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Accident detection and rescue information system

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ABSTRACT

Nowadays accidents have been a quiet common problem for the people who are in highly populated countries. Every day most of the people here are met with accidents and losing their lives. At least if there is an availability of emergency facilities there is a chance of saving lives. This project is to overcome the drawback mentioned if any vehicle met with an accident immediately a vibration sensor in the pre-installed device kept in the vehicle gets activated and sends signals to the Arduino microcontroller. Now the microcontroller will send an alert message through GSM modem includes the location coordinates to the police station or to the rescue team so that the rescue team or police can be able to locate the location easily using GPS modem to provide emergency facilities or they will take them to the nearest hospital once the information received. The proposed system has been simulated and practically designed using hardware components and the results are satisfied with the explanation.

Keywords— Arduino, GPS, GSM, Vibration Sensor

1. INTRODUCTION

With the growing population the use of vehicles has become superfluous .and this has led to increasing the traffic hazards and road accidents, which causes huge loss of life because of the poor emergency facilities. The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system, most of the times we may not be able to find accident location because we don't know where an accident will happen. When a vehicle meets with an accident immediately Vibration sensor will detect the signal and sends it to Arduino microcontroller. The microcontroller sends the alert message through the GSM modem including the location to the police station or a rescue team. So the police can immediately trace the location through the GPS modem after receiving the information.

2. PROBLEM STATEMENT

The unavailability of the precise methods for accident occurrence detection besides to a reliable locating tool with a quick reporting feature is the major problem under the research. The accidents are also increasing nowadays. Due to the delay

in the arrival of an ambulance to the accident spot it causes the loss of human life. So, it is necessary to take the accident victim to the hospital as early as possible.

3. PROPOSED SYSTEM

Proposes to combine independent and complementary solutions in a global accident detection system to provide stable and accurate positioning of car accident even in severe urban environments. The proposed solutions consist of augmenting the navigation solution exploiting the inertial sensor to estimate the dynamics of the vehicle to extract the accident.

4. LITERATURE SURVEY

Shete, Shah et al [1] tried to solve automobile thefts. Developed an intelligent vehicle tracking and locking system in which the user will be able to interact with the system and to control his vehicle through an android based smartphone. He aims is to design such a tracking system that reduces the time and cost to find out the stolen vehicle. If the rate of vibration exceeds the threshold value it will automatically send the messages to the nearby hospitals and as well as the relatives of the victim, Shete, et al.Rathina Kumar and Manivannan[2] have seen that the accident occurs due to a drunken driver and improper use of the belt. The main cause of the accident is due to the driver drowsy and tired condition, which will be noticed by the help of eyes sensor which will not start and informs the status of the driver to the base station along with the vehicle ID. Their system includes three modules; an automatic speed control module, accident detection and information sending module and security enabling module. In case of an accident, the vibration in vibration sensor increases beyond the limit and information is sent to GSM module, The GSM can send a message to respective authority, Rathinakumar and Manivannan. Kumar and Jayasree [3] main concentration of this project is to find out the vehicle which is met with an accident by using a MEMS sensor and GPS, GSM. This system will be placed in a moving vehicle. The ARM controller will poll GPS module in prefixed intervals and sends the vehicle location information (Latitude & Longitude) to central station over GSM network. This module provides information about the accident to the hospital and police station, Kumar and Jayasree. Pingle and Ahirrao [4] in this paper tried to save people life's from car accidents by using GSM and GPS model. They designed a system has accuracy which can detect

accidents in significantly less time and sends the location information to medical centre within a fraction of seconds covering the time, geographical coordinates and angle in which a vehicle accident had occurred. The message is sent through the Internet Dongle and the location of the accident is detected using the GPS module. When the accident occurs the alert message is sent automatically to the rescue team and to the police station & family members, Pingle, et al.

5. WIRELESS NETWORKING BY GSM

A GSM network consists of the following components:



Fig. 1: GSM module

5.1 Mobile Station

It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.

5.2 Base Station Subsystem

It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as an interface between the mobile station and mobile switching centre.

5.3 Network Subsystem

It provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipment's wherein each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

6. SENSOR NETWORKS

6.1 Vibration sensor

The vibration sensor is used originally as a vibration switch because of its high sensitivity; it is sensitive to environment vibration, and generally used to detect the ambient vibration strength. When the module did not reach the threshold in shock or vibration strength, DO port output gets high level and when external vibration strength exceeds the threshold, DO port output gets low level. Small digital output DO can be directly connected to the microcontroller, for the microcontroller to detect low level, thereby to detect the ambient vibration. Small digital output DO can directly drive the relay module, which can be composed of a vibration switch.

