Efficient Accident Detection and Notification System

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Abstract—**Previously, the world has gone through fast advancement in innovation just as the transportation system. Vehicles are modernized and efficient as well as shockingly cause the number of causalities in street accidents. Unidentified crashes and late rescue causes more tense circumstances, especially in remote areas. To diminish this unintentional death rate, a minimal expense programmed accident discovery system is suggested that consequently distinguishes the accident and sends notification through Short Message Services (SMS) of the accident spot to concerned relative with precise GPS location. The proposed system comprises equipment and programming modules. The equipment module depends on the Arduino board with push button and GPS which is installed in the vehicle while the software part is an Android application that is installed on user's phone. The experimental results indicate that the presented system works well as expected.**

Keywords—*Disaster Detection, Arduino, Android Application Smartphones, Car Accident Detection, GPS, Push Button.*

I. INTRODUCTION

Disaster is referred to a sudden event, such as an accident or a natural catastrophe that causes great damage or loss of life [1]. In this 21st century the quantity of street accidents are expanding step by step. The primary reason of road accidents are for the most part because of human blunders, for example, over speeding, plastered driving and red light bouncing which bring about increment of death rate and loss of propertys. The major causes are not just accidents but unknown accident spots play significant job. Even a few hours of the misfortune, spot can't be identified to begin rescue activity. In results, a great deal of valuable lives can't save on time. In the wake of remembering human existence, this work presents a programmed accident recognition system which will be saviour of life.

The proposed system has the capabilities to automatically detect an accident and quickly inform to the emergency services or concerned family member with precise location through Short Message Service (SMS). The reached one can send emergency services straightaway. Since, there are a ton of events on which individuals have no admittance to any close by clinic to get speedy clinical help before the extreme misfortune. In that circumstance, system will fullfil the hole among identification and caution. The proposed system comprises of hardware and software modules. The hardware module depends on the Arduino board with GSM and Push Button introduced in vehicle and the software part contains an Android application

that is introduced on users device that driving the vehicle. It is for the simplicity of execution.

Introductory advance beginnings with push button setting off while an Accident happens. This will send message to Arduino and it sends notification message by means of GSM introduced and it will send the co-ordinates to the saved contact. The software part Is utilized to distinguish and guide close by places for the individual driving the vehicle. It shows nitty gritty perspective on the map. What's more, the accident is confirmed just when push button is initiated.

II. LITERATURE REVIEW

There are a ton of contemplations and thoughts behind each item and application which cause new expectation for the advancement of person. At present, there are not many innovations for getting accidents location. The vast majority of the systems need a manual activity and the casualty of the accident relies upon the kindness of others to race to the medical clinic. Commonly, one accident is unseen for quite a long time before help shows up. Attributable to this load of variables, there is a high death pace of the survivors of the accident. There are a few systems attempting to work with individual being for certain upsides and downsides.

Prachiet al. [3] presented Intelligent Accident-Detection and Ambulance Rescue system prototype that consist of a sensor, Global Positioning System (GPS), Global System for Mobile (GSM) unit. The system is fitted in the vehicle to identify the accident and sends the accident area to the primary worker unit which houses the information base of the multitude of close by medical clinics. An emergency vehicle is dispatched to the accident spot which conveys the patient to the clinic and at the same time screens the imperative boundaries like temperature and heartbeat rate and passes on them to the concerned medical clinic. Alongside this, Radio Frequency (RF) correspondence is utilized to give a make way to the rescue vehicle. This will limit the time needed by the emergency vehicle to arrive at the clinic. Albeit this system is acceptable yet it required total mechanization of medical clinics and traffic signals that expanded the expense and season of sending.

SoSMart application [4] detects accident automatically using the internal sensors and accelerometer of the smartphone. After accident detection it sends an alert notification with location to pre-selected contact, so the contacted one can send

rescue services as soon as possible. This application uses professional and sophisticated algorithms that are developed and tested on real car crash data from the National Highway Traffic Safety Administration [5].

Using these algorithms, it is easy to differentiate the sensitivity of accident whether it is hard, normal and just minor to avoid false alarm.

Kaladeviet al. [6] proposed Android Smartphone based solution to automatically identify the accident and generate alert with the location of the spot. In this solution, heartbeat sensor is integrated with a Smartphone. Since there is a defined standard of a normal human heartbeat rate (60 to 100 beats per minute BPM). If there is any variation in heartbeat rate relevant to given range the system check if it is an accident or not. Then the system sends an alert SMS to the pre-selected contact along with the location of the spot. Actually, in our opinion, instead of accident detection, it can be used as heart failure notification. Sane et al. [7] presented a Real Time Vehicle Accident Detection and Tracking using GPS and GSM. This system is much different from the rest of the systems because it uses push buttons on the front and rear bonnet on the car. As soon as there is a collision with another vehicle, the accident detection unit sends signals to interrupt pins of the microcontroller. A key is provided with the system which will be used by the driver if there is a minor collision. If the driver presses the key, the microcontroller understands that accident is not serious so do not alert the others. If a collision has been detected and the key has not been pressed yet, the microcontroller will get the coordinates of the current location and will transmit the alert SMS to the family of the driver through fitted GPS and GSM modules.

