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Advanced Automatic Vehicle Accident Detection and Rescue System

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ABSTRACT: Road accidents rates are very high nowadays, especially two wheelers. Timely medical aid can help in saving lives. This system aims to alert the nearby medical center about the accident to provide immediate medical aid. The attached accelerometer in the vehicle senses the tilt of the vehicle and the a heartbeat sensor on the user's body senses the abnormality of the heartbeat to understand the seriousness of the accident. Thus the systems will make the decision and sends the information to the smartphone, connected to the accelerometer through gsm and gps modules. The Android application in the mobile phone will send text messages to the nearest medical center and friends. Application also shares the exact location of the accident and it can save time.

KEYWORDS: Accident detection, alert system, GPS, GSM, Accelerometer, Android application.

1. INTRODUCTION

Nowadays, the rate of accidents has increased rapidly. Due to employment, the usage of vehicles like cars, bikes have increased, because of this reason the accidents can happen 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 a solution. Automatic accident detection and alert systems are introduced. The main objective is to control the accidents by sending a message to the registered mobile, hospital and police station using wireless communications techniques. When an accident occurs in a city or any place, the message is sent to the registered mobile through GSM module in less time. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Vibration sensor will be activated when the accident occurs and the information is transferred to the registered number through the GSM module. The GPS system will help in finding the location of the accident spot. The proposed system will check whether an accident has occurred and notify nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through a tracking system to cover the geographical coordinates over the area. The accident can be detected by a vibration sensor which is used as a major module in the system.

II. METHODOLOGY

An advanced automatic vehicle detection and rescue system methodology would involve the following steps: Vehicle Detection: The first step is to detect the presence of a vehicle that needs to be rescued. This can be done using sensors such as cameras, radar, or LIDAR. The sensors will detect the vehicle and provide information about its location and orientation. Identification: Once the vehicle has been detected, the next step is to identify it. This can be done using computer vision techniques such as object recognition or license plate recognition. The identification process will provide information about the type of vehicle and its owner.

Communication: The system must be able to communicate with the vehicle's owner or emergency services. This can be done using a variety of communication channels such as cellular networks, satellite communication, or short-range wireless communication. Rescue Plan: Based on the information collected from the previous steps, the system must create a rescue plan. The plan will involve determining the best way to approach the vehicle, how to extract the occupants safely, and how to transport them to safety.

