

Emergency Vehicle Management System

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Abstract—Traffic collisions are the major causes for death and injuries. The frequency of the accidents is approximately 5 lakhs every year in our country and a count of 4,12,432 in the year 2021, with 25% (1,53,972)[10] fatality rate. Major cause for the deaths are due to lack of information about the accidents that occur during midnights and the other reason when person is not sent to the hospital in time. The target of this paper is giving an alert message to the family members and nearby hospitals and police stations whenever any accident occurs. The Arduino interfaced with vibration and accelerometer sensor detects accident and that location is tracked by GPS module and an alert message is sent through GSM module. In case of any accidents where in only vehicle is damaged and no harm to person then a manual switch is provided so that the system is turned off. This project helps in minimizing the deaths and may save persons life by informing at right time. Nearly 6% are non-injury accidents in that case the vehicle need to be serviced in order to reach the destination. An web application is built in order to get the list of service centers in any remote or new places.

Index Terms—GSM, GPS, Arduino, vibration sensor, accelerometer sensor, LCD display, buzzer, switch and web application

I. INTRODUCTION

A. Road Accidents in India

Every day in the news or in newspapers the mankind read about thousands of people dying in road accidents not because of improper medical facilities but because the families of the people did not get timely informed.. The entire system build with Arduino and uses various sensors such as vibration sensor, accelerometer, GSM module, GPS module and manual switch. This system can help in saving lives and by informing the families of the victims in that road accident by contacting the nearest hospital and by sharing the exact co-ordinates of the location where accident has taken place. We are developing one app which helps to contact nearby hospitals.

V. TILTING ANGLE

Tilting angle is the maximum angle after which the vehicle can be tilted without our interference and causes accidents. For the two wheelers the tilting angle for the different vehicles are taken in consideration and average of these is taken as threshold value. This threshold value is given to the Arduino . If vehicle is tilted greater than the threshold value accelerometer detects and an SMS is sent.

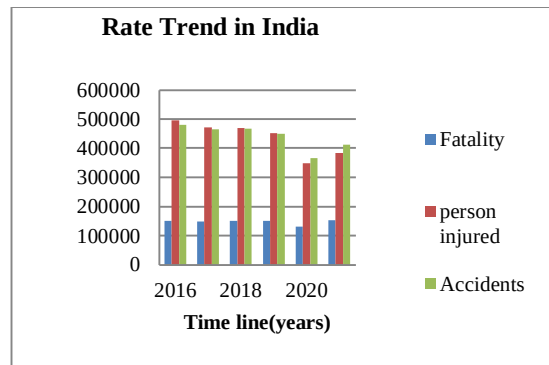


Figure 1.: Rate Trend in India 2016 to 2021[10]

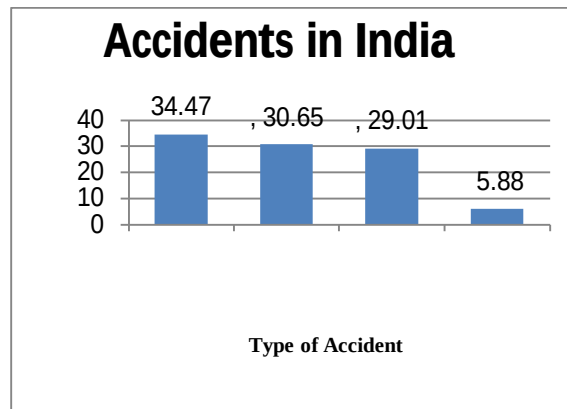


Figure 2. Accidents in India[10]

