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Accident detection and rescue system

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Abstract—The Rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. The incidence of accidental deaths increased by 44.2% in 2011 from 2001. Our project will provide an optimum solution to this draw back. Nowadays we are able to track vehicles using many applications which helps in securing personal vehicles, public vehicles, feet units and others. Furthermore there is a rapid increase in the occurrence of the Road accident . This paper is about a system which is developed to automatically detect an accident and alert the nearest hospitals and medical services about it. This system can also locate the place of the accident so that the medical services can be directed immediately towards it. The goal of this paper is to build up a Accident Alert System Using Arduino. The system comprises of Sensors, GPS & GSM Module support in sending message. The Sensors is used to detect vibrations and impact are used to detect accident. Short Message will contain GPS [Latitude, Longitude] which helps in locating the vehicles.

Keywords- *GSM, GPS, Arduino*

I. INTRODUCTION

The development in the field of automobiles is highly increasing and which leads to the accidents and so many hazards due to traffic. People's life is under high risk. This situation prevails, just because there is a lack of emergency facilities in our country. In our country, many people lose their life because of accidents. Because of causalities or improper communication to rescue team. We are in the process of solving this issue by proposing an efficient solution and to reduce the loss of lives as much as possible. In our theory, the design of the system helps us to detect accidents in significantly minimum time and transfer the fundamental information to the first aid centre within a few seconds covering the geographical coordinates, the time and the angle where the vehicle had met with an accident. This alert message is sent to the rescue team(ambulance) and the registered mobile number within short period. This real time application saves many valuable lives. The message is sent through the GSM module and the location of the incident. The basic idea is to localize the vehicle system by receiving the real time position of the vehicle through GPS and send the information through GSM module through SMS service.[1]

With evolving technologies, these systems can be enhanced to make human life safer. IoT or Internet Things refers to connecting the hardware and software this helps communicate and exchange data among themselves without any human intervention. Here, we are going to propose a system for the rescue in case of any accident without human intervention. Time is an essential factor in any deadly situation and can decide the fate of its outcome.[1] We will use a combination of Vibration Sensor, Alarm, and other sensors for this system. Considering a car moving at normal speed suddenly experience an abnormal change of speed and motion will trigger the accelerometer. This information will be passed onto the microcontroller attached in the system. Once microcontroller make sure that the predefined value of the vibration sensor is crossed it will set off an alarm. Further it will use the GPRS Module to get the live location or the coordinates in the form of longitude and latitude. The GSM Module is used to send the obtained data to the rescue service and the guardians of the driver. GSM Module uses nearest telephone tower and send the information via SMS. The contact information of the relatives and the rescue service will be installed in the system. So, no time in waste for establishing the communications. The whole system works without any human intervention. As no time is loss waiting for anybody to help you and calling for the rescue services as it can take a lot of time depending upon the situation. Implementation of this system would help in saving a lot of life as there are increasing number of automobiles on the road day by day.[2]

II. RELATED WORKS

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The monitoring center distributes the data to the client in an understandable format and it also stores the travelling records and displays the real time information about vehicle on electronic map through GIS system [IoanLita, Ion BogdanCioc, Daniel AlexandruVisan et al, 2006]. Another approach is that vehicle terminal includes a GPS receiver which extracts information about position through GPS satellites and sends it through GSM network and to the control center which reads. This section overlooks similar existing solutions and examines their advantages and disadvantages. IOT approach to Accident detection, reporting and navigation is an existing system for accident detection, reporting and vehicle navigation.[3]

