PRELIMINARY MEDICAL MONITORING SYSTEM IN AMBULANCE FOR RESCUE OF ACCIDENT VICTIMS

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Abstract - *The motor vehicle population is growing at a rapid rate than the population growth. Road accidents are increasing day by day. Most of the accident death happens due to the lack of immediate medical assistance. We introduce a preliminary medical aid system itself in the ambulance in addition to the accident detection system to reduce the loss of human life due to accidents .The idea behind the automatic accident detection system is to provide a smooth flow for ambulance to reach hospitals in time. But the delay in medical aid also leads to the rise in death rate .To overcome this, here we introduce a preliminary medical checking in the ambulance. An advanced device is added to the proposed system in order to check the patient condition using sensors such as blood pressure sensor, heart rate sensor, ECG sensor and result is send via a message. There by we can inform the specified doctors or the authorized hospitals about the physical condition of the patient.so they can do the necessary as soon as possible.*

Key Words: **Sensor System, GPS, Rescue People, Accelerator, Alert System**

1. INTRODUCTION

Death rate due to accidents are increasing at an alarming rate. Many times an accident goes unnoticed for hours, due to this many life loss. Improving efficiency in health care is one of the most challenging jobs. Sensor, GPS, GSM units implemented in the vehicle detects the accident and the accident location sends to the main server unit which consists the database of all nearby hospitals, but lack of immediate medical assistance also increases the death rate. A facility for providing immediate medical assistance to the accident space will scale back the fatality to a bigger extend. This comes the idea of an alert system that senses the accident and alert its seriousness to authorized hospitals.

Intelligent accident detection has been studied extensively over several years. Research works proposed a model consist of four main units [1].The system identify the location of the vehicle through GPS receiver and send the location information to vehicle owner via SMS. Here, an efficient and low cost alert system is proposed to provide immediate medical aid to the patient by alerting the nearby hospitals and the details of the current physical condition of the patient is send via a message.This system takes the medical condition of the patient using sensors thus the hospital authorities can able to arrange the necessary as soon as possible for the rescue ofpatient.

The proposed system check whether an accident occurs and if it occurred the authorized authorities informed about the accident and physical condition of the accident victim is analysed. Once an accident spot was identified, the GPS in the installed system will check for the nearest hospital and through a GSM module the information is passed to the authorized hospitals[2].Physical condition of the victim is analysed and the results are immediately send to the doctors.

The controller identifies the placement of the accident spot through the sensor systems implemented in the vehicle which identifies the accident[3] [4] and thus the controller provides information to ambulance driver. The ambulance is controlled by the control unit which provide location details to the ambulance driver. This scheme is fully automated, thus it find the accident spot[5].When the patient enters the ambulance, with the help of medical sensors the physical condition analysed and the result are send to the hospital authorities and specified doctors. It will enable the hospital authorities to take immediate action and helping to start the necessary treatment in time.

2. RELATED WORK

There is no such advanced technologies existing today to reduce accident death rate. Many times, the accident goes unnoticed and victims is pleaded for the mercy of others. When accident occurs people does not came forward to inform due to legal issues.so an automatic accident detection system was introduced earlier. But most of ambulances cannot reach the accident spot on time, due to lack of proper communication. Therefore, there is crucial need to provide proper rescue route to ambulance. The GPS installed in vehicle unit helps to reach the ambulance in time. Thus the rescue people can identify the accident spot and do necessary steps. Google has developed application program interface for user's ease. Google Maps gives information about nearby hospitals, with its rating and distance from user's current location. The drawback of Google Maps is that it only pins the hospitals but does not provide any detailed information about the

availability of medical caretakers and their services[6].The proposed system overcomes this drawback and confirms about the accident with the hospital authorities.

But the lack of immediate medical assistance always become an issue. This project has a goal to create a preliminary medical checkup itself in the ambulance. It's a protocol that gives information efficiently about the patient's health including pulse, blood pressure etc. All this is informed to the doctor about the patient's condition This project helps doctors to get information about the victim[7].The delay occurred in noticing accident and unability in providing medical assistance on time increases the chances to loss the valuable life. The importance of communication during the accident times is understood well by this project. Client and rescue application is developed as an android application. Server is implemented as a web based application. The system is tested using various GPS enabled android Phone[8].

3. ACCIDENT DETECTION AND ALERT SYSTEM

The proposed system consist of accident detection system and an android smartphone. The accident detection system will constantly monitor the vehicle and detect whether the vehicle is normal driving posture or has fallen down[9]. When the vehicle is fall down, an alert message is passed to the ambulance owner including the location details. Rescue team rush to the spot immediately. A preliminary medical aid is setup in the ambulance, with the help of advanced sensors the blood pressure and heartbeat rate is checked and result is send to the nearby medical center.