II. LITERATURE REVIEW

Paper author	Paper title	Components used	result
G.Azeez Raheem Ajetola	Web-based accident reporting and tracking system (artsys) using sensor technology	GPS,GSM Module ,shock Sensor.	When the shock is greater than the threshold value then the alert is send.
Namrata H. sane	Real time vehicle accident detection and tracking using GPS and GSM	GPS, GSM Module ,push buttons , Switch.	When an accident occurs due to collisions the message is sent and in case of minor accidents the system is turned off by manual Switch.
Unaiza alvi, Muazzam A. khan khattak [july 2020.IEEE Access PP(99):1-1]	A comprehensive Study on IOT based accident detection systems for smart vehicles.	GPS/GSM Based systems, and various machine learning Techniques, vehicular Ad-hoc networks.	They present a various existing methodologies Used for predicting and preventing road accidents Highlighting their strengths, limitations and challenges that need to be addressed to ensure road safety and save valuable lives.
Ulhas patil pranali more Rahul pandey [august 2022]	Tracking and recovery of the Vehicle using GPS and GSM.	GPS and GSM modules Renessa's Micro-controller, Smart sensing Equipment.	This technology continuously track the vehicle and report what ever is asked and send rescue alert message after any emergency situation takes place.
B. kumar, R. jagadeesh, Ch.gowri [1 april 2020]	Accident detection and tracking system using GSM,GPS and ARDUINO.	Accelerometer, Ultrasonic sensor ,vibration sensor, GSM and GPS module.	This can helps to achieve the rescue service in time and saves the precious human life.

III. FLOWCHART

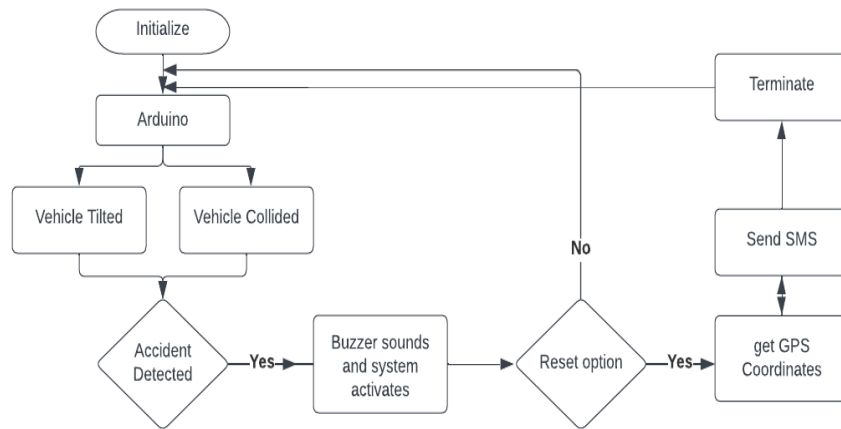


Figure 3. Steps involved in the alert system

IV. BLOCK DIAGRAM

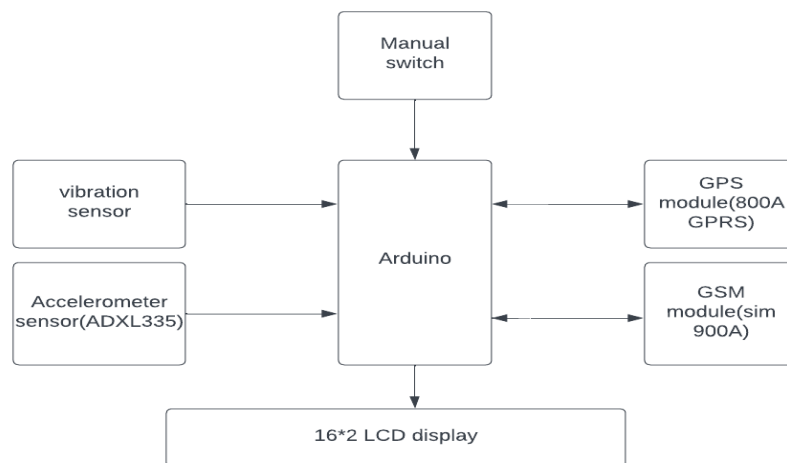


Figure 4. Block diagram of the system

TABLE I. TILTING ANGLES FOR DIFFERENT VEHICLES [11]

S.N o	Bike Name	Maximum Tilt Angle (°)
1	Honda CD 70 cc	33.1
2	Yamaha 70 cc	32.8
3	Kawasaki 100 cc	35.2
4	Honda CG125 cc	36.4
5	Yamaha YB 125Z 125 cc	36.6
6	Road Prince 70 cc	33
7	Keeway Superlight 200 cc	38.2
8	Ravi Humsafar Plus 70cc	32.9
9	Renegade Classic 300 cc	39.8
10	Derbi ETX 150 cc	37.2

