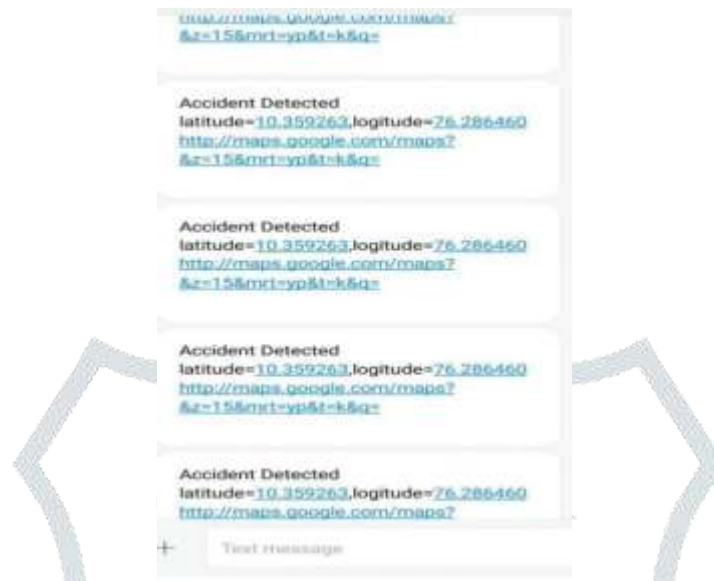

Fig viii sample text received by Emergency contact number

7. Conclusion:

The project on Arduino UNO Based Accident Prevention and Detection System is one of the very valuable projects considering the present-day scenario. This project includes the use of Ultrasonic sensors, GPS Module, GSM Module, Vibration Sensors which are synchronized by using the Arduino Board.

In the past two decades, there has been a tremendous increase in the number of automobile users and the world has also seen an increase in the rate of accidents. These are mainly caused due to carelessness, drunken driving, over speeding, etc. So, we need to implement some important measures to make driving a safer mode of transportation.

The Ultrasonic Sensors detects any vehicle approaching from behind the automobile and gives an alarm to the driver to be careful when he changes lanes on highways, apply brakes or overtake other vehicles. The vibration sensor detects the occurrence of accident and then using the GPS Module and GSM Module it sends the accident report to the Emergency services after any accident has occurred, the time taken for sending the information to the any Emergency services will also be reduced by implementing our technique.

8. References:

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