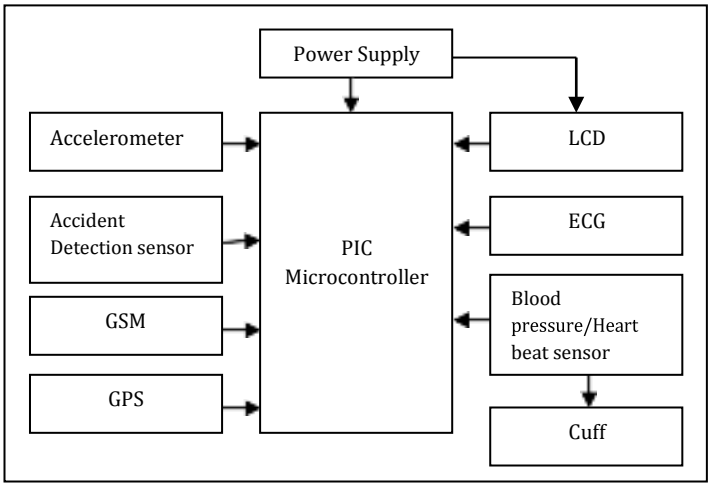

Fig -1: Block diagram of accident detection and alert system

4. SYSTEM FEATURES

The system consists of four main units, which coordinate with each other and make sure that the ambulance reaches the hospital without any time lag and informed the hospital authorities about the seriousness of the physical condition of the victim. The accident detection sensor implemented in the vehicle identifies whether accident occurred or not. When the patient enters the ambulance, with the help of medical sensors, the physical condition analysed and report is send to the hospitals.

4.1 Accident Detection System

The system find out whether accident occurred or not with the help of accident detection sensor. A vehicle which consist of microcontroller along with the accelerometer, GPS, GSM module and sensors to sense the accident. If vehicle is fall down, information about the accident is send to the main server. This information includes the location of accident detected by GPS modules in installed vehicle. The GPS system finds out the exact accident spot and gives information to GSM module[10][11]. There is also provision of avoidance of the accident by using accelerometer, which alerts driver by displaying the position.

4.2 Ambulance Unit

Designed blood pressure and heart beat sensor using a PPG sensor is implemented in this unit. The controller finds the nearest machine to the accident spot and conjointly the shortest path between the machine, accident spot and also the nearest hospital[12].ECG circuit is a combination of different stages of signal conditioning, the differential signal is converted and it passes through low pass filter and high pass filter. In this unit, microcontroller interfaces with blood pressure sensor, heartbeat sensor and ECG sensor. When the patient enters in ambulance, the physical condition analysed and the result is send to the nearest hospital using GSM module.

4.3 Blood Pressure and Heart Rate Sensing Module

This medical sensor has been designed in order to test the physical condition of the accident victim. It is a low cost and open source solution. The heart rate sensing module count the heartbeat to check whether rate is normal or not[13].Automated blood pressure measurements can be valuable tool in collecting and documenting the critical information about the patient health. Here, we use the PPG(photoplethysmogram) sensor which measures changes in blood volume by illuminating tissue and measuring changes in light absorption, which can be determine the heart beat. If we apply pressure on your finger, the blood pressure can be calculate[14].

4.4 Hospital Unit

In this unit, the patients all parameter that we have a tendency to had measured in the ambulance are send to the recognized mobile number. Thus the hospital authorities and the doctors are informed about the physical condition of the patient so that they can take immediate action.

5. FLOW CHART FOR ACCIDENT DETECTION AND ALERTING THE MEDICAL AUTHORITIES

Automatic accident detection, location tracking GPS, sending location coordinates to ambulance, finding exact spot of accident using GPS viewer application, starting of rescue operation and set up for analyzing the physical condition and alerting the hospital authorities are executed.

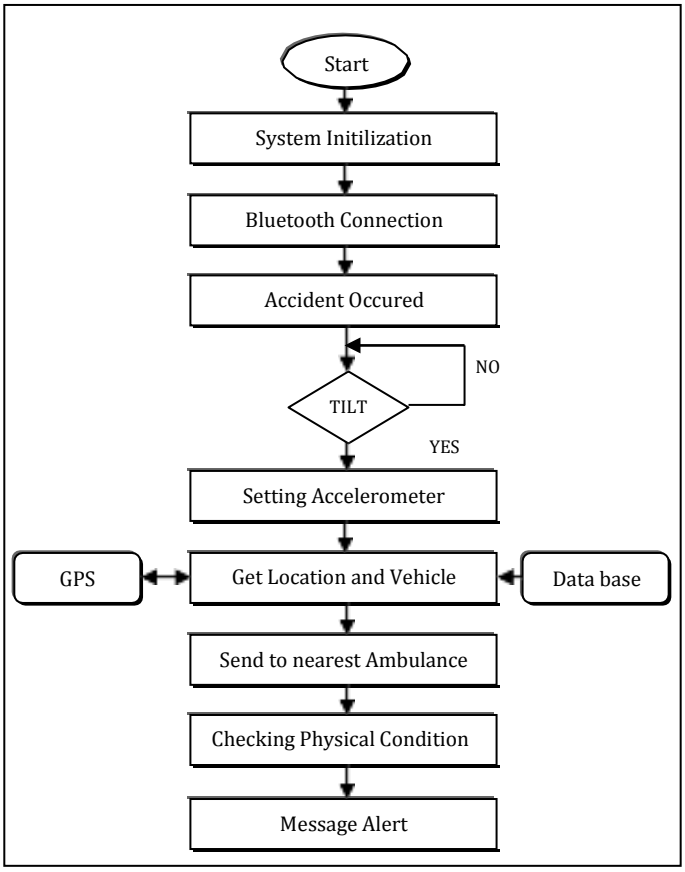

Fig -2: Flow chart of the accident detection and alert system

6. CONCLUSION

The system can detect the accident and alert the nearest medical center as well as it checks the physical condition of the patient and confirms the result to the authorized doctors to provide emergency medical aid to accident victim. Accelerometer are used to determine whether accident had occurred. The communications between the modules are done by using GSM. The system will inform the nearest hospitals through message. Accident detection, alert system and preliminary medical aid service are highly relevant. This system aims at developing a low cost solution for reducing the death rate due to accidents for the benefit of the society.

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