III. PROPOSED SYSTEM MODEL

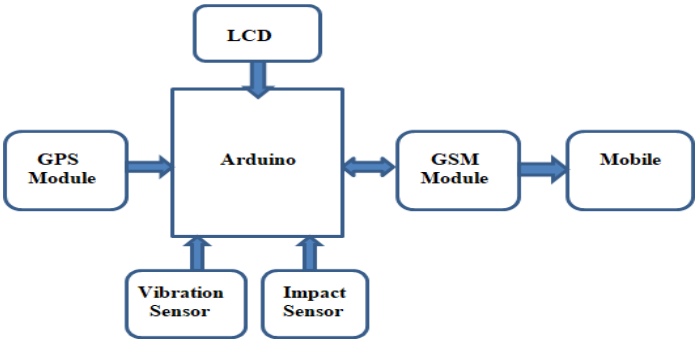

Fig. 1. Proposed System Model

The GPS Module, GSM Module, microcontroller, LCD display, Vibration sensors and Impact Sensors are being used in the system.

Arduino NANO

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.

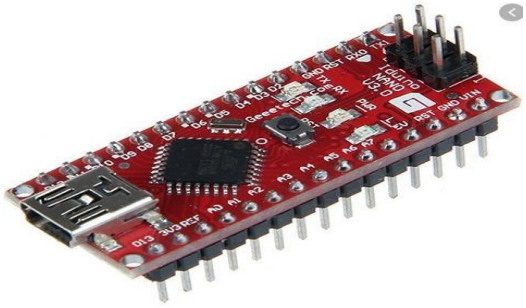

Fig. 2. Arduino NANO

The Arduino Nano is equipped with 30 male I/O headers, in a dip-30 like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-b micro-USB cable, or through a 9V battery

GSM Module (SIM800L)

Fig. 3. GSM Module (SIM800L)

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. There are various cell sizes in a GSM system such as macro, micro, Pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, Pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

GPS Module (NEO-6M)

Fig. 4. GPS Module (NEO-6M)

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high- performance u-box 6 positioning engine. These flexible and cost-effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and

memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. The 50- channel u-box 6 positioning engine boasts a TimeTo-First-Fix0(TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlate's, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments. For more details, check the datasheet here.

LM2596 DC-DC Buck Converter

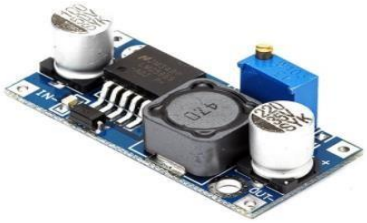

Fig. 5. LM2596 DC-DC Converter

DC-DC Buck Converter Step Down Module LM2596 Power Supply is a step-down(buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3 V, 5 V, 12 V, and an adjustable output version.

The LM2596 series operates at a switching frequency of 150kHz, thus allowing smaller sized filter components than what would be required with lower frequency switching regulators.

LCD 16X2 Display

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

Fig. 6. LCD 16X2 Display

Vibration Sensor

Sensors for vibration are sensors that operate according to different mechanical or optical principles to detect vibrations of an observed system. The measurement of vibrations can be done using various types of sensors. Although there are no direct vibration sensors, vibrations can be measured indirectly, deducing values from classic mechanical or optical quantities. These sensors differ in some features. Among other things they can be divided based on active and passive behavior, there are sensors that measure relative and others absolute. Other distinctive features are frequency range, signal dynamics and the quality of the measurement data. The following sensors shown here were first structured in a contacting and a non-contacting group and within these in the sub items path, velocity and acceleration measurement.

Fig. 7. Vibration sensor

Impact Sensor

The Impact Switch Collision Switch Sensor Module for Arduino is leading installation module of the collision. This is low output module, no high output clash. M3 License Module Easy fix hole, small car fix. With the power switch, there is a collision, fire, no lightning bumps. It is used for detecting the collision. Therefore it can also be called a collision signal sensor. Due to different collision direction. The crash switch can turn mechanical quantity to electricity.

Fig. 8. Impact sensor

IV. SYSTEM IMPLEMENTATION

The waterfall model is a sequential process to solve any problem to develop any system it should arrange the whole work in the segment so that accuracy can be provided. It is seven stage attributes and feedback opportunity system the characteristics of our workflow is it can return to previous steps.