VI. CIRCUIT DIAGRAM

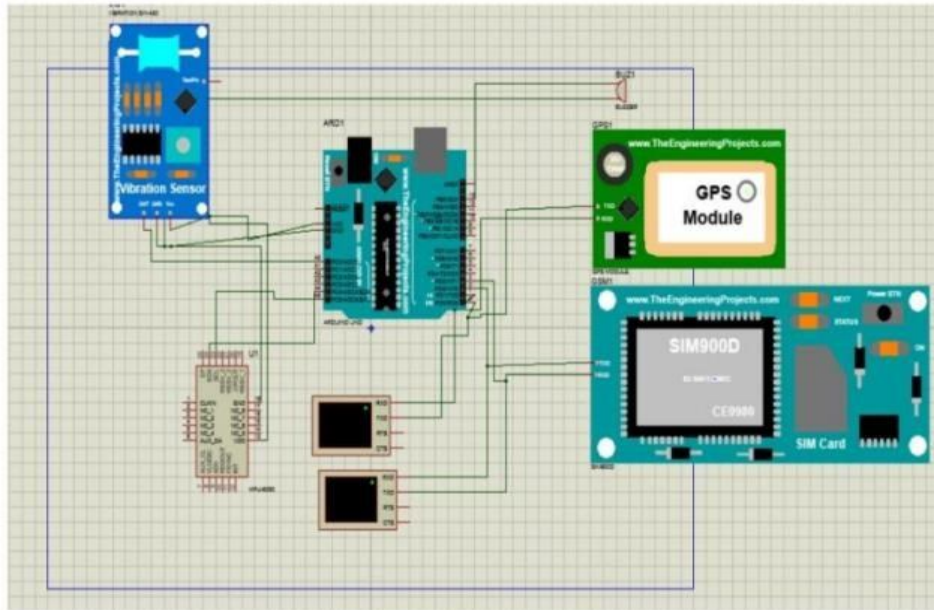


Figure 5. Circuit Diagram of Alert System

VII. COMPONENTS AND TEST CASES

MODULES	TEST-ID	TEST CASE NAME	INPUT	EXPECTED OUTPUT	RESULT
GSM (SIM 900A)	GSM_T_1	Giving supply to module and checking the circuit	12v power supply	Module should on and led should glow	Pass
	GSM_T_2	Inserting sim to the module	Any working sim	Network led should glow with delay of 3 seconds	Pass
	GSM_T_3	Interfacing module to arduino	Connecting Rx, Tx, GND pins to arduino	GSM should respond to arduino	Pass
GPS (SIM 808 GPRS MODULE)	GPS_T_1	Giving supply to module and checking the circuit	12v power supply	Module should on and led should glow	Pass
	GPS_T_2	Interfacing module to arduino	Connecting Rx, Tx, GND pins to arduino	GPS module should respond to arduino and send the location	Pass
16*2 LCD	LCD_T_1	Supply is given to LCD module and interfacing to arduino	+5v power is given to the LCD, and data pins are connected to 12,11,2,3,4,5	LCD should display the text given in arduino code	Pass
ACCELEROMETER (ADXL335)	ACC_T_1	Checking the circuit by giving the supply as per the instruction given in module description	5v supply and GND	Module LED should turn ON	Pass
	ACC_T_2	Verifying the module by interfacing with arduino and observing angle change	Connect input of X to A0 of arduino	Accelerometer should provide axis values	Pass
BUZZER (PIZEO BUZZER)	BZR_T_1	Checking whether the buzzer works or not by giving supply	+5v and GND	Buzzer should produce sound when it is given supply	Pass

	BZR_T_2	Verifying that it makes sounds when there is axial change in accelerometer and bumper switch is pressurized	Threshold value is given for any one sensor		Pass
ACCIDENT SLERT SYSTEM	TC_1	Verifying that the circuit is power ON	12v power supply	All modules and sensors should turn ON	Pass
	TC_2	Verifying GSM module is initialized successfully and respond with OK AT command		OK should be displayed in command terminal	Pass
	TC_3	Verifying GSM module's network led is blinking with 3 sec delay	Sim is inserted	Led blinks with delay of 3sec	Pass
	TC_4	Verify that GPS module is initialized successfully and provide the coordinates		GPS module provides the coordinates	Pass
	TC_5	Verify that LCD is turned ON and showing the message As per code		LCD display the text	Pass
	TC_6	Verify that on tilting the accelerometer the buzzer should make sound		Beep sound is produced	Pass
	TC_7	Verify that the bumper switch is pressed and the buzzer make sound		Beep sound is produced	Pass
	TC_8	On pressing button the system is made reset without sending the message	Press reset button by user	No intimation should initiate	Pass
	TC_9	Verify that either on tilting the accelerometer or bumper switch is pressurized the GPS and GSM should initiate		GPS module should get the current coordinates and alert message is sent	Pass
	TC_10	Verify after sending the sms the system must restart		System is ready is displayed on the LCD screen	Pass

