

An Active System for Vehicle Accident Detection and Tracking

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ABSTRACT

Nowadays, road accidents are very high. Over time medical aid can help save lives. We are eliminating the delay time between the accident happened and rescue team with the help of vehicle accident detection and notification system. In occurrence of accident the Contact Sensors that are mounted on the vehicle will break and it will send the signals to ESP32 microcontroller. Microcontroller then sends the alert notification of Accident Occurred! through GSM. The notification will be send on the Mobile through an app where the user can find the live location of vehicle with the help of GPS. Also, in case the vehicle has been theft, the owner can find the live location of vehicle through the Mobile App. User can make the Ignition OFF in case if vehicle is still moving and also can make buzzer ON. This both features are provided in the Mobile App. The proposed system aims to alert people in and around the occupant of the vehicle about the accident so that they can provide immediate medical attention and also give the facility to make the vehicle start or stop in case of theft.

Keywords : IoT(Internet of Things), GPS(Global Positioning System), GSM (Global System for Mobile Communication).

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I. INTRODUCTION

The number of vehicles is growing faster than the growth of the economy and population. Most accidental deaths occur due to a lack of immediate medical attention on roads such as highways. The victim's health and death are determined by the emergency department's response time (ERD) which varies according to the speed of emergency information obtained by the ERD. Extensive analysis has shown that by reducing the time to respond to an

accident per minute, it can help increase the chances of saving a person up to 6%. This is how the idea of an emergency alert system comes into play so that it can alert medical personnel, near and dear passengers, by providing an ambulance or medical aid at the scene of an accident. The main purpose of coming up with this plan is to increase the safety features of vehicles and thus contributes to providing timely emergency services to the affected people.

The proposed plan will look into whether an accident has occurred and identify the severity of the victim's injury / driver. Once a serious accident decision has been made, the system will notify the injured loved ones with notifications and they can notify the rescue team so that the rescue team can rush to the accident spot immediately without delay as the exact location will be notified by victim's cell phone application. Also there is a front camera on the vehicle which is in recording mode. This camera may help us to determine the cause of the accident. As we can also install the camera module in the back, top and sides of the car. But in our project we are using only the front camera. Here is a low cost warning system to provide immediate medical attention to accident victims by alerting those close to a loved one who is close to the exact area of the accident via notification. The system also has the feature of tracking the location of a vehicle in the event of a theft. It will also ON and OFF the ignition of vehicle with the help of mobile app. So that car will stop and start using the mobile app again. In case owner can't find the car, they can turn on the buzzer which provided in the app to find the vehicle.

II. PROPOSED WORK

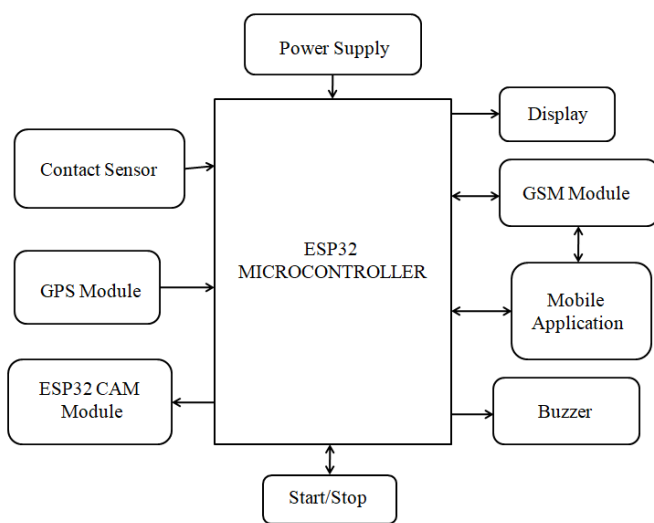


Fig.2.1 Block Diagram of Proposed System

The above components are assembled according to the block diagram provided in Fig 2.1.

In the proposed system the ESP32 microcontroller is connected to the power supply, LCD, GPS, GSM. Sensor, ESP32 Cam module, Buzzer and Ignition control unit. Mobile Application is also connected to the microcontroller through GSM. Contact Sensor breaks the contact in case of accident. GPS gives live location in Mobile app. Alert notification is send to the mobile through GSM. LCD display shows the live location of vehicle. Cam module is for continuous recording. By making ignition ON-OFF the vehicle can Start-Stop. Owner can also find the vehicle by making buzzer ON.

