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Accident Detection System using Smart Phone

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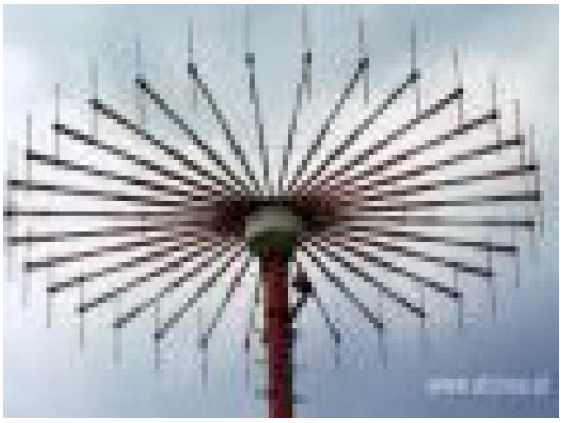
***Abstract*-- Today with the increasing traffic, the probability of accidents has also increased. The Victims of the accidents can be saved easily if the accidents occur in the urban areas with the help of the Emergency services we have. Our system helps in saving the victims at any remote area with the maximum possible help from the Emergency Services nearby to that location and also at the same time informs the appropriate persons related to the victim. This System is called SOS (Save Our Souls) TRANSMISSION system. The idea has been developed keeping in mind the considerations of cost and compatibility with existing system at the same time providing maximum safety to the people. The Short Message Service (SMS) as it is popularly referred to, is made use of for this purpose. The solution offered is the Force-Transducer method. The victim is assumed to be unconscious and also the accident is detected mechanically. Detailed simulation results at a scaled down level area unit provided for this answer.**

I. INTRODUCTION

Cellular phones square measure bobbing up to be a menace on the road. This is a significant drawback for the cell phone makers. This paper provides an answer that transmits a SOS signal to save lots of the accident victim. It describes in detail a cost-effective fool proof solution. There area unit several factors to be thought-about once planning such a system. In most of the accidents, the victim becomes unconscious. How is a SOS transmitted then? Here, many ideas can be implemented. One such solution is described here. The telephone is fitted with a electrical device, that detects shocks. The telephone mechanically transmits the SOS if the shock level goes on the far side a particular share. The cellular phone should not trigger AN accidental SOS. To ensure this, the shock level that triggers the SOS should be high enough. Based on the first condition, if the shock level is made very high, then accident might not be identified at all.



Having so known the things within the accident, one has to perceive the particular needs in every case. They are given below. solution needs a software package automaton resident within the cell phone provider's server, which may transmit the SOS signal in AN intelligent manner and monitor responses for the victim.

SimiIarIy, the solution needs a Positioning System to transmit the victim's whereabouts to others. This needs to be an inexpensive system and will not increase the telephone receiver's price greatly.

The solution requires a high fidelity shock transducer and decoding circuit to identify the shock magnitude.

The SOS has to be transmitted as soon as possible. So all systems should have a really tiny time

Above all, the new system must fit in with the present system (i.e.,) there must be no difference in the information received between a user who requests this option and one who does not. The elaborate description of the answer are going to be given currently.

II. TOY CAR EXPERIMENT

In case the victim becomes unconscious, the system should be able to mechanically discover AN accident and transmit the SOS mechanically.

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In order to realize this, a shock transducer is used to measure the jerk experienced through the accident and trigger the SOS circuit if the force level is very high. This system wants applied math information acquisition to seek out out the precise strength of the force in AN accident. It is extremely valuable to simulate the accident in real time. So, a scaled down experiment is used. Here, a combine of toy cars of mass 200g is created to run into one another. The force caused by them is measured by simple piezoelectric transducers. The results of this experiment are tabulated below.

Fig : Toy automotive experiment to verify the operating of the system.

As seen from the experiment, the average force acting on a toy car in case of an accident is approximately IN. For a car measuring 960kg and moving at 70kmph speed, the force will be scaled 1 8000 times or 18kN. These sensible results are often verified by an easy theoretical calculation. A automotive advisement 960kg decelerates from some 70kmph to 0kmph in a pair of seconds just in case of AN accident. Hence, the force is given by F -ma which is, 960*70*1000/3600 or 1 8.67kN approximately. This confirms with the scaled down experimental results. However, in an exceedingly fourwheeler, all of the total force does not act inside the vehicle. As per information got from Mercedes Benz, only 1 0% of the total force acts inside the car (Acknowledgement [4]). Thus, the brink are often set to some at one kN. The scaled down experiment used a less expensive electrical device that doesn't live high forces. The electrical device needed for the particular system prices Rs. 1 000 a pair. Based on the applied math information collected higher than, the approximate threshold level is determined. More correct results are often determined if the experiments area unit carried in real time to the precise detail. In order to make sure that the force calculated higher than acts on the telephone, it is essential to place the phone in the stand that normally comes as a standard part of cars. This stand needs a small modification to produce the telephone alittle moving house in order that it's jerked once AN accident happens. The alternate and higher resolution would be to connect the electrical device to some a part of the vehicle itself and connect the telephone to that whenever the user is driving hi/her car.

