ISSN 2278-3091

International Journal of Advanced Trends in Computer Science and Engineering (IJATCSE), Vol.2 , No.3, Pages : 07-12 (2013)
Special Issue of ICCSIE 2013 - Held during 24 May, 2013 Bangalore, India

Various Accident Detection Technologies and Recovery Systems with Victim Analysis

Ch. Ramya Keerthi[1], G.Shanmukh[2], Dr. R. Sivaram[3]
[1]St.Mary's Women's Engineering College, India, ramya.kirthe@gmail.com
[2]Acharya Nagarjuna University College of Engineering & Technology, India, gollapudi.shanmukh@gmail.com
[3]St.Mary's Women's Engineering College, India, dr.r.sivaram@gmail.com

Abstract: In this technological revulsion world there is no time for anyone to know what happening round them they keep on moving without any care. As they give importance to their work rather than others. Due to reduce in moral values once cannot get proper help when they need. This can be solved by this technology itself. Due to time laps many lives are in risk. To reduce this risk factor automatic accident detection and victim analysis plays an important role. Reducing the time laps will reduce the death rate. As reducing the time taken to take first aid will reduce the effect of accident on the victim. Probability of victim security will be more. As now a day's mobile is common electronic gadget that is present with everyone and this problem can be solved by it only. By the short message service (SMS) on of the fetcher of mobile will help to solve this problem. By this embedded system we can now the place of accident, rate of accident, status of the victim like blood pressure and heart beat. By this information rescue team will be easily help the victim. By using technologies GPS and GPRS one can easily locate the position of the accident. This paper say the technologies that how an accident is detected and victim status. The technology needs to have more features like pre analysis of driver and then the vehicles get started. As prevention is better than cure. The main motive of this paper is to reduce the accident rate and reduce the time forfirst aid.The proposed system ensures that to reduce the human death ratio by accidents.

Keywords: - Accident monitoring, Accident detection, GPS, GPRS, Victim analysis.

INTRODUCTION

In a large country like India there are many kind of places like hilly area plateaus and due to improper road facilities accidents are more and death rate due to this accidents are more. India faces the highest number of accidents and accidental fatalities in the world.The maximum number of accidents are reported from the transport sector i.e. road as well as railways.

Some approximations claim that Indian roads alone accounted for approximately 105,000 accidental fatalities in 2010. This is almost 15 percent of the global road fatalities when India has just 1 percent of the total global vehicles. The incidents of accidental deaths have shown increasing trend during the decade of 2000-2010 with an increase of 50 percent in the year 2010 as compared to the year 2000.

According to Planning Commission of India, the total annual economic loss is 2.5 percent of India's GDP due to rising number of road fatalities.

In 2010, the highest number of deaths due to road accidents took place in Tamil Nadu (15,409 deaths) followed by Andhra Pradesh (15,337 deaths), Uttar Pradesh (15,099 deaths) and Maharashtra (14,063 deaths). In cities, highest number of road accidents took place in Delhi (7479 cases) followed by Bangalore (6490 cases) and Mumbai (4008 cases). Trucks and two-wheelers were responsible for over 40 percent of accident related deaths in India. Besides road accidents, accidents taking place at the workplace also pose a formidable risk to employees' safety. It is hard to get reliable data of occupational diseases and workplace accidents in India due to lack of specific system for reporting and recording. As per the statistics put forth by Greenpeace, India, as many as 16 accidents have so far taken place from 1990–2010 in India's civilian nuclear power installations in which several people lost their lives.

According to Times survey In UP, the deaths increased by at least 30% (it was 15,175 in 2010), while in Punjab 3,613 people died in 2011 as compared to 3,400 in the previous year. "We are worried. The roads are getting better and people are driving at high speed, while there are deficiencies in traffic engineering. The figures supplied by the worst performing states have shocked the road transport and highways ministry, which is primarily responsible and accountable for nationwide road safety. Early this year some states had submitted provisional data that projected the likely fall of road deaths by 1% in 2011. India is signatory to the Decade for Action declaration by the United States to reduce deaths by 50% by 2020.