2.2 Vehicle Accident Detection and Alert System

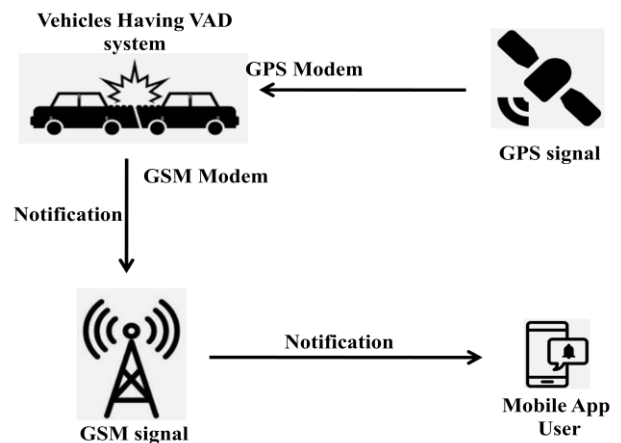


Fig.2.2 (a) An Overview of Accident Detection and Alerting System

When the vehicle meets with an accident the contact sensor which are mounted on the vehicle breaks and it send the signal to the ESP32 microcontroller . Microcontroller sends signal to the mobile application it will process the signals according to the programming in that application and it will send the notification continuously through GSM.

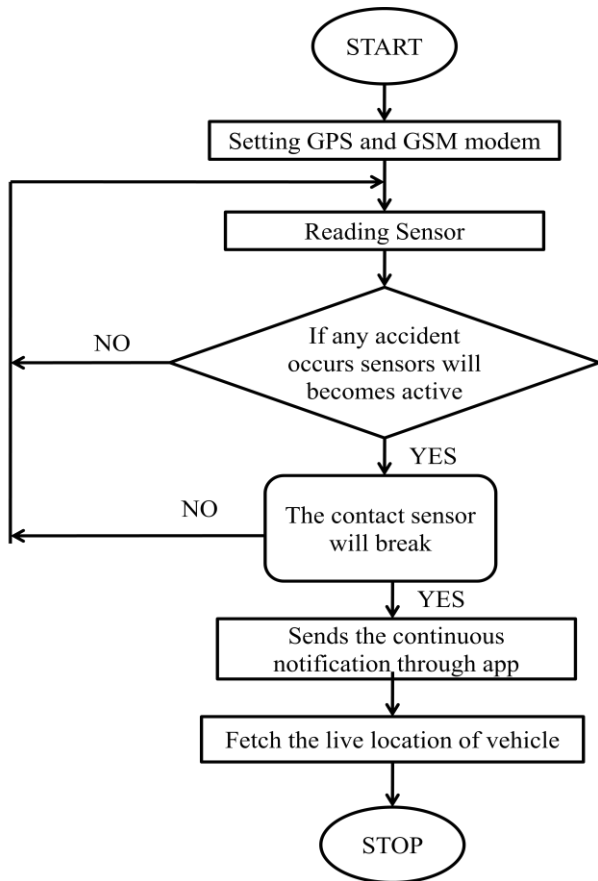


Fig.2.2 (b) Flowchart of Accident Detection System\

- i. This system contains two important parts.
- ii. The first part detects that the vehicle has crashed or encountered any impact that has occurred.
- iii. This module contains sensor.
- iv. When the accident occurs, the contact sensor breaks and sends the signal to the microcontroller.
- v. If there is no accident occurrence, the procedure starts again from getting live GPS location and again reading the contact sensor signals.
- vi. The second part contains the microcontroller, the GSM module, the GPS module.
- vii. In second part, after receiving the signals from sensors, the microcontroller will process the signals.
- viii. Then it will communicate with mobile application through GSM module.
- ix. As the signals received from sensors, the mobile application will send an alert notification to the relatives or rescue team.

