



AUTOMATED EMERGENCY RESPONSE ON ROAD ACCIDENTS

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ABSTRACT

Road accidents and traffic congestion are the major problems in urban areas. Due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome the drawback of existing system we will implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A main server unit houses the database of all hospitals in the city. A GPS and GSM in the phone in the concerned vehicle will send the location of the accident to the main server which will send information to the traffic police on that area to control the traffic and also to 108 emergency services which will rush an ambulance to the nearest hospital to the accident spot. Along with this the SMS is sent to traffic police who will then help in clearing the traffic. Normally the response of the ambulance will be within a one and half minute and we are reducing the time less than a minute of accident takes place that is if nobody tells the information mostly in high ways then the time of response also increases. This system is fully automated, thus it finds the accident spot, controls the traffic lights, helping to reach the hospital in time. But the existing system has a disadvantage that they won't send information regarding the number of people and also the type of accidents. Today the Airbags convert the major accident into minor accident and thus there will be confusion occurs in declaring the type of accident.

KEYWORDS: GPS, GSM, Road Accidents and Database

1. INTRODUCTION

1.1 Existing System

Currently there is no technology for accident detection. As it is done manually there is loss of life in golden hours. The accident victim is dependent on the mercy of others to rush him to hospital. Many a times an accident goes unnoticed for hours before help comes in. Due to all these factors there is a high rate of mortality of the accident victims. In addition to this there is delay in the ambulance reaching the hospital due to the traffic congestion between accident location and hospital which increases the chances of the death of victim.

1.2 Some proposed systems and their Disadvantages

1. Detecting the accident by using information from air bag sensors and by MEMS sensor which will detect the releasing of Airbag and by using information from that we can send information to the server through GPS, GSM. Then from server it passes information to the ambulance services [1].

In this case the usage of GSM and GPS are costly are not feasible. So every people can't able to afford it. Also the air bags are not that much accurate. The MEMS sensor can only

detect accident by using the rate of acceleration/deceleration. But the real problem is, now a days all the cars has Airbags, which will reduce the effect of the accidents (that is even though major accidents occurs the air bags will reduce it to minor accidents by protecting the people) so in case of minor accidents the injuries were less and if the accident information is passed to ambulance then it is waste of use [2]. Then the emergency services won't respond to the message unless they know whether it is major/minor accident. People were this will make unreliable on the system.

2. another case instead of airbag sensor, accelerometer is used and by using complex algorithms the accident is detected and all other steps are same as told before and here wrist watch is used to measure heart beat (to decrease the false information)

In this case wrist watch is used but according to the internet sources they are not that much accurate and so false information is provided and the during fear also the heart beat will be more and when we come to the accelerometer, the major disadvantage is it will not able to distinguish between major and minor accidents. And in wrist watch false information is protected by using timer which is under control of user but the main disadvantage is the user won't first consider it as important in case of accident and what if he



was stuck inside the car and was unconscious but has minor injury? He won't be able to click on timer.

3. In USA after the accidents occurs they process the server and connect it to satellite to capture the satellite image of the crashed car.

In this case not all the people were allowed to use satellite imaging. It requires lot of formalities and security is needed for using it and the government won't give to us.

There are also many ACN systems are used like ONSTAR, COMMANDO etc. which are not affordable (costly) and they are available only to specific car [3].

2. PROPOSED SYSTEM

Once the accident occurs the Airbags will open and convert major accidents into minor accidents and thus SMS sent will be of waste (that is if the person had less injury then no need of bringing multiple ambulances because if the accident was major then each person is carried in separate ambulance and if it was minor then a single ambulance is enough for all). So it is mandatory to declare what type of accident had taken place (major /minor) our system address it.

We have a Bluetooth enabled microprocessor which takes information from crash sensors (which will detect the force of collision and above certain value it will trigger and information is passed) and if the value is above a particular limit then the microprocessor will send SMS through mobile phone to the server containing the details of car no., location and longitude, where the mobile phone and the microprocessor are connected by using Bluetooth, then message is received by server and server checks the location of phone by tracking mobile phone tower and all the mobile phone in that particular location, the voice message will be sent. It is done by the converting message into online voice (so no need of app) so that if the accident place is near residential areas then the people in that area will help. That is, if any off duty doctors were there they will help and even if the people don't like they can block the message. And also to their relatives (by searching on frequent contact list), due to this the cars on that road will also get information and they will take different route and traffic jam is reduced. Due to this nearby hospitals will also easily help on accidents. Here we use ZIGBEE to connect to tower incase if there is no mobile

phone signal. A camera will be kept in the roof top of the car so that if the car rolls over or if any damage occurs at the roof of the car the small camera (like primary camera) will damage and the microprocessor will detect it and send information as "major accident" due to this the ambulance will be coming with premeasured safety things (if any damage occurs on roof top of car then it will cause head injury) on the same time the information is passed to the traffic police on duty [4]. So that he will help to clear traffic.

Normally if the accident is major then only one person is carried by ambulance and if it is minor then 2 or 3 people will be carried in same ambulance, so it is mandatory to tell the number of persons in the car, it is done by camera in roof top. The microprocessor will take the information from camera and it will send mms to server through phone [5]. And the server analyses the 2 photos of which one is taken few microseconds before the accident and another is after the accident occurs, then the server confirms the number of persons and the type of accident and again send the photo to the 108 for further analysing so that they will be well prepared.

2.1 False information

Is this being prevented and the server then send image to ambulance?

The camera will collect data on frequent interval of time period and before the accident occurs, the microprocessor will sense the accident from the crash sensor and activate camera to take a snap and process it. This will happen within few microseconds. Since image is sent we can be able to detect the major or minor accidents and once the ambulance reached the nearby hospital then the information is passed to their relatives.