Anupriyaet al. [8] proposed a Smart Accident Notification and Collision Avoidance System. In this system almost the working of the system is same as that of earlier systems [3], [4], [6], [7]. The mortality rate of human lives is tried to decrease through this system that is a good step towards human living. The main function of this unit is to send the location of the spot of the accident towards the ZIGBEE which will give further instructions. Actually, the GPS sends the latitude and longitude to the main server if accident takes place keeping in view it is prudent to say that most of the existing solutions demand complete information technology infrastructure to utilize. In developing countries hospitals rescue services and traffic systems are not automated so it is not possible to deploy existing systems. So there is need to develop a simple, user friendly and low cost automatic accident detection and alert system.

III. METHODOLOGY

In this undertaking, we are attempting to make an IOT Based vehicle accident location and warning system utilizing Arduino board and different segments, for example, GSM, GPS, and Push button. The square outline of the proposed system is shown Fig. 1. It comprises of equipment and programming segments. The Efficient accident location and notice system comprise of two stages, Detection stage and Notification stage.

Arduino-based vehicle global positioning system utilizing Global Positioning System (GPS) and Global system utilizing GSM modules are utilized. The functioning interaction of the system are as per the following. Based on the Collison, push button is set off and it triggers Arduino it then, at that point passes notifications to the GPS and SMS is sent utilizing GSM containing coordinates. The Display Console additionally used to get message about the directions, GSM is utilized to get the area of the vehicle. A DC power supply of 5V is given to the Arduino board. To make this controls are made utilizing Arduino though the LCD is utilized to show the messages.

Further, the working of this proposed system is as below:

1. The Arduino setup is installed in a vehicles crash guard or in bumpers of the vehicle on each sides.

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 then 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 of the buzzer and device will come back to normal.
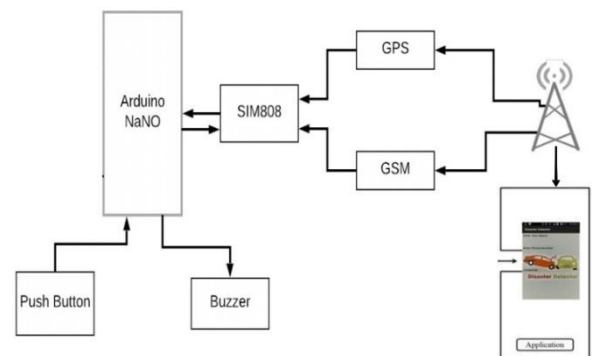

Fig.1. Proposed System

The target of our venture is to forestall lethal circumstance for absence of crisis offices when an accident happens. Utilizing this system, in the event that if anybody faces an accident, their direct relatives and close by assist with focusing will get a notification so they can promptly come to help them as our system gives the specific area of the accident spot which is shown in the fig.4.

IV. SYSTEM REQUIREMENTS

System Requirements Specification is a bunch of documentation that depicts the highlights of a system or programming application. It incorporates an assortment of components that endeavours to characterize the planned usefulness needed by the clients to full fill their various

customers. The equipment part comprises of various modules. Coming up next are the fundamental modules:

A. Arduino Board:

Arduino [9] is an open-source platform utilized for building hardware items. Arduino comprises of both an actual programmable circuit board. The Arduino is an Integrated Development Environment (IDE) or Arduino Software has a content tool for composing programs. It likewise has a book console, message region, a toolbar with catches for capacities and a progression of menus. It is associated with the Arduino equipment to transfer programs [10] and interface with them.

B. Push Button:

A push button switch is a little, fixed component that finishes an electric circuit when you press on it. At the point when it's on, a little metal spring inside connects with two wires, permitting power to stream. At the point when it's off, the spring withdraws, contact is intruded, and current will not stream.

C. GLOBAL POSITIONIG SYSTEMS(GPS):

It is an U.S claimed utility that gives clients situating, route, and timing (PNT) administrations. This system comprises of three fragments: the space portion, the control section, and the client section.

D. SIM808:

SIM808[11] is integrated with a high-performance GSM/GPRS engine, a GPS engine and a BT engine which meets almost all the type of space requirements, such as M2M, smart phone, PDA, tracker and, other mobile devices.