2.3 Vehicle Theft Detection and Tracking System

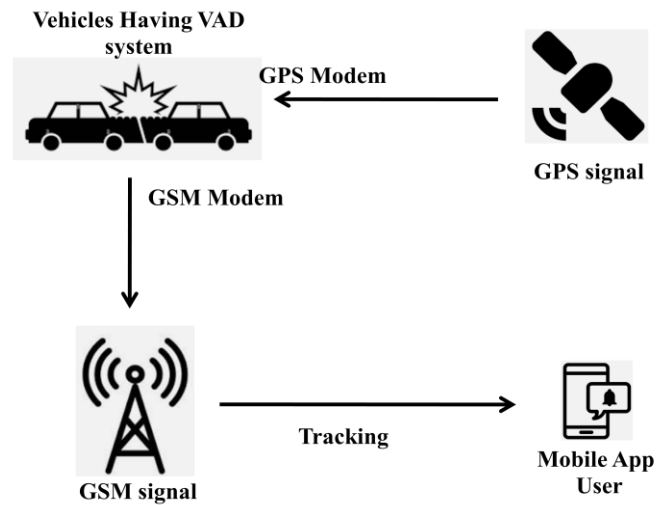


Fig.2.3 (a) An Overview of Traking system in case of Theft

The proposed system also provides the detetction of vehicle in case of theft. If the owner found out that the vehicle is not at the same place where it parked. Then the owner can find the live location of vehicle. If the vehicle is still moving then the owner can make its ignition OFF given in the app. The buzzer is also provided.

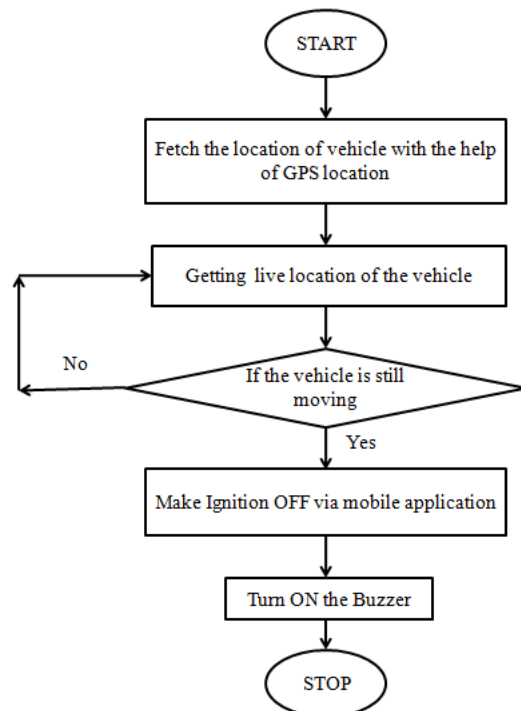


Fig.2.3 (b) Flowchart of Vehicle Tracking in case of Theft

- i. This system also contains two parts.
- ii. The first part detects the live location of vehicle in case of theft.
- iii. The process is that, when the vehicle is stolen the owner will find the vehicle's live location via GPS in the mobile app.
- iv. The second part contains ignition control and buzzer system.
- v. After getting the live location of vehicle, if the vehicle is still moving, the owner can make its ignition OFF with the help of a mobile application.
- vi. So that the vehicle stops at a specific location and the owner can find that location via GPS showing in the mobile app.
- vii. Even after getting the location of the vehicle, if the owner still fails to find the vehicle they can make the buzzer ON with the mobile app.
- viii. As the buzzer sounds the owner will find the car.

GPS. GSM module mounted on the PCB and connected to the microcontroller. There is also a cam module in recording mode which can be helpful for finding the reason of the accident. The LCD screen is showing the longitude and latitude values i.e. the location of the system.

2.4 Actual Model

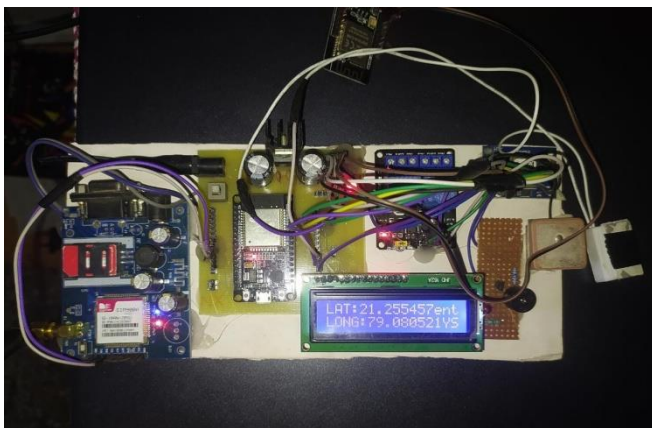


Fig.2.4 (a) Proposed Vehicle Accident Detection and Tracking System in working condition

The above figure shows the working of Accident Detection System. Here the contact sensor is connected to the microcontroller. When the two parts of contacts sensors are separated from each other, it will give signals to the ESP32 microcontroller and microcontroller will send the signals to mobile application. The above figure has