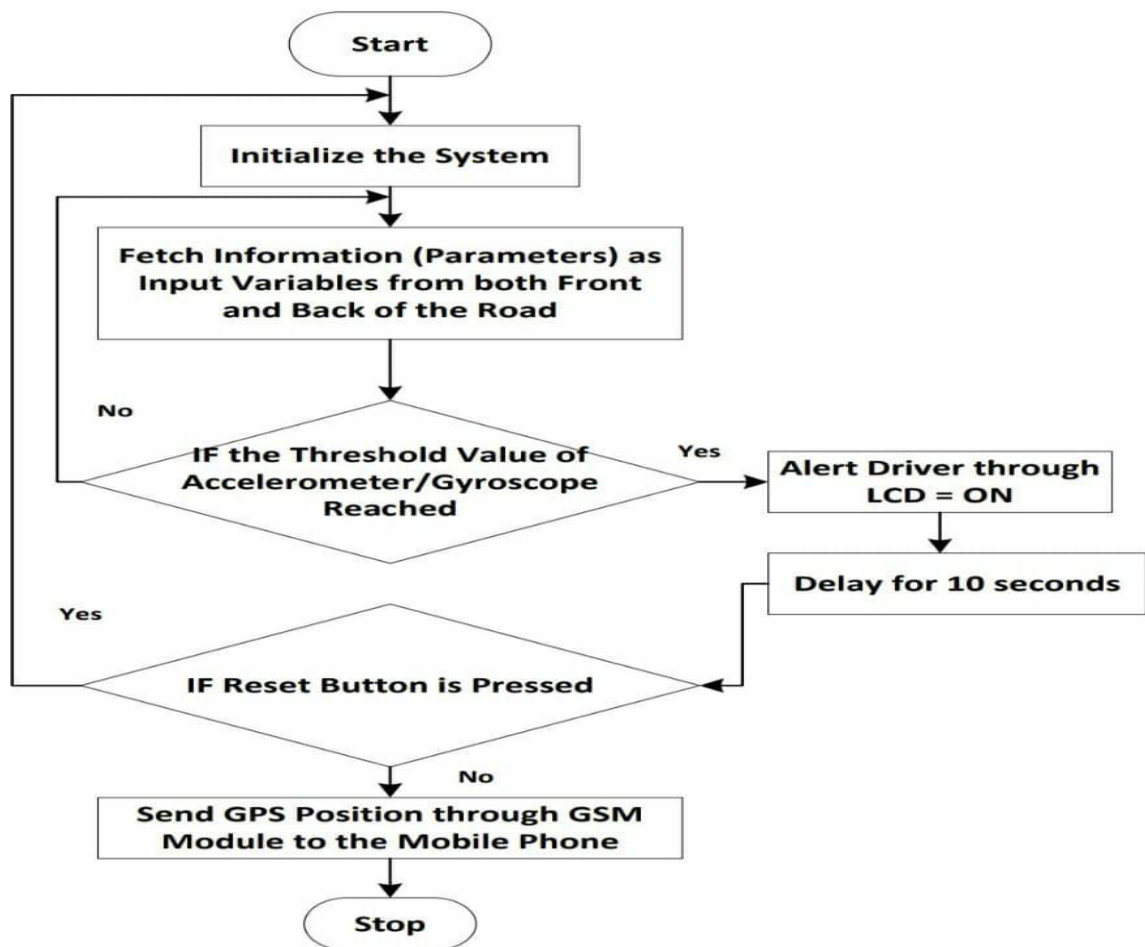
III.OBJECTIVES AND SCOPE

The main objective of this project is to prevent casualties which happen due to lack of medical assistance in time. Certainly, if the accident happens due to other cases, the used electronic devices will be able to provide the spontaneous message and exact location to police and ambulance in order to recover victims. Avoiding casualties caused by road accidents is the main goal of this paper, with the help of Accelerometer and GPS present in the mobile phones. Based on the data collected from these sensors, which are present in most mobile phones, the location of the accident is sent at the same time of the accident to the friends and relatives which the user allowed and stored, and also to the rescue and emergency services.

IV. SYSTEM ARCHITECTURE

In this system, the external disturbance is detected by the accident detection module and when it is detected, a function is called to find the current location of the user with the help of GPS in the Location Detection Module. The location data obtained from the GPS is sent to the emergency services to request help.

Flowchart



Fig(4.1):Advanced Automatic Vehicle Detection And Rescue System

1. The Arduino setup is installed in a vehicle's crash guard or in bumpers of the vehicle on each side.
2. When collision occurs it triggers the push button and it sends a notification to the Arduino Board.
3. Arduino will take this input and will convert to the SIM808.
4. The coordinates are shared through GSM.
5. Through GSM the notification is passed to the saved mobile number.
6. It contains the exact GPS location.
7. The application is used to know the route and location.
8. If the accident is not severe the person can turn off the buzzer and the device will come back to normal

V. MODULES AND PROJECT DESCRIPTION

ARDUINO: The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The arduino is the major control unit to detect or alert when an accident occurs. It collects the data from vibration sensors, GPRS and GSM modules and reflects the output either in display system or through a message. Here the vibration sensor plays a major role. This vibration sensor will receive the vibrations of the vehicle which in turn acts as an accident detection module. Arduino gathers the information from all other modules and sends the message to the receiver through the GSM module.

GSM MODULE: For providing communication between the GPS, GSM and the allocated mobile number GSM SIM900 module is preferred. The name SIM900 says that, it is a tri band work ranging a frequency of 900MHz to 1900 MHz such as EGSM900 MHz, PCS 1900 MHz and DCS 1800 MHz. Receiving pin of GSM module and transmitting pin of GPS module are used for communication between the modules and the mobile phone.