2.2 Details of components used

1. Crash sensors
2. Bluetooth enabled microcontroller
3. Camera
4. Server
5. Cell phone

2.3 Functioning of components

2.3.1 Crash sensor

The crash sensor detects the accidents using g-force. G-force is the force acting during the collision. Once the measured g-force is beyond the particular value (10 N/m) then the crash sensor will send information to the micro controller [6].



Microcontroller



Figure 1:Atmega8 microcontroller

Atmega8 microcontroller is used. It is used to store the image captured before and after the accident. The microprocessor will then send these images to the cell phone via Bluetooth. The Bluetooth module is connected to it.

2.3.2 Camera

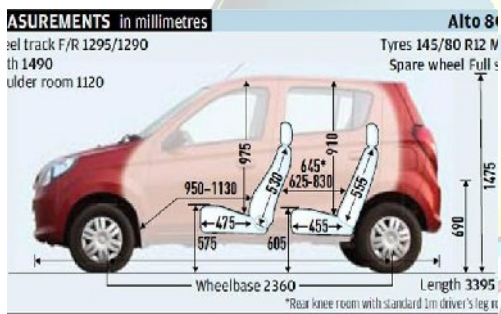


Figure 2: dimensions of car (in mm)

Since a single 170 degree camera can't capture full images two cameras are used. These two cameras are kept above the front seat and the back seat of the car on the roof, so that the 170 degree cameras can capture the full image of persons sitting in front seat and backseat. But the position of camera depends on the car. Additionally a led is fixed near to the camera so that it works as flash. During night times, the led is triggered along with camera [7]. So that cameras can also be used in night.

2.3.3 Server:



Figure 3:server

Server is used to pass information to the emergency services, the traffic police and to the mobile phones in that particular location [8]. By using GEOGRAPHICAL MESSAGING the server will send messages to the particular latitude where the accident had been take place. An app is installed in cell phones so that it will convert only the messages received from server into voice.

3. BLOCK DIAGRAM

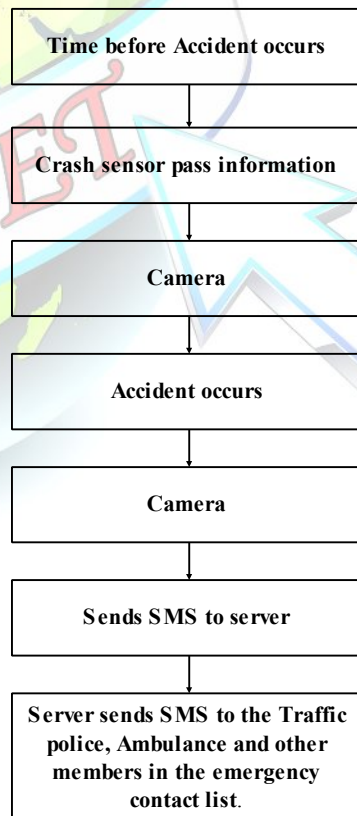




Fig. 4. Block diagram

4. RESULT

This system is can be used in all kind of phones (smart & ordinary phones) which are having Bluetooth and does not requires mobile phone data and internet.

1. Since we are using the only the existing devices there is no need of huge capital cost.

2. System can easily implemented within less time that is the product will reach the people in less time.

3. If message is passed then sometimes people will hesitate to see it while driving and they would ignore it. So the voice message is sent, when this message is received by phone they won't need to answer it instead it will automatically choose music and play this voice message.

4. We will be further expanding the project for collection of money in toll booth by connecting the phone and the receiver in toll booth where app like PAYTM will be used for paying the toll money as blue tooth can be used within the range of 10m

5. We will also be connecting more devices using Bluetooth. So that we will be trying it for C2C communication through Bluetooth.

6. Also the message will be sent to nearby hospitals separately through server and if there is no nearby hospitals then message (not voice message) will be sent to 108 services. But since some private hospitals neglect it, the message is sent to 108 also.

7. Since it is not integrated to car ECU the hackers can't able to hack and if they do also there won't be any problem

5. COST DETAILS

Table 1: Cost details

Explanation:

Total base area = 2360 (shown in fig)

$2360/2=1180$ (area of the car from front seat to front wheel base)

Camera focuses 170 degree on both directions so $170/2=85$ degree (in particular direction)

Thus 360 degree \rightarrow 1180 \rightarrow

85 degree \rightarrow ? \rightarrow

Thus after calculation the answer would be 278.6mm .since totally the area of the back seat has 455mm, the single camera cant able to capture, so the double camera is used.

By using the camera on roof top has an added advantage that when the car roll over then the camera will get damaged and the microcontroller will detect the camera after the collision occurs and thus it confirms that accident is a major accident because once anything happens in roof, it will definitely cause major accident.

5.1 Disadvantages

1. Bluetooth can be able to pass information only at the speed of 720kb/sec.

2. Only can be connected to small number of devices.

3. The user must turn on the Bluetooth.

4. The user should have balance in his/her

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Equipment's used	Cost
At mega 8 microcontroller	RS.500
Blue tooth module	RS.320
Camera	RS.1000
Crash sensor	RS. 800
TOTAL COST	RS.2620

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ISSN 2394-3777 (Print)

ISSN 2394-3785 (Online)

Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)

Vol. II, Special Issue XXVIII, September 2015 in association with

Adhiyamaan College of Engineering, Hosur-635109, Tamil Nadu

Department Of Computer Applications

National Conference on "Exploration of Computation and Information Technology for Disaster Management (ECITDM15)

11th-12th September 2015

DRIVER ANALYTICS - Patent us20140300739, Oct. 9,

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