India's status as the world leader in deaths due to road accidents is a matter of national shame. The fact is that a large proportion of these deaths can be prevented by simple measures. The most important of these is strict enforcement of traffic rules, which is conspicuous by its absence in our cities as well as on highways.

Other measures like preventing overloading of vehicles and making sure that highways have a divider separating the two carriageways would also make a huge difference. Surely this is not asking for too much. Considering the number of people killed each year, not taking these simple steps amounts to gross negligence.

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ROAD ACCIDENTS STATISTICS AT A GLANCE

- **85%** of all road accidents occur in Asia pacific region.
- India occupies second place with **10%** of total road accidents in world.
- Nearly **1,275,000** persons are injured in road accident. Social cost of accidents is estimated at **$11,000.**
- Most of the accidents are occurring due to lack of professional drivers and positive driving culture.

According to government study in 2011 there was an accident in every minute in 2011 in the country that claimed the lives of 1.42 lakh people, according to a government study. The number of accidents in the previous year was 4.97 lakh injuring 5.11 lakh people, according to a report released by Ministry of Road Transport and Highways. The study attributed the high number of accidents, injuries and deaths to exposure to risk nature of traffic, lack of traffic separation, etc. The 2011 numbers are, however, marginally lower than the 5.27 lakh accidents and 1.42 lakh deaths in 2010.

The **main objectives** of this work are,

1. To Reduce the Human Death Ratio due to Road Accident in India.
2. To intimate the condition of the victim who met with accident.
3. If accident takes place, fastindication by message to emergency care centers to intimate the condition of victims.
4. To provide maximum assistance even in unpopulated area.

This proposed methodology is the automatic system which will provide the solution for identifying the accident location and also the status of the victims in the accident. The physiological parameters such as heart rate, body temperature and coma stage status of the victims are the vital information transmitted to the nearest emergency care centers spontaneously when the accidents occurred.

MOTIVATION

When a traffic accident takes place, assisting injured passengers as soon as possible is crucial to minimize the negative effects on their health. Mortality from traffic accidents can be classified into three phases:

Stage-1: It involves casualties in the first few minutes or seconds after an accident (about 10% of all deaths).

Stage-2: It is the first hour after the accident, the so called golden hour, has the highest mortality (75% ofall deaths) and is the phase during which the highest death rate can be avoided by proper initial health care.
Stage-3: Happens days or weeks after the traumatic incident, has 15% of mortality, and takes hard work and a high amount of resources to reduce mortality

As can be observed, the phase where more benefits can be achieved by reducing rescue response time is the second one. A fast and efficient rescue operation during the hour after a traffic accident significantly increases the probability of survival of the injured and reduces the injury severity.

For a noticeable reduction in rescue time, two major steps must be taken:

1) Fast and accurate accident detection and reporting to an appropriate public safety answering point (PSAP) and
2) Fast and efficient evacuation of occupants trapped inside a vehicle.

WORK DONE

Studied different kind of IEEE papers for the technologies and hardware and software that are used in the detection and indicating that accident and victim condition.

Jorge Zaldivarpropose an Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents and application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents. The application reacts to positive detection by sending details about the accident through either e-mail or SMS to pre-defined destinations, immediatelyfollowed by an automatic phone call to the emergency services. Experimental results using a real vehicle show that the application is able to react to accident events in less than 3 seconds, a very low time, validating the feasibility of Smartphone based solutions for improving safety on the road.[1]

Manuel Foguethe proposed system requires each vehicle to be endowed with an onboard unit (OBU) responsible for detecting and reporting accident situations to an external control unit (CU) that estimates its severity, allocating the necessary resources for the rescue operation. The development of a prototype based on off-the-shelf devices and its validation at the Applus+ IDIADA Automotive Research Corporation facilities show that our system could notably reduce the time needed to alert and deploy the emergency services after an accident takes place.[2]

Prabakar Sproposed the system that has been developed and implemented using the biomedical smart sensors and microcontroller based mobile technology integrated with the evolving LabVIEW platform.

