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ACCIDENT DETECTION AND ALERTINGSYSTEM USING ARDUINO

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Abstract*: *Rising demand for automobile has increased the traffic, thereby causing more accidents on the road. People often lose their lives because of poor emergency facilities in the case of unattended accidents. Pre-emption of the accidents taking place on the roads is not possible but at least the after effects can be minimized. The proposed system ensures making emergency facilities available to accident victims as early as possible by letting relatives, hospital or a rescue team know the accident spot with the help of this module embedded in the vehicle

KEYWORDS*: *Intelligent transportation system, vehicle accident, road traffic accident, road safety, accident detection

1. Introduction

Whenever a road accident happens, the people nearby have to manually call the ambulance which causes a waste of time. Hence there is a delay for emergency services to arrive at the location of the accident. In order to fix this problem, we are going to build a system that will provide the emergency facilities for the victims in the shortest time possible. It incorporates an embedded system that contains GPS and GSM modules connected with an Arduino NANO. The entire set-up is installed at the front end of the vehicle. Global Positioning System (GPS) is used to identify the location of the vehicle. GSM is used to inform the exact vehicular location in the form of the longitude and latitude coordinates to the precoded numbers using an SMS. GSM module provides a two-way communication by using a SIM card. Such a module works in the same manner as a regular phone. This application provides the optimum solution to poor emergency facilities provided for road accidents in the most feasible way.

The evolution of the transportation system has made possible the rapid change in the civilization of human history. Transportation has great importance in our daily life and its development has made our communication much easier. But it can be also cause of loss of lives and properties. According to Association for Safe International Road Travel [1] approximately 1.25 million people die in road accident every year while 3,287 deaths every day. Besides, 20-50 million people are injured and disabled. Road traffic accident is ranked as 9th leading cause of loss of lives. Annually USD $518 billion has been damaged because of road traffic accident which costs from 1-2% of annual GDP of individual countries. The most obvious reason of a person's death during accidents is the unavailability of the first aid provision due to the delay in accessing the exact information of the accident location. The trivial reasons of unavailability of prompt onsite medical assistance are late reporting of accident, incorrect geographic location [2], and unreliable mobile application due to malfunctioning of smartphone [3]. The typical scenario is eyewitnesses do not notify hospital and police while an accident takes place. Moreover, accidents occur on highways, vehicles passing the accident location generally ignore their responsibility to notify hospital and police [4]. Hence, this problem needs immediate attention and intelligent accident detection and location tracking system should be developed which do not required human intervention. The paper begins by discussing the significance of a lightweight, standalone, intelligent accident detection system in the current scenario. A brief description of the existing approaches is presented in Section II. The methodology of the proposed system including system architecture is described in Section III. Hardware set up is described in Section IV. The working flow diagram is shown in Section V. The experimental results along with the device prototype are presented in Section VI. Finally, Section VII concludes the paper with future direction.

II. Existing System

Whenever a road accident happens, the people nearby have to manually call the ambulance which causes a waste of time. Hence there is a delay for emergency services to arrive at the location of the accident. Another possible way of existing system is to transport the victims by the individuals if the essential medical help was not received in this cases the victims may get life and death situation there are so many problems associated with this approach } The other drawback of this system is the emergency medical support if the situation becomes serious the outsiders may or may not be available all the time to support the victims they will just join the victims in hospital and then move away if the situation was got worse then the information about the serious condition of victims can't be reached to the individuals so that they can take responsibility for arranging essential medical support The other possibility in these situations was takes place after someone identify and help

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the victims but if someone can't find the accident or the time for someone to identify the accident was so long which may leads to the death of the victim from serious condition to death so to avoid these situation our proposed project makes the essential requirements for the support in these situation.