This resolution would need that the electrical device be properly protected. The problem of finding the position's victim is currently prohibited.

III. IDENTIFYING THE POSITION OF THE SYSYTEM

The downside of knowing wherever we tend to area unit has been a remarkable and troublesome problem through the ages. Years of research have resulted in the Global Positioning System (GPS). This technique uses 3 satellites and pin points the situation by the triangulation method, wherein the user's position is located as the point of intersection of the three circles corresponding to the satellites. Installing such a system is quite simple. But the major constraint here is the cost. A normal handheld GPS costs around $100 and weighs quite heavy. Minimizing the on top of equipment can increase the value more. This would mean an extra cost of Rs. 10000 to Rs. 15000 for the Indian user. The better choice would be to attend for a SOS signal and so determine the victim's position. This being a quicker technique conjointly makes the planning method straightforward and low-cost.

Fig: distinguishing the position of the victim through satellite

This being the case, one could make use of certain obvious facts to identify the victim. They are,

i) The cell among that the victim is gift are often known simply by the bottom station. However, this resolution isn't enough as a result of the cell are often of an enormous size.

Accidents are exceptional cases. They occur rarely. Further, the chance of 2 users within the same cell entering into associate degree accident is extremely inconceivable.

The system advised by this paper makes use of a beacon or search signal transmitted by the bottom station. This is a constant amplitude a.c. signal that matches within the guard band of the several cell.

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The signal has an equivalent frequency for all users and then is unsuitable for coincidental multi-user handling. However, that will be a highly improbable case as reasoned above.

This search signal is distributed as long as associate degree SOS is known. So, once a victim sends out his SOS, the bottom station straightaway sends the search signal. The mobile phone is fitted with atiny low reflector that reflects this signal in and of itself. This is simply achieved by constructing a mismatched termination within the mobile phone for that frequency. Now, the to and fro travel of the signal introduces a time delay. So, from the signal mirrored, the user's distance can be identified.

Fig: Cellular phone used in SOS transmission

The information got currently offers solely the radius of the circle among that the user could be gift. This could be overlarge space |a neighborhood |a district |a region| a locality |a vicinity |a part |a section} to spot the user even among the cell limits as there's no most limit on the cell area. Since we've got the radius, all that is required is to find the angle or direction within which the user might be present. To do this, we tend to use the Radio receiver (RDF) antenna system. This makes use of a extremely directional loop antenna to spot the signal supply that during this case is that the mobile phone.

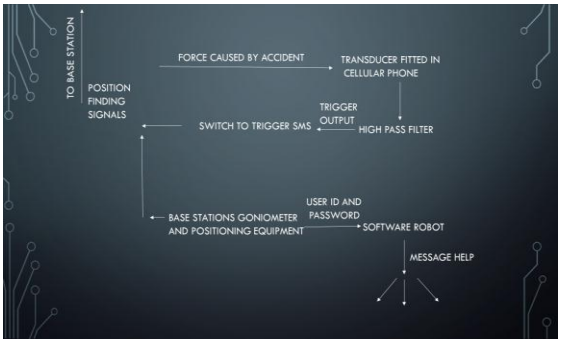
In order to try and do this, the cellular phone needs to transmit a microwave signal to the base station. This can be of any frequency that has not been allotted for the present management frequencies. The base station is then fitted with the CROSSED LOOP or Vincenzo Bellini TOSI or direction finder kind of receiver. It has been well-tried mathematically that the meter points to the direction of the signal supply.

The user in distress sends out a microwave signal to the bottom station even as the bottom station sends its beacon signal. From the mirrored beacon signal the radius of the victim's position is found. From the direction finder, the direction is found as well. This system as assumed on top of presents a style for less than one user. To do this atiny low electronic system, preferably a microcontroller based system maybe used.

Such systems area unit obtainable wide within the market and then there's no purpose in attempting to style one. Thus, the matter of distinctive the victim is overcome. Once the victim's location is known, the base station transmits the SOS sent by the cell phone along with his coordinates to the main server. The telephone therefore initiates the method and also the base station propagates it.

IV. Complete Diagram Of The System

The below diagram depicts the operating of the whole system. As seen, the jerk caused by the accident is detected by the shock electrical device and also the SMS sub-routine is triggered. Along with the message, management signals that inform the bottom station that associate degree accident has occurred area unit transmitted. The triggering is achieved by employing a high pass filter that detects abrupt changes within the electrical device. Simultaneously, the microwave signal for the direction finder is additionally transmitted. The position is identified as described in the previous section. The user's id and his position within the polar coordinates area unit given to the package golem. This robot, then decodes the user's position to alternative subscribers supported a priority list.



So far the hardware design of the system dealt within detail.