VIII. WEB APPLICATION

Since the idea of alert system includes all kinds of possibilities there is need of taking care of vehicle also in case of small accidents where there is no damage to the people and only damage to the vehicle. An app is built to get service centers and their contact numbers, along with their address and landmark. So, this helps the people in a case where the accident occur in a place where the locality is very new to us. They can directly contact them and can get the vehicle repaired so that they can reach their destination.

IX. WORKING OF WEB APPLICATION

In this proposed web application there will be two pages, one is admin page and other is user page. In user page we will get all the details of the service centers which includes name, mobile number, alternate mobile number, area, city, landmark, and distance of their service(in terms of meters/ kilometers).User page cannot be edited, means user cannot edit the data which he sees. Admin page refers to the service centers editable data, it includes addition and deletion of service centers and edit option will helps to edit the data of that particular service center.

To enter into admin page a username and password is used, so that there will be security to the data. Whenever any non-facile accidents occurs or people want to get their vehicle serviced they can get access to the service centers through the web application.

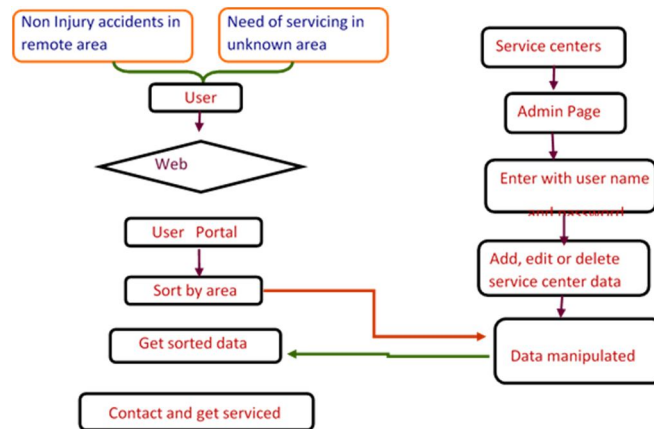


Figure 5. Flow chart of web application

X RESULTS AND CONCLUSION

In the event of an accident when there is an abrupt shift in axis, the accelerometer will shake unnaturally, sending an SMS to the cell phone specified in the code along with the latitude and longitude in the form of Google maps. The message and the precise location are received to the respective mobile number.

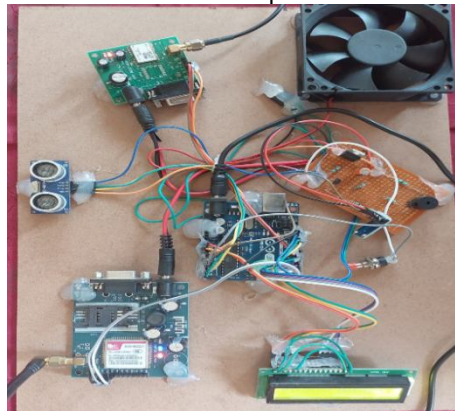


Figure 7. Prototype of system

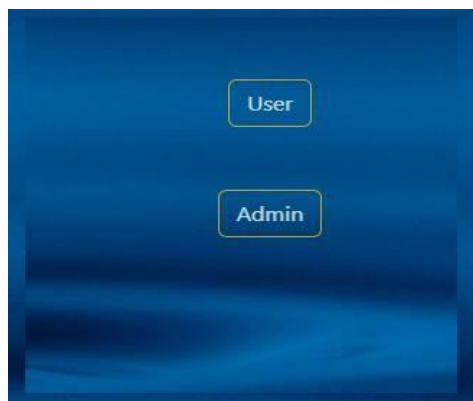


Figure 8. Web application

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