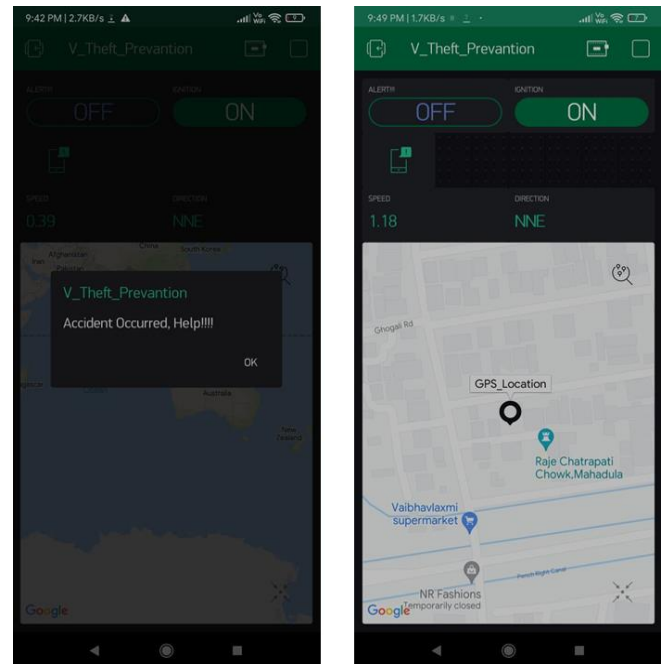


Fig.2.4 (b) Mobile showing notification and Blynk App showing GPS location and other features

The Fig.2.4(b) is showing the mobile app working. As soon as contact sensor breaks it will send the alert notification to the relatives or rescue team as Accident Occurred through GSM and mobile application. In the app, the user (Relative and emergency unit) will get the live location of the vehicle. The app also shows the ON/OFF control of ignition through which the app user or vehicle owner can stop or start the vehicle. The app also has alert button in case of theft of vehicle.

For blynk app, vehicle owner or relative have to install the app and have to register on that app then the user will get the login id and password. The app has already connected to the microcontroller through embedded C programming. The app has 5000 free energy which are used for various function which is

ignition control, live location of vehicle, alert system, etc. Only 5 members can access to the app through only one ID.

III. OBSERVATION

If the accident occurred the contact sensor will break and VAD system will become active and it will show the following readings:

1. LCD screen in the car or system:
LAT: 21.255457
LONG: 79.080521YS
2. Mobile get notification: Accident Occurred, Help!!!!
3. Mobile Application (Blynk App):
Live GPS location of vehicle or system
Direction: NNE
Alert: OFF
Ignition: ON

IV. Result

From the proposed module we can reduce the time between accident occurrence and emergency response team. If the accident occurred the sensors will break and sends the notification to the registered user (relatives or rescue team) mobile through an App. The app provides the live location of vehicle. It also provides the ignition control of the vehicle by which owner can make his vehicle start/stop and also can sound the buzzer in case of theft. The cam module is always in recording mode.

V. Conclusion

Every human life is precious and should be preserved. An emergency medical facility may reduce the number of deaths. This project is asking for help where we can't call for help. The proposed plan will look into whether an accident has occurred and identify the severity of the victim's injury / driver. Once a serious accident decision has been made, the

system will notify the injured loved ones with notification as Accident Occurred. Help!! And they can notify the rescue team so that the rescue team can rush to the scene immediately without delay. The exact location of vehicle will be given to the mobile app as GPS location. With the help of the camera, it can be useful to find the reason behind accident. Also, if the vehicle got stolen it can be found with the help of mobile app. The mobile app always shows the live location of vehicle. And if the vehicle is still moving after getting the location, the owner can stop the vehicle by clicking on the ignition button making it OFF in the app. Owner can also find the vehicle by turning ON the buzzer.

VI. Advantages

In case of severe accident then it is very important to provide medical treatment immediately to the accident victim. By using application user can get the live location of accident. Therefore vehicle accident detection system will provide immediate medical treatment to accident victims in remote areas.

Blynk application user can see the live location of vehicle. If any accident occurs than the user can monitor the location of vehicle through Blynk application and if any severity takes place then the notification is also send to the user. Thus this system can be used to monitor all accidents and occurs.

In case of theft of vehicle owner of vehicle can get the live location of vehicle through Blynk App and can turn off the ignition of vehicle by function provided in Blynk App. To get the exact location of vehicle owner can also turn ON the alert button by which buzzer will ON. Thus this system can also find the vehicle in case of theft.

When any severe accident takes place and the person needs immediate help so by using Blynk App user can get the live location of vehicle where the accident has

take place and can immediately provide treatment. Camera module is also proposed in this system which continuously recording the video. Thus this method is used.

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