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ACCIDENT DETECTION AND MESSAGING SYSTEM USING GPS AND GSM TECHNIQUES

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ABSTRACT

Human life is something which is considered as the most valuable asset. The rapid growth of technology has made our lives easier and much faster. But this has made human life suffer in various aspects. This paper is useful in detecting the accident with the help of proximity sensor. In previous systems only the buzzer will raise during accidents and hence the patrol cannot locate the accident spot. Sometimes the alarm siren does not even attract the attention of the public because of the mentality of people nowadays to ignore such alarms considering them as false alarms. Statistics show that 96% of the public is not even aware when they hear the alarm. The problem faced in the existing system is that there is no ignition control over the car. Only after the theft of the car the location can be traced. There is no such preventive measure. Only the siren is available which is not even heard over long distances. Most of the time people ignore such alarm in today's world. So it is not a possible solution for safety of a person as there are same alarms for most of the cars. There is always a scope for betterment which we are trying to implement in our project.

I. INTRODUCTION

The traffic hazards and road accidents have increased tremendously because of a high demand of automobiles. The life of a person is under immense risk. This is because of lack of best emergency facilities available in our country. The ability to accurately detect a vehicles position and its status is the main goal of this accident detection and messaging system using GPS and GSM module. This design is a system which can detect accidents in significantly less time and sends the basic information required to the first aid centre.

1.1. Automatic Accident Detection and Reporting System Using GPS and GSM:

Traffic has become an important topic of interest nowadays. Many lives get spoiled just because of lag in response time to access the appropriate care that may be available. This project gives appropriate response time by informing the desired and mandatory helps for the situation. This is a platform for emergency rescue of the person in need and providing the affected with proper medication and facilities. This is a platform for emergency rescue which will operate optimally in order to reduce the time of arrival of rescuers. Our project aims in presenting a technology automatically detecting the accidents and a hardware tracking device based on GPS/GSM technology informing at the occurrence of accident with important details like time and exact location at which accident happened. This system is highly accurate and sensitive.

The main goals of this project is to design an economical model which requires less power and less complexity. An extra setting could be implemented by interfacing the system to the car's alarm to alert the owner on the cell phone in case the alarm is set off. The airbag system of the car could also be interfaced with the system. During the accident as soon as the car collides the vibrations can be felt by the vibration sensor and suddenly the air bag pops out. This would help in avoiding the physical damage to the person driving the car.

Our proposed system consists of three modules:

(1) SMS Module: This is a user defined module. When the car starts, the short message service (SMS) is send to the owner of the car, and the user is enabled to crank the car only if a reply is received.

(2) Malfunction Module: If there is any malfunction to the car, a message is send to the service centre.

(3)Accident Alert Module: This module sends alert message to the hospital or to the specified person when the car meets with an accident. Here the GSM is used to send the message and GPS is used to track the exact coordinates of the car. The communication between the microcontroller GSM and GPS module is done by using the serial communication interface UART[2].

In Japan, in the 1970's , research efforts in the field of real time automobile guidance were begun with the goal of reducing traffic congestion. In the 1970's and 1980's, the Japanese government ,in cooperation with industry, launched initiatives which helped to develop vehicle navigation technology[2]. Today, most Japanese car manufacturers offer factory-installed navigation systems in at least some of their models. It was estimated that by the year 2000, per annum sales of vehicle with factory installed navigation systems will be reached 2.5 million. Many researchers have proposed using cutting edge technologies to help in vehicle tracking. These technology include Communication remote control ,GPS, GIS server systems and others.

II. LITERATURE SURVEY

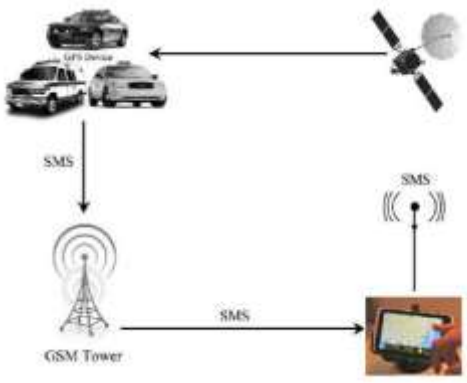

Figure 1: GPS Tracking System

In the past, the navigation systems have been large, expensive and used only in aviation or military applications. Nowadays, the presence of the GPS and several low-cost motion sensors have made those navigation systems possible that are both small and inexpensive to be used in consumer products. Commercial consumer-grade navigation systems , having application in mobile navigation systems, are easily found today in Japan, Europe and the United States[2].