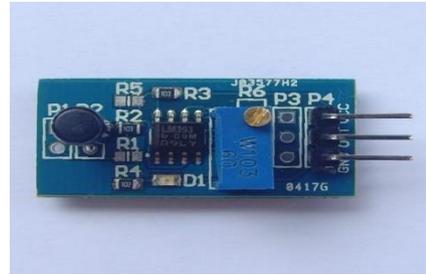


Fig. 2: Vibration sensor

7. RESEARCH FRAMEWORK

- Install the PROTEUS program and download the libraries of the components.
- Build the Microcontroller circuit and connect it with components and write simple code in Arduino program to define the pins of the Arduino and add it to PROTEUS simulator
- Validate by gets the program output displayed in PROTEUS simulator Verified.
- Add the GPS module to the circuits and develop the simple program code in PROTEUS simulator Verified.
- Validate the functionality, and then display coordinates on the LCD in PROTEUS simulator Verified.
- Add GSM module to the circuits and develop the program in PROTEUS simulator Verified.
- Validate the GSM functionality by receiving the message which sends through the program in PROTEUS simulator verified.
- Add Vibration sensor module to circuit in PROTEUS simulator.
- Validate the vibration sensor functionality by receiving the message which sends through the program PROTEUS Verified.
- Run the system in different scenarios in PROTEUS simulator, and compare the result with prior researcher works simulation model Accepted.
- Build the hardware model for the system and compare the result with the simulation model.

8. SYSTEM BLOCK DIAGRAM

Here in the system block diagram shown in FIGURE, Arduino is used as the main microcontroller, this system is made for accident alert, the whole system is to be implemented in the vehicle itself. So, when the accident happens, the vibration senses the shock and sends it to an Arduino microcontroller, at the same time, with GPS the latitude and longitude of that location are obtained, and with that, the exact location of the accident site is determined. And here, GSM modem SIM900 is interfaced with the microcontroller. So, when the accident happens, the SMS will be sent automatically to the numbers which would be entered in the database. The location co-ordinate which is sent to the mobile numbers contains GOOGLE MAPS location to have the exact accident location details instead of sending only latitude and longitude.

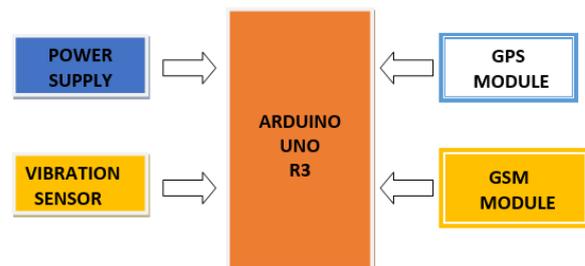


Fig. 3: system block diagram

9. FLOW CHART

The figure below explains how the system is work and shows the steps that the system follows at the operation.

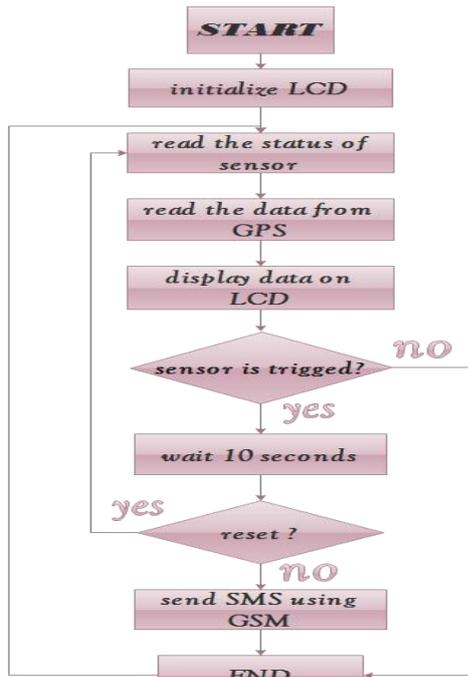


Fig. 4: Flow chart

10. RESULTS

The system detects an accident from a vehicle and sends a message through GSM module. The message is received by another GSM module. GPS Module tracks the exact location of the accident, hence there is a small variation in the coordinates, the initial value of latitude and longitude are same but fractional value changes with a small difference. At the simulation we tread the GPS and GSM modules with Virtual terminal, it acts the same as the modules work with more efficient at PROTEUS program. We connect the vibration sensor in the simulation with a variable resistance to control the vibrate level. The results we get from the simulation are shown in figure 4.1. At hardware we built, Arduino receive analogy signals from the vibration sensor , it display on the LCD , We set a certain limit for the amount of vibration if the shock exceed the limit then a delay of 10 seconds will display at the LCD and start count down to 0 , we introduced a key that will abort sending message if the key has been pressed before counting down finish , GPS will send the coordinates to microcontroller , GSM will send a message to the recorded numbers, the message that will be sent is shown in figure 5 the full system is shown in figure follows.