The system will automatically identify the accident, then immediately transmit the location of the accident and the status of the physiological parameters of the victims to the emergency care center phone number through Short Message Service (SMS). The victim's physiological parameters such as body

temperature, Heartbeat, Coma stage recovery status have been transmitted in the SMS.[3]

Md. Syedul Aminproposes to utilize the capability of a GPS receiver to monitor speed of a vehicle and detect accident basing on monitored speed and send accident location to an Alert Service Center. The GPS will monitor speed of a vehicle and compare with the previous speed in every second through a Microcontroller Unit. Whenever the speed will be below the specified speed, it will assume that an accident has occurred. The system will then send the accident location acquired from the GPS along with the time and the speed by utilizing the GSM network. This will help to reach the rescue service in time and save the valuable human life.[4]

C.Vidya Lakshmi proposed automatically find a traffic accident, search for the spot and then send the basic information to first aid center within two seconds covering geographical coordinates, the time and circumstances in which a traffic accident takes place. GPS software is fitted in the vehicle will now start communicate with the satellite and get the latitude and longitude values and send the information to the centralized server.[5]

DIFFERENT TECHNOLOGIES THAT ARE USED IN ACCIDENT DETECTION AND VICTIM ANALYSIS

1. Networks through OBD-II:

This application basically combines two elements - vehicle and smartphone - to achieve a symbiosis between both that is able to improve the effectiveness of emergency services by making accident detection fully automatic. Accident detection is based on the parameters provided by the OBD-II interface, such as airbag triggering detection, and is complemented with the information gathered by the mobile phone itself, such as GPS information.

Initially the smartphone connects to an OBDII device via Bluetooth to retrieve data from the vehicle's bus. The information gained, together with data from other sources (e.g. GPS system) is packed and sent to an emergency services database or to other third parties defined by the user if an accident is detected. This procedure is followed by an automatic call to an operator, which will send an ambulance or other rescue services to the accident location. The application also offers general purpose information to the driver, including gas levels, detection of failures in mechanical elements, extensive engine feedback data, etc.

Several operating modes are defined by the OBD-II standard to allow for an easier interaction with the system, and defining the desired functionality. Most automobile manufacturers have introduced additional operation modes that are specific to their vehicles, thus offering a full control of the available functionality.[1]

2. Automatic accident detection by e-NOTIFY System:

This system consists of several components with different functions. First, the vehicles should incorporate an OBU responsible for detecting accidents and communicating information about dangerous situations Next, the notification of the detected accidents is made through a combination of both V2V and V2I communications. Finally, the destination of the information is the CU that will handle the warning notification, estimating the severity of the accident and communicating the incident to the appropriate emergency services.

The OBU definition is of utmost importance for the proposed system. This device must be technically and economically feasible, as its adoption in a wide range of vehicles could increase in the near future. In addition, this system should be open to future software updates. Although the design of the hardware to be included in vehicles initially consisted of special-purpose systems, this trend is heading toward general-purpose systems because of the constant inclusion of new services. The information exchange between the OBUs and the CU is made through the Internet, either through vehicles providing Internet access Telecommunications System (UMTS), for example] or by reaching infrastructure units [roadside units (RSU)] that provide this service.