III. Proposed System

In order to fix this problem, we are going to build a system that will provide the emergency facilities for the victims in the shortest time possible. It incorporates an embedded system that contains GPS and GSM modules connected with an Arduino UNO. The entire set-up is installed at the front end of the vehicle. Global Positioning System (GPS) is used to identify the location of the vehicle. GSM is used to inform the exact vehicular location in the form of the longitude and latitude coordinates to the precoded numbers using an SMS. GSM module provides a two-way communication by using a SIM card. Such a module works in the same manner as a regular phone. This application provides the optimum solution to poor emergency facilities provided for road accidents in the most feasible way. Arduino is used for controlling whole the process with a GPS Receiver and GSM module. GPS Receiver is used for detecting coordinates of the vehicle, the GSM module is used for sending the alert SMS with the coordinates and the link to Google Map. Accelerometer namely ADXL335 is used for detecting accident or sudden change in any axis. And an optional 16x2 LCD is also used for displaying status messages or coordinates. We have used GPS Module SIM28ML and GSM Module SIM900A.Now whenever there is an accident, the car gets tilt and accelerometer changes his axis values. These values are read by Arduino and checks if any change occurs in any axis. If any change occurs, then Arduino reads coordinates by extracting $GPGGA String from GPS module data (GPS working explained above) and send SMS to the predefined number to the police or ambulance or family member with the location coordinates of accident place

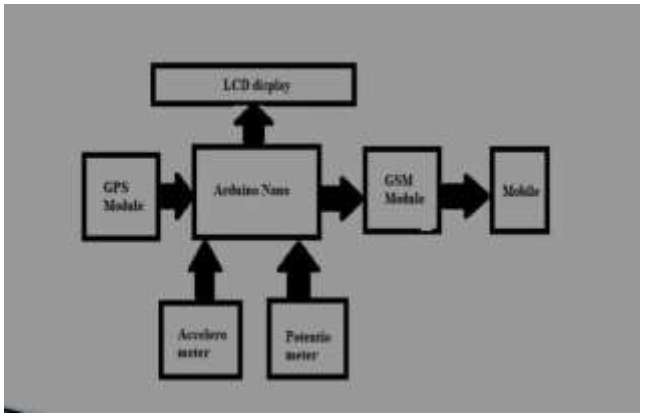

Fig 1:- *Block Diagram of Accident Detection and alerting system*

The message also contains a Google Map link to the accident location, so that location can be easily tracked. When we receive the message then we only need to click the link and we will redirect to the Google map and then we can see the exact location of the vehicle. The speed of Vehicle, in knots (1.852 KPH), is also sent in the SMS and displayed on the LCD panel When the accident takes place the whole process motto was to get the information to the nearest medical support and to the responsible individual of the victim the messages with the exact location like as follows. After Clicking the received location link shared by the gps module then it will directly connect to the google Maps for the exact location the exact location was found out by the latitude and longitude of the location as follows

Fig2:- Sending notification to nearby hospital and police station

IV. Hardware Setup

Circuit connection of our accident detection and alerting system is very simple which is shown in fig. 1. The Tx pin of the GPS module is directly connected to the RX pin (RX0) of Arduino UNO. By using Software Serial Library, we have allowed serial communication on pin RX0 and TX0, and made them Rx and Tx respectively and left the Rx pin of the GPS Module open. Though generally pin 0 and pin 1 of Arduino UNO are used for serial communication, through the Software Serial library, we can allow serial communication on other digital pins of the Arduino as well. 5 Volt supply is used to operate the GPS Module.

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GSM module's Tx and Rx pins are directly connected to pin D8 and D7 of Arduino. For GSM interfacing, we also use a software serial library. GSM module is also

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powered by 5v supply. An optional LCD's data pins D4, D5, D6, and D7 are connected to pin number 12, 11, 6, and 5 of Arduino UNO. Command pin RS and EN of LCD are connected with pin 4 and pin 3 of Arduino UNO and the RW pin is directly connected with ground

V. Results

If the car flips over after accident

If the car speed drops below threshold level

VI. Conclusion

With the advent of science and technology in every walk of life, the importance of vehicle safety has received the highest priority. We design a low cost, portable vehicle accident detection system to resolve the problem of lack of an automated system for accident detection and location tracking. Consequently, the time for searching the location is reduced and therefore, the injured person can get help rapidly which will save many lives. The limitation of the system is the ultrasonic sensor which always turns on when an object reaches within 5 cm of the vehicle. Sometimes it creates a false prediction of collision. We assume that as the vehicle will be driven on the highway roads, there are lesser chances of reach of humans or objects other than vehicles around 5 cm of the front car frequently. Hence, the false positive rate will decrease. We have a future plan of an interconnecting camera to the controller module that will capture the images of the accident spot to facilitate easy accident detection and increase accountability towards maintaining traffic rules. The proposed system provides a feasible solution to traffic hazards and saves time and reduces the loss of lives.

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