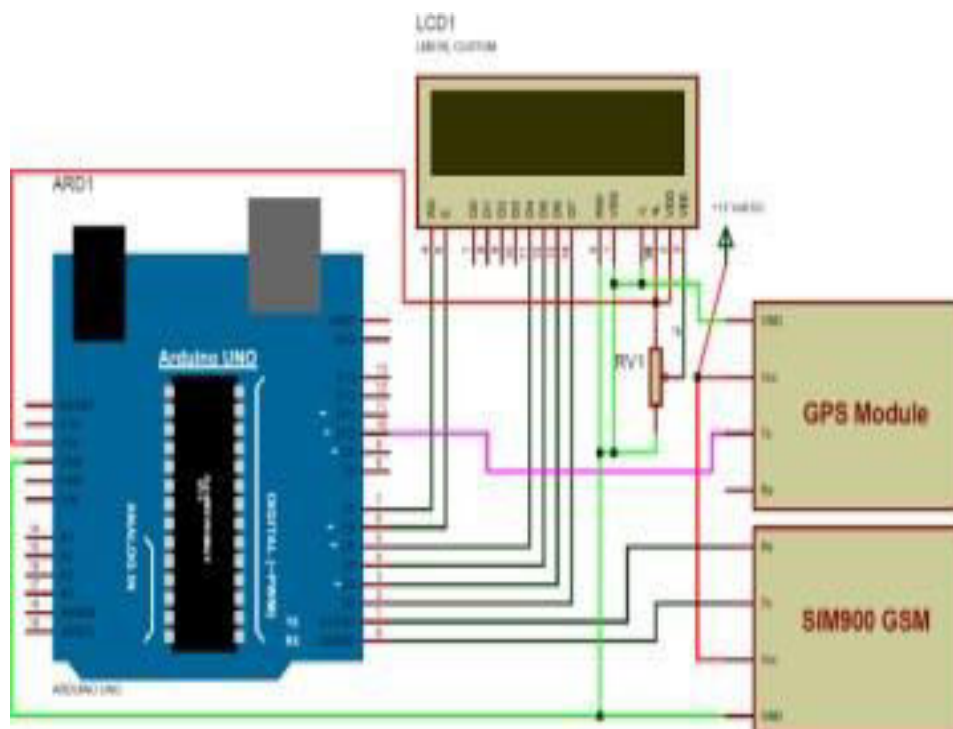


Fig (5.1): Working module of Advanced Automatic Vehicle Detection And Rescue System

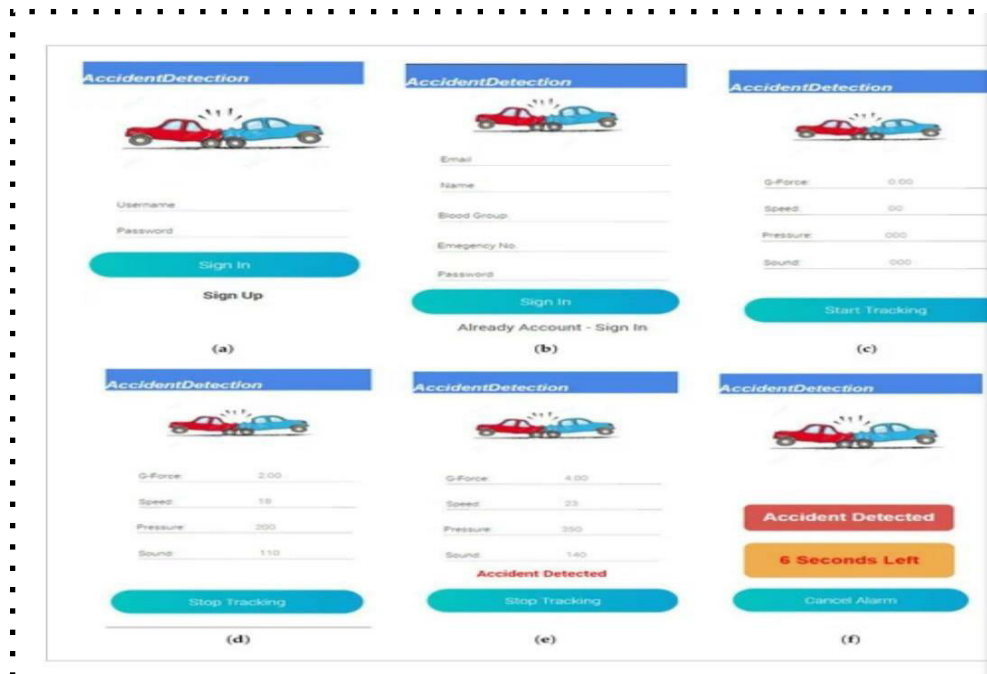
The controller used in this project is Arduino which is used for controlling all the modules in the circuit. The two major parts other than the controller is the GPS module which is used as a receiver and other module is GSM. To receive the coordinates of the vehicle GPS module is used and GSM will send the received coordinates to the user through SMS. There is an additional LCD which is used for displaying status message or coordinates. When a person is driving the vehicle met with an accident then the vibrations of the vehicle is received by the vibration sensor and the sensor acts as an accident detection module which further send the information to the micro controller and the location of the vehicle is received through GPS module and the coordinates The vehicle is sent to the GSM module. The received information is sent to arduino uno. The received coordinate information is collected and is send to the respected person,hospitals and police station through SMS.