At present, we are unable to detect where the accident has taken place and hence no information related to it, leading to the death of an individual. Research is going on to track the position of the vehicle even in very dark areas where there is no network for receiving the signals.GPS is used to track the position of the vehicle, GSM is used to send the message and the ARM Controller is used to save the mobile number in the EEPROM and sends the message to that number when an accident has been detected[1].Though the concept of in-vehicle navigation is not new, but implementation of such systems are relatively recent. The programs which investigated the possibility of establishing infrastructure for supporting widespread navigation for motor vehicles began in the U.S. As early as the late 1960's.The results from these studies showed that the supporting infrastructure for such a system would be very expensive, and untill 1980s ,further study in the United States was dropped. In the late 1980's,The U.S. Government launched a campaign to promote the application of high-tech solutions in order to enhance roadway efficiency. This campaign was outlined in the National Program Plan for Intelligent Transportation Systems(NPP),including a strategy for improving the efficiency of the U.S. Highway system over a 20-year period. The goals of NPP are to reduce highway congestion and fuel consumption and the number of traffic accidents by providing drivers with real-time tracking information, route guidance, electronic toll collection, advanced vehicle collision avoidance systems and provision for automatic notification to authorities in case of a traffic emergency. These renovations to the U.S. road system involve various technologies, and knowledge of a vehicle's location can be known by using many services described in the NPP(like emergency response and route guidance)[2].In the 1970's, research efforts in real-time automobile route guidance were begun in Japan with the goal to reduce traffic congestion. Throghout the 1970's and the 1980's,the Japanese Government, in cooperation with industry, launched various initiatives to mature vehicle navigation technology. Nowadays, most Japanese car manufacturers are offering factory-installed navigation systems in some of their models. It was estimated that by the year 2000,per annum sales of vehicles with factory-installed navigation systems would reach 2.5 million. The use of cutting edge technologies has been proposed by many researchers to serve the goal of vehicle tracking. These technologies include Communication Remote Control, GPS, GIS server systems and others. As shown in figure 1[2],the proposed system consists of GPS receiver, GSM Modems and embedded controllers[2].

III. HARDWARE DESIGN

3.1. The Controlling Unit

This is the heart of the system. It consists of 256 bytes of RAM and 8kb of internal ROM . It has flash memory and thus is easily programmable. The g range is selectable between 1.5g to 6g.The 3- axis accelerometer contains an onboard single pole switched capacitor filter. Because the filter is realized using switched capacitor technique,there is no requirement for external passive components (capacitors and resistors) for setting the cut off frequency. Here the output analog only one axis has been utilized (the axis along which the car moves forward). The analog output of the accelerometer is fed to the input of the ADC[3].

3.2. Information Detection Module

This sensor is a 3-axis analog output accelerometer. The device consists of a signal conditioning ASIC and a surface micro matched capacitive sensing cell(g-cell) contained in a single package. The g-cell is a mechanical

structure formed by using semiconductor materials i.e. polysilicon using semiconductor processes. It can be modeled as a set of beams attached to a central mass that move between fixed beams. The movable beams can be deflected from their rest position by subjecting the system to acceleration. The change is acceleration is a measure of distance[3].

3.3. GPS Location Module

The GPS module that this system has used has 20 channel receiver with a tracking sensitivity and an accuracy of 10m. This module has a start up first acquisition time of 2 seconds during normal temperatures and upto to about 40 seconds under extreme cool conditions. The global positioning system satellite transmits signal equipment on the ground. GPS receivers passively receives satellite signals they do not transmit. When an accident occurs,the GPS system tracks the exact location of the vehicle and sends the details through GSM[3].