As mentioned at the beginning of the paper, a software robot that manages the whole show will have to be designed. This golem is formed resident within the main server within the tower of the cellular service supplier. The functions that this golem can have to be compelled to perform area unit advanced. The algorithmic rule it follows and its code at the best level of abstraction area unit explained within the next section.

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V. DESIGNING THE SOFTWARE ROBOT

A package automaton could be a program that resides AN exceedingly|in a very} network (or an environment) and executes a particular task allotted to that. For this purpose, it's going to move round the setting or contact different package robots within the same or different environments. A package automaton is to be designed for this method thus on monitor Associate in Nursingd transmit the SOS signals in an intelligent manner. The tasks that ar to be performed by the package automaton ar listed below.

i) lt has to transmit the SOS to appropriate persons as will be described.
ii) lt has to act in the victim's place and monitor responses.
iii) lt has to check for a confirmation form the victim to avoid false alarms. This is accomplished by interrogating the victim and anticipating the confirmation. If in an exceedingly} very short time, there is no response, the transmitted SOS must be followed through with a False Alarm message.

Before planning the formula, the hierarchy in which the SOS is to be transmitted is to be decided. This takes into account the following factors,

i) The proximity of the help source.
ii) The certainty with which help might be got. For example, a relative whose cell number is present in the victim's address book would be more likely to help rather than a third person. Based on the higher than constraints, a suggested hierarchy of transmitting the SOS is given below. This is maintained as sets of indices within the agent's research table with every index representing one cluster. . Public void class Agent

/* get victim variety and position from MAILER DAEMON. Subscriber class defines the victim */

Subscriber SOS Transmitter = new Subscriber (MAILERDAEMON. get Victim ()); Position victim position = new position (MAILERDAEMON. get Position ( ));

Boolean processing FIag = True;

Subscriber help Sub;

// search - research table with all indices

While ((help Sub = browse List (search)))

send facilitate " + vicitim Posn, help Sub); delay (30); // watch for thirty seconds

Response respl = new Response (scan Response ()); if

(Response NULL)

if (Response NULL)

//scan response continuously for 1 20 secs after transmitting to all subscribers

Response = scanResponse(120) ;

If (Response NULL) send(" HELP ON THE WAY " , SOSTransmitter); //inform victim of help processingFIag = False;

i) Emergency table of all hospitals within the victim's cell.
ii) AII doctors presently in the victim's cell.
iii) AII subscribers in the victim's address book that are presently in the cell.
iv) AII subscribers in the victim's cell.
v) Emergency table of all hospitals within the next nearest cell so on.

This set of indices in modified in a very dynamic fashion by the MAILER DAEMON within the server. This MAILER DAEMON is generally gift all told servers. It is this program that initiates the particular Agent whenever a SOS happens. The code of the Agent is given in Associate in Nursing abstracted level below.

The agent given here once started, gets the victim's id and his position into the various objects. It then puts every of the indexes from the planning up table into its corresponding object and sends the SOS to them. It then monitors the response and informs the victim once someone responds.

VI. SIMULATION

The simulation of this method has been applied in a very tiny scale level. As seen from the diagram a electro-acoustic substitutes for the shock transducer within the original system. This then transmitted through a radio radiation transmitter to a private pc. The signal received is gone through an ADC and received in a very C program. This program checks the signal price and sets a flag variable once it goes on the far side an exact level.

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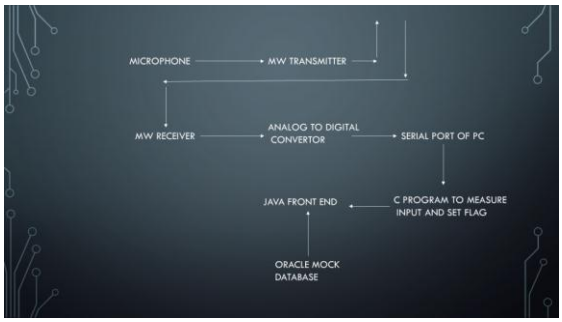
This flag is regularly checked by a thread of the JAVA front-end. If the flag is set, the program connects to the back-end database and displays a list of users to whom the mock message is sent based on the hierarchy explained above. The simulation doesn't cowl the positioning a part of the system as that's too costly to be done on tiny scale. The screen shot of the Java front-end is shown within the next section.



VII. CONCLUSION

The system though complete presents a few limitations. They are, the system needs the user to position the cell phone in a very stand or connect the electrical device to the vehicle just in case of 4 wheelers. Though this may appear as if taking alternative from the user, the fact that the system deals with a question of life or death is more important. The system desires elaborate measuring to decrypt the position of the user in polar coordinates to actual localities. This however is a one time job. This can be reduced by ringing the cell phone each time AN SOS is shipped and thereby warning the user. The data collected are approximate. However, correct knowledge are often collected if the system is tested in real time as a billboard venture.

Thus, if enforced this technique would convince be a boon to any or all the folks out there driving with hands-free phone in their ears.

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