VI. IMPLEMENTATION

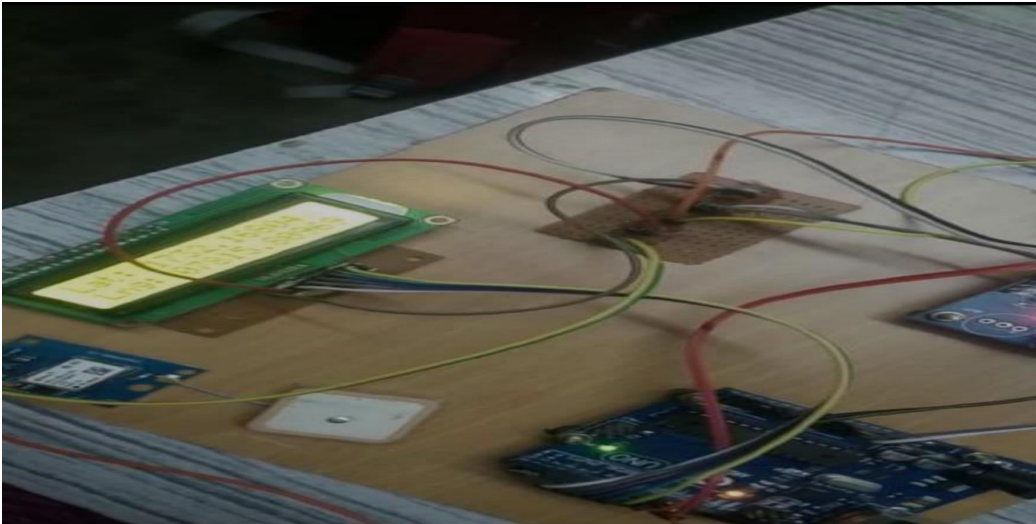
Our system comprises two phases: accident detection and notification phase. For the accident detection phase, a smartphone application has been fully implemented. For the notification phase, a web-based system has been implemented for use by hospitals.

6.1 Detection Phase Implementation:

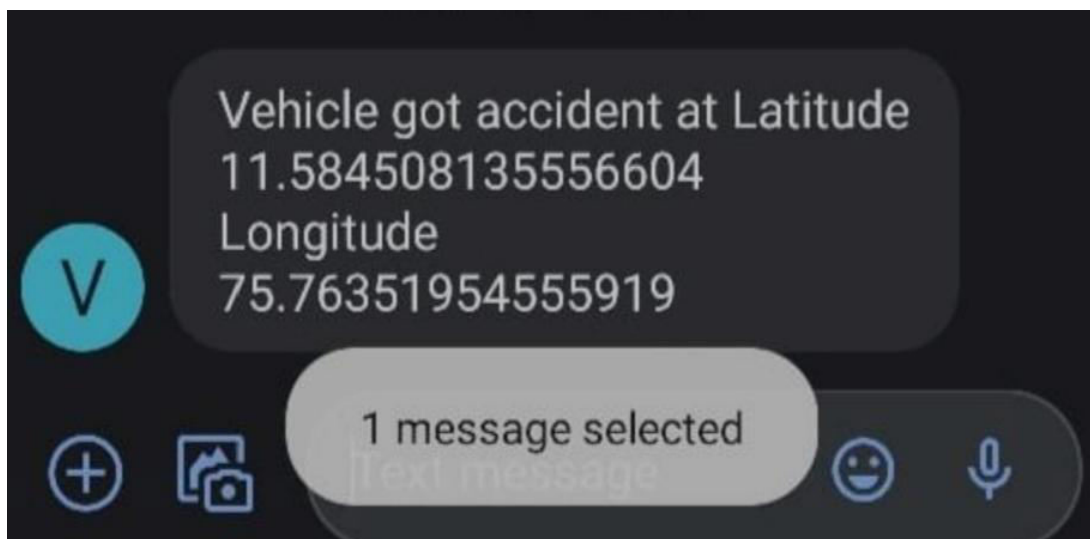
An Android application has been developed in the Java programming language. The application is developed for an Android operating system with minimum API level 17 and target API level 26. A user first registers for system use. Once registered, to use the system, the user enters their ID and password to log in to the system. Recording and transmission of data starts when the user clicks to start tracking. The application continually reads the data from the smartphone’s sensors and sends the data to the cloud. If an accident is identified, the application generates an alarm for 10 s. Figure below shows the interfaces of smartphone android applications. The smartphone application consists of the following activities:



VII. RESULT



Fig(7.1). Interfacing controller with Lcd.



Fig(7.2).Notification message.

CONCLUSION

The proposed programmed accident detection system can be a rescuer of life for the people who met with accidents. The proposed system is exceptionally easy to understand and even a non-specialized Person can use it without any problem. The system consists of equipment and programming segments. The equipment unit includes accident detection sensors that are constrained by an Arduino board and is fitted in the vehicle. Then again, the programming part is an Android application introduced in drivers Smartphones which is used to get the point by point map. In general, the benefits of this system are low cost, secure and simple to use. The system introduced in this work reduces the casualties due to accidents.



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