The software component used:

A. KOTLIN:

Kotlin is a cross-stage, statically composed, universally useful programming language with type derivation. Kotlin is intended to interoperate completely with Java, and the JVM adaptation of Kotlin's standard library relies upon the Java Class Library, however type derivation permits its sentence structure to be more compact.

B. Google APIs

Google API's are application programming interfaces created by Google which permit correspondence with Google Services and their mix to different administrations. Instances of these incorporate Search, Gmail, Translate or Google Maps

V. SYSTEM DESIGN AND IMPLEMENENATION

System design is the way toward planning the components of a system like the parts, design and the various interfaces of those segments and the information that goes through that system. Figure 2 separates the persistent workflow of the system. It constantly checked the states of the recognition plot from current qualities with the recently put away qualities to recognize any sort of peculiarities. The system is ended when the notification message is sent.
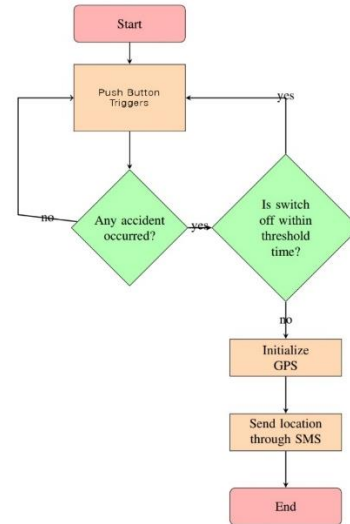

Fig.2 Circuit Diagram of system.

At first, we have set a few qualities, for example, limit esteems lets the system identifies an accident, a cell number for sending SMS if an accident happens. The Circuit Board graph of the equipment part is shown in Fig. 3
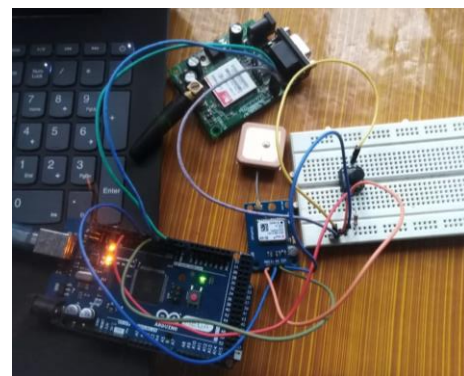

Fig.3 Prototype of proposed system

When collision occurs the notification is send in terms of SMS through gsm to the saved contact and it will shows the exact location. The location is shown in the fig.4 that a message showing the coordinates. It is send to the person's relatives which is saved in the gsm.
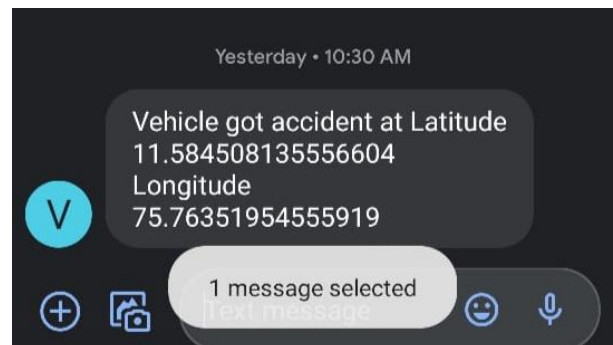

Fig.4 Notification Message

The software part implementation is shown below. It is the interface visible to the person that is driving the vehicle. It contains the detailed view of map which shows up to

destination. The software is built as driver friendly which means it shows the dips, curves, nearby schools etc. It is shown in the figure 5.
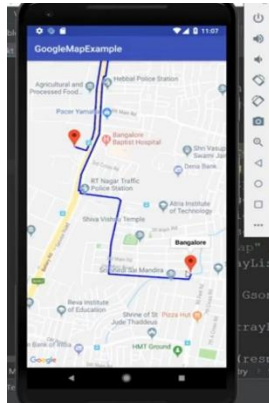

Fig. 5 Map Interface

VI. CONCLUSION

The proposed programmed accident identification system can be a rescuer of life for the individuals who are concerned in light of street crash. It can assume a fundamental part to lessen the passing rate in accidents. The proposed system is exceptionally easy to understand that even a non-specialized individual can utilize it without any problem. The system comprises of equipment and programming segments. The equipment unit includes accident identification sensors that are constrained by Arduino board and is fitted in the vehicle. Then again, programming part is Android versatile application introduced in drivers Smartphone which is utilized to get the point by point map. In general, benefits of this system is minimal expense, secure and simple to user. The system introduced in this work lessen the demise setbacks brought about by the street accidents.

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