3.4. Message Transmission Modem

Here GSM is used as the message transmission modem. GSM is a cellular network that means mobile phones are connected by searching for cells in the immediate vicinity. GSM network operates in four different frequency ranges. Most GSM networks operates in 900 to 1800 MHz of band ranges. GSM is used to alert the person by sending the SMS. GSM systems are the basic requirement in our project as these are the systems with the help of which message will be sent to the emergency numbers through mobile phones. These systems are the satellites which sends and receives different signals generated from the site of accident. Certain numbers are stored as emergency numbers and the messages are sent to those numbers .You can feed the contact details of your family persons , hospitals, police stations whoever it may concern[3].

IV. FLOW DIAGRAM

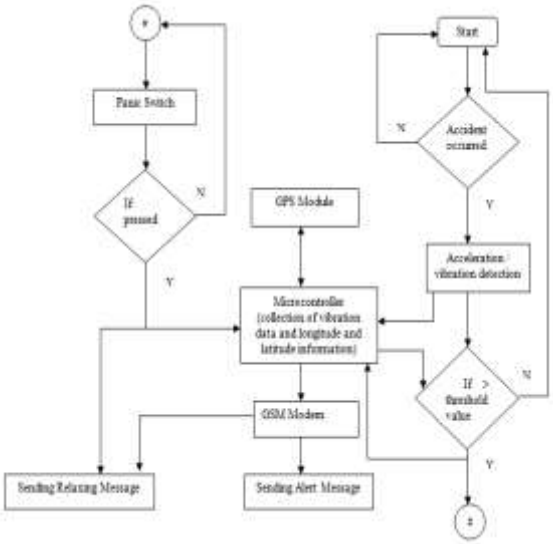

Figure 2: Flow Diagram

In figure 2, the flow diagram[3] is shown to illustrate the basic working of our project.

V. APPLICATIONS

- It is used in automotives and transport vehicles-from heavier automotives like ships, aeroplanes etc to lighter vehicles like cars.
- It provides security and remote monitoring of vehicles especially during military operations.
- We can interface this system with Vehicle airbag system so that when the sensors detect the accident, the airbags get opened.
- It helps in stolen vehicle recovery.The vehicles can be fitted with RF or GPS units to allow the tracking and recovery by police.The police can also activate the tracking unit in the vehicle directly and follow tracking signals, as in the case of LoJack.
- It aids in fleet management.While managing a fleet of vehicles, if we know the real-time location of all drivers, we can manage to meet customer needs more efficiently.Whether it is delivery, service or other multi-vehicle enterprises, drivers now only need a mobile phone with an internet connection to be tracked by and dispatched efficiently.
- It helps in asset tracking also.Companies can track valuable assets for insurance or other monitoring purposes and can now closely monitor movement and operating status by plotting the real-time asset location on a map.
- It helps in transit tracking.It is the temporary tracking of cargoes or assets from one point to the other.Users can easily ensure that the assets do not stop on route or do a U-Turn, thereby ensuring the security of the assets.

VI. ADVANTAGES

- It is easy to operate.
- It provides sophisticated security.
- It has a simple and reliable design.
- It seperates both GPS and GSM signal.
- High security is provided since the car can be started only after acknowledgement of the owner himself.
- We do not need to look for service center in case of malfunction in cars.
- This system helps in providing a quick medical support to the accident victims.
- It can help in identifying the exact coordinates during accidents.

VII. DISADVANTAGES

- It requires network connection. It cannot work without it.
- Only the accidents which occur on the front side are monitored, not on the rear side.

VIII. CONCLUSION

The main aim of this project is to detect the accidents occurred and provide an alert system via SMS. With this system an embedded system is designed which can be used for accident detection. It is a low cost, power

efficient system by which the action time can be minimized and an exact location of the system can also be determined with GPS service. Also the information regarding accident can also be sent to particular contact numbers. Because of the flexibility of embedded systems,this system is very much compatible to any kind of vehicles. Over all this system is very much affordable to common man and can be easily implemented.This system differs from other systems in a variety of ways which are easy to implement.

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