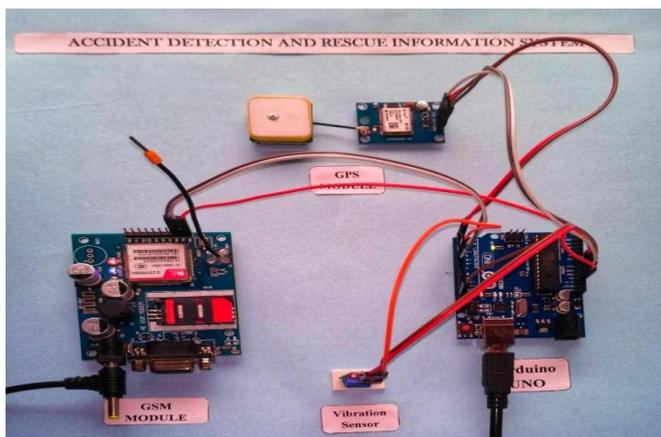


Fig. 5: Apparatus arrangement

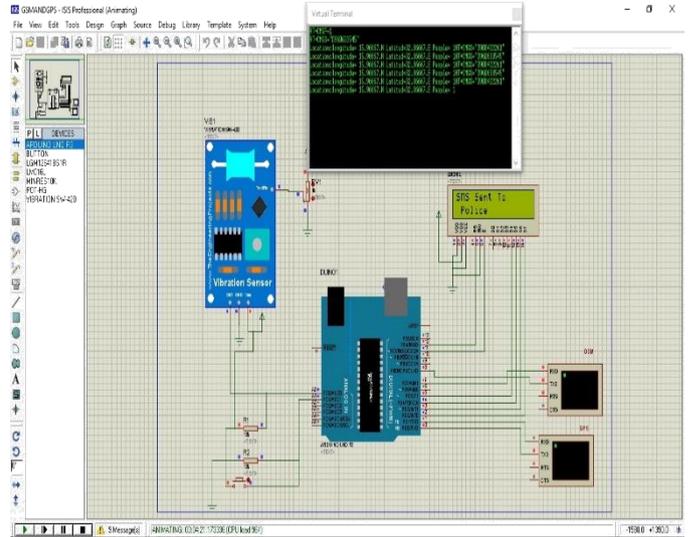


Fig. 6: Circuit arrangement in PROTEUS

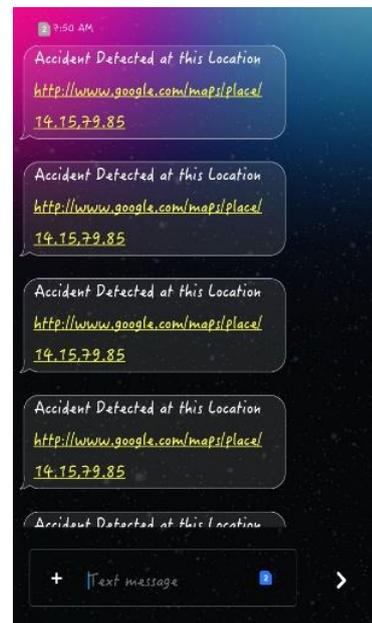


Fig. 7: Alert message came to mobile

11. DISCUSSION ON PROJECT

In our project, we used Arduino Uno but in the other projects we did research about, they use microcontroller ARM7, we used it because Arduino easier to program and fast also Arduino contains a programmer, unlike microcontroller ARM7 that is hard to program. We first checked out the result in Proteus and then we followed up onto hardware design which had shown in above.

12. FUTURE FRAMEWORK

- Further, this system can be implemented by using sound sensor, in order to make it more accurate and efficient to detect an accident.
- This is extended with alcoholic detection also. If the person who is driving took alcohol, then the vehicle will be stopped immediately by giving an alarm.
- This can also be developed by INTERCONNECTING camera to the controller module that takes the photograph of the accident spot makes tracking easier.
- Finally, we can make a website which can directly store the information at the accident spot and directly linked up with Google maps using IoT and can help the device for finding the very nearest hospital and the fastest route possible to reach the accident spot

12.1 Advantages

- Without the use of the third person, the vehicle itself will send information to rescue force without having any delay
- Can be able to locate nearest hospitals/police station
- Can be used to save lives at least one in the vehicle met with an accident

13. CONCLUSION

The proposed system is developed to provide information about the accident occurs and the location of the accident . It helps to easily provide the assistant and help to the victim of the accident. This system uses the GPS module to locate the vehicle. GSM is used to provide information on accident. The results of the proposed systems are satisfactory

14. REFERENCES

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