If the vehicle does not get direct access to the CU on its own, it can generate messages to be broadcast by nearby vehicles until they reach one of the aforementioned communication paths. These messages, when disseminated among the vehicles in the area where the accident took place, also serve the purpose of alerting drivers traveling to the accident area about the state of the affected vehicle and its possible interference on the normal traffic flow. An efficient warning message dissemination protocol should exploit the street and buildings layout of the surrounding area to carefully select the most appropriate forwarding node for the message. This allows maximizing the percentage of informed vehicles and reducing the time elapsed between the accident occurrence and its actual notification to each specific vehicle (i.e., the warning notification time) while simultaneously reducing the amount of traffic generated in the wireless channel.[2]

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3. Accident Detection and Victim Status Indicating System:

The enhanced automatic accident identification and victimstatus indicating system consists of microcontroller(PIC16F877) based CPU, Heart rate and heart beat monitoringmodule, SM/GPS module, Body temperature sensor module(LM35), Coma stage status identification module and RS232,USB serial communication devices to interface the systemwith the LabVIEW environment to evaluate the parameters arein normal or abnormal and also utilized to monitor and displaysame. LabVIEW will also ensures the communicationestablishment between the microcontroller system andconfigure the GSM interface module to transmit the requiredinformation to the nearest critical care centers and also themobile phone numbers which are preferred by the user tointimate instantly.

This is used to identify the accident occurrence and to detect the victim's status. The microcontroller based system hardware has been developed to acquire the various parameters such as accident location, heart rate and beat, body temperature, and coma stage status at accident occurrence spot and the same data have been transmitted to the LabVIEW software to analyze and indicate the physiological status of the victims. The same data and analysis report will be transmitted to the mobile phoneswhich are in emergency care center andphone numbers for which the users would like to send the intimation.[3]

PROPOSED SYSTEM

From all the above study there are different kind of technologies that are present for the accident detection among them enhanced accident detection and victim analysis is most preferable even though there are few more feathers to be added. Prevention is better than cure. So a system that has pre analysis about the driver can prevent the accidents. Fig 1 represents the modified operation flow of Accident Identification system for Indication of Victim Status. In order to do this system should have alcohol detector and by using alcohol sensors sensing of drunk state of the driver if it is in proper way next seat belt sensing module will come into appearance then it will sense that weather the seat belt is used or not. If all these conditions are ok then vehicle get start.Once vehicle get started GPS system will be continuously monitor for the accident prone area. If vehicle entered into that area it will alert the driver that it is an accident prone area and at the same time like school gone it gives an alert to the driver that to be careful while driving. If an accident is caused then the vibrating sensors that are present in the system get sensed and by using GPS locations is tracked. And then it get try to analyze the condition of the victim that rate of heart beat, coma stage and body temperature by an SMS. Then SMS is sent to emergency center and to an alternative mobile number.

