International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 10 | Oct -2016 www.irjet.net p-ISSN: 2395-0072

Automatic Ambulance Rescue and Physiological Parameter Monitoring System

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Abstract - *Now days due to traffic congestion and tidal flow management, increase in Road accidents causes mostly in an urban areas. The existing traffic lights follow the predetermined sequence so the vehicles like Ambulance and fire brigade also have to wait in traffic and waste their valuable time. Delay in reaching the Rescue system can cause the death of a victim. The delay of rescue system is mostly because of the rapid and timely notice from accident spot and/or traffic in the road between accident spot and an ambulance. To implement this we introduce a system called as An Automatic Ambulance Rescue and Physiological Parameter Monitoring System. The main theme behind this scheme is to detect accident, to provide the smooth flow to an Ambulance and to monitor the status of the patient. This system is fully automated.*

Key Words: **AARS, GPS, Zigbee, ECG, Heart rate**

1.INTRODUCTION

There is a loss of life due to the delay in the arrival of ambulance to the hospital. This happens because of two reasons first one is because of delay in notice from accident spot and the second one is because of the waiting of the Ambulance in Traffic Signal. It would be of great use to the Victim if the rapid and timely notice of the accident from accident spot to the Ambulance will be there and also it would be of great use to the ambulance if the traffic signals in the path (i.e. from ambulance unit to accident spot and from accident spot to hospital) are ON. Thus we propose a new system for automatically detection of an accident from the accident spot to the ambulance and automatically controlling the traffic signals so that the ambulance would be able to cross all the traffic signals without waiting and achieves a smooth flow. Every traffic junction will have a controller unit and a transceiver modem (like Zigbee modem) The controlling is done by the server unit by sending the control signals or messages. When a traffic signal is controlled and it is made to be green for the ambulance to pass through traffic signal without waiting.

2. METHADOLOGY

The proposed system is the rescue system using zigbee and GPS modem working will be made in following steps: The accelerometer will first sense the occurrence of accident and relatively gives the output to the microcontroller in the vehicle unit. If the voltage level of accelerometer is above threshold level then the accident is occurred, microcontroller turns ON the buzzer for 60 seconds. If buzzer is not switched OFF in 60 seconds then the GPS location of vehicle unit from GPS module will send to the server along with the message "accident occurred".

Using zigbee module the server receives the GPS location of vehicle unit. Server will already have the GPS locations of ambulances. By using both these locations server selects the nearest ambulance to the vehicle unit and sends message to go to the spot to the selected ambulance. In this state the server makes this ambulance as a busy state from Free State.

Server will have the database of traffic signal unit. All these traffic signal units have the microcontroller and zigbee transceiver. When an ambulance is near to the immediate next traffic signal then the server make it ON (i.e. Green) by sending the message to that traffic signal unit and it achieves the smooth flow to go.

When ambulance reaches to accident spot the victim is received in the ambulance. Now monitoring of physiological parameters like Heart rate, ECG, and Temperature of victim will be takes place using sensor unit present in ambulance and send continuous status of victim to the server. All the parameters are displayed on server side.

When ambulance reaches to hospital server will be intimated as ambulance reached to the hospital and now the server makes this ambulance as a free state from busy state.

2.1 SYSTEM ARCHITECTURE

Our system consists of four main units Vehicle unit, Main

unit, Ambulance unit and the Traffic signal unit. The figure1 given below shows the block diagram of an Automatic ambulance rescue and physiological parameter monitoring system.

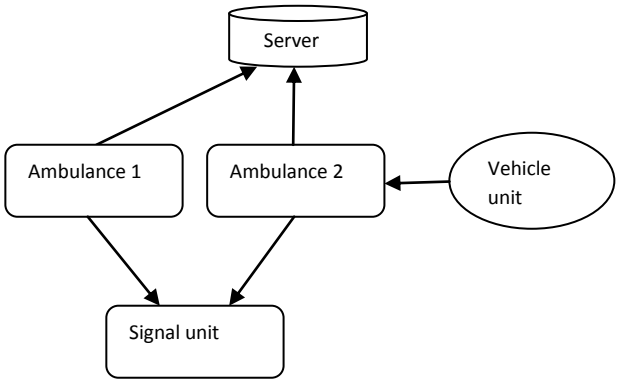

Fig 1: Block Diagram

2.2 VEHICLE UNIT

According to our system every vehicle should have vehicle unit. The vehicle unit is consists of accelerometer, controller, buzzer, user interface, Transceiver as shown in figure 2. If an accident is occurred to the vehicle which is sensed by an accelerometer then the buzzer and the timer will turn ON in the vehicle unit. If the victim is not critically ill or not that much serious to call the Ambulance then the victim will turn OFF the buzzer of vehicle unit. The victim should have to turn OFF the buzzer before the timer turns OFF.