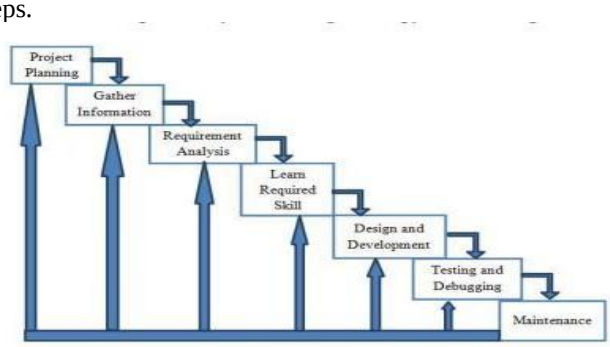

Fig. 9. Waterfall model of the Project

Step by Step Activity

- Project Planning:- We seek for some problems in our real life. Then we found this problem and planned to solve the problem.
- Gather Information:- We read some research papers related to accident detection problem. We search on the internet to find solutions.
- Requirement Analysis:- We use Arduino nano, GPS, GSM, Vibration sensor, Impact sensor, LCD Display, resistor, 9v Battery etc.
- Learn Required Skill:- To complete the project, we learned C++ language, Arduino language, hardware connection.

V. RESULTS AND ANALYSIS

We have also covered discussions about advantages, disadvantages of the current version of the accident detection and alert system.

Hardware Results

The system is mounted on a toy car for demonstration purpose. All the components were connected as per the circuit diagram. The figure below shows the hardware connections and prototype of the project.

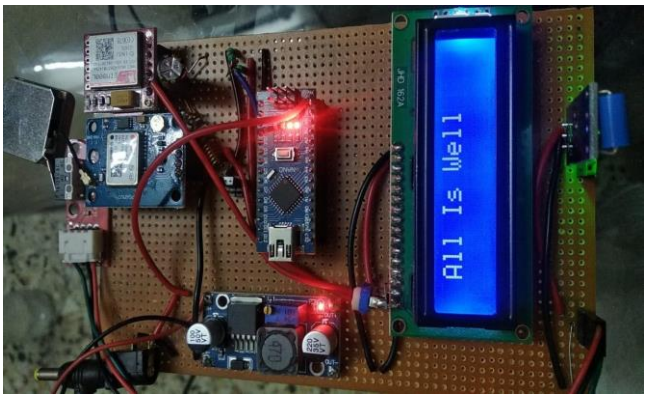

Fig. 10. System model

Advantages

1. Portable and easy to use.
2. It is easy to design and manufacture as all the components are easily available.
3. It is portable and hence can be placed anywhere.
4. Due to wireless communication data rate is faster.
5. No need for lengthy wires.
6. Easy to control
7. Easy to maintain and repair

Disadvantages

It does not work without network.

VI. CONCLUSION AND FUTURE WORK

Vehicle tracking system makes better fleet management and which in turn brings large profits. Better scheduling or route planning can enable us to handle larger loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So, in the coming years it is going to play a major role in our day to day living. The main motto of the accident alert and detection project is to decrease the chances of losing life in such accidents which we can't stop from occurring. Whenever accident is alerted the paramedics can reach the particular location to increase the chances of life. This vehicle tracking and accident alert feature may play a more important role in day to day life in the future.However, in some places where there is no provision of GSM networks it is difficult for communication.

VII. ACKNOWLEDGEMENT

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of research project report. I am thankful for their aspiring guidance, invaluably constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project. I am also thankful to principal Dr. Prashant Deshmukh and management of NHITM for their support and encouragement. I am highly indebted to my Head of Department Dr. Sanjay Sharma and guide Mr. Deepak Khachane for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project. I am thankful to the review committee for their valuable suggestion and feedback. I also thank laboratory staff for their valuable support. Last but not the least, I sincerely thank to those from teaching and non-teaching staff from NHITM who were somehow attached with my endeavor.

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