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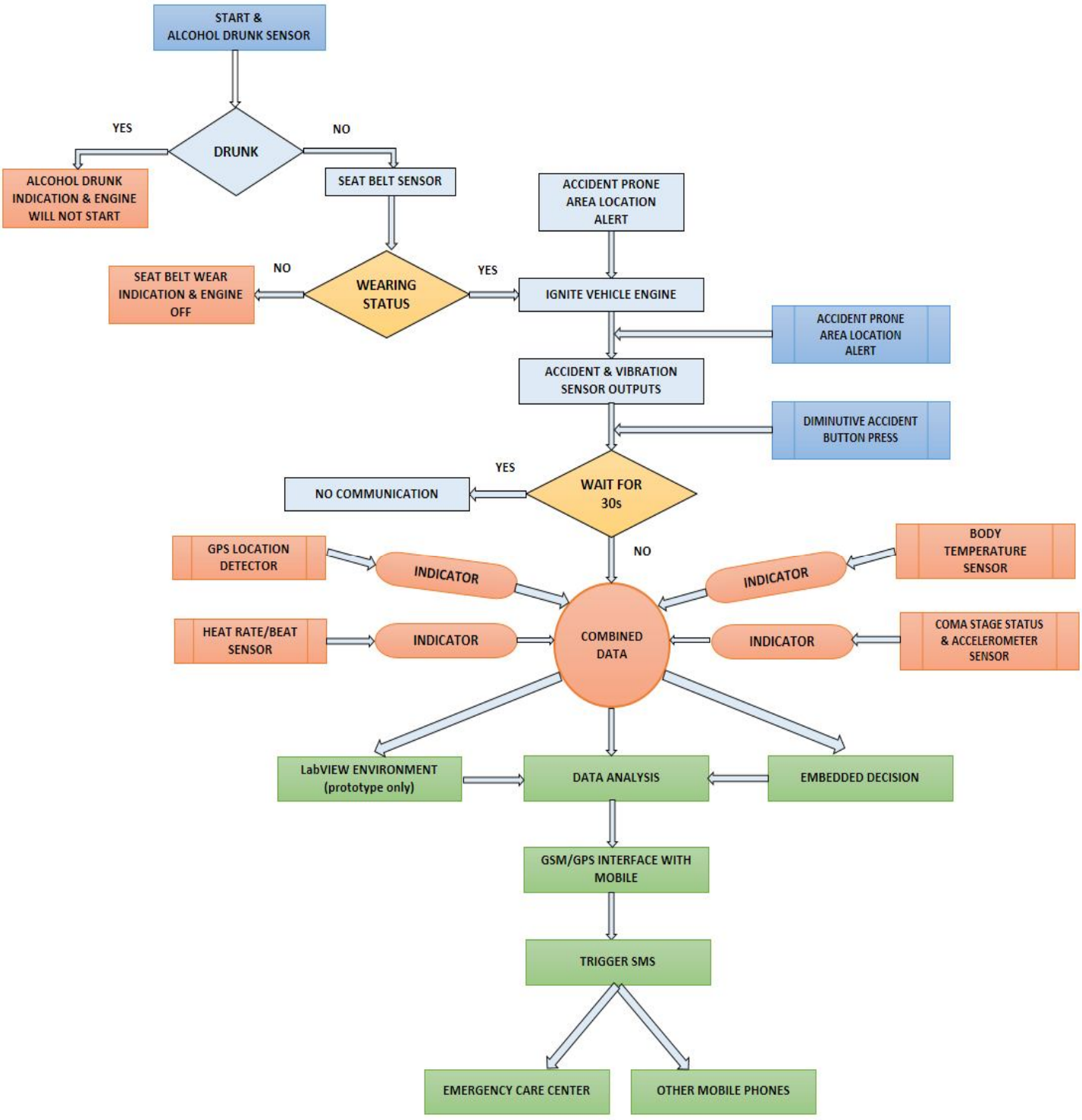

Fig 1: The Modified operation flow of Accident Identification system for Indication of Victim Status

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CONCLUSION

The proposed work is the prototype which has delivered very reliable results of accident identification, location and physiological parameters monitoring and transmission. The entire works have to be integrated with the automobile to validate its functionality and reliability. Thus this work will reduce the accident death ratio in considerable amount even in rural roads. Then it has a great importance in day to day life of the people in the country like India.

The complete integration with automobile, the accident identification module will be fastened with the standard Airbag ECU (Electronic Control Unit). This will optimize the proposed technology to the maximum extent and deliver the best accident identification system. The collision detection algorithm for the ECU of single –point sensing airbag system has enhanced accident detection system to release the airbag provision in the present vehicles. So, the present work will be fastened with this existing system to provide the enhanced and instant result.

Thus this work will provide vital information about the accidents even in unpopulated area. So, the emergence care center could be able to serve to the victims with better efficiency and they could plan to have important first aid kits which have to be brought along with them to the accident spot.

ACKNOWLEDGEMENT

We are overwhelmed in all humbleness and gratefulness to acknowledge our debt to those who have helped and supported us to move this Paper well above the level of simplicity and into something concrete.

We would like to express our heartfelt gratitude and deep obeisance to Dr. R. Sivaram, Principal, St. Mary's Women's Engineering College, Guntur, India, for his inspiration, enthusiastic encouragement and useful critiques of this Paper and we thank our parents for giving support to do this work.

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