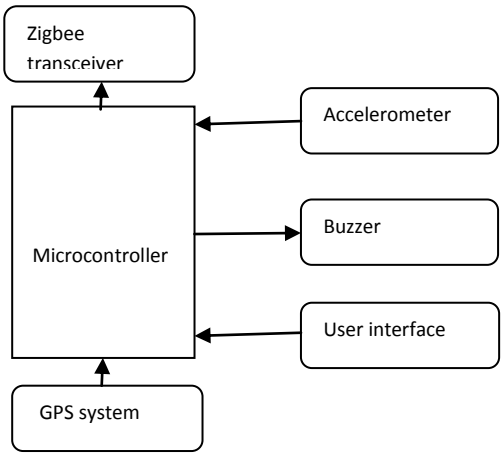

Fig 2: vehicle unit

If the victim is critically ill then he/she will not turn OFF the buzzer. When timer gets OFF, the appropriate message will send to the Ambulance unit through Server to call an Ambulance.

The message will contain the data like location of the vehicle unit (latitude, longitude by GPS modem), the unique number of vehicle unit.

2.3 MAIN SERVER UNIT

The main server unit is the central brain of our system. It is the unit in which controlling of all units of the system will be done and there is the communication between main server unit and all other units will be takes place. Main server unit maintains the database of the Ambulances which are busy and which are free and also maintains the database of locations of traffic signals. When location of vehicle is received at the main server then it locates the nearest and free ambulance for it.

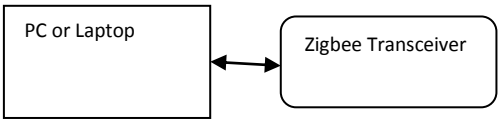

Fig 3: main server unit

Server sends the information of the vehicle unit and nearest hospital to the ambulance. The next task of the server is to communicate with the traffic signal units and give smooth flow to the ambulance. When victim is received in an ambulance then continuous monitored data of physiological parameters like ECG, heart rate, body temperature etc of patient will be received at the server unit. With the help of this information the pre planning of the medicines and the instruments can be done in a hospital.

2.4 AMBULANCE UNIT

The ambulance unit is consists of GPS system, zigbee transceiver, controller, sensor unit, LCD display and buzzer. Sensor unit is consists of ECG, heart rate and temperature sensors used for monitoring of the physiological parameters of the patient. When an ambulance have a task from the server it receives the location of vehicle, location of hospital it also have the location of itself. With the help of this information it will be reach to the destination. When the patient is received in the ambulance the sensor unit is attached to the patient and continuous monitoring of the patient will takes place. This monitored data is then sends continuously to the server by an ambulance unit.

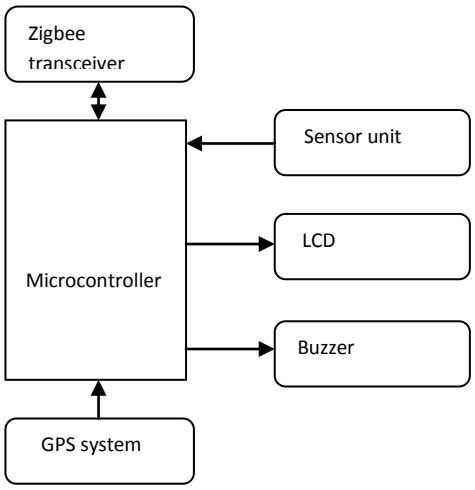

Fig 4: Ambulance Unit

2.5TRAFFIC SIGNAL UNIT

It is the unit which is placed on a route. It consists of a controller, GPS system, zigbee transceiver.

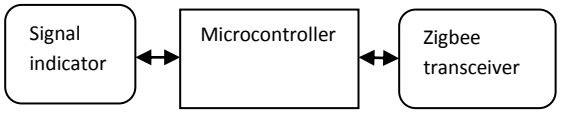

Fig 5: TRAFFIC SIGNAL UNIT

When an ambulance is near to the immediate next traffic signal unit then that signal is made ON (green) for the smooth flow to the ambulance. This mechanism gives ease of movement to ambulance in traffic and need not to wait in golden hours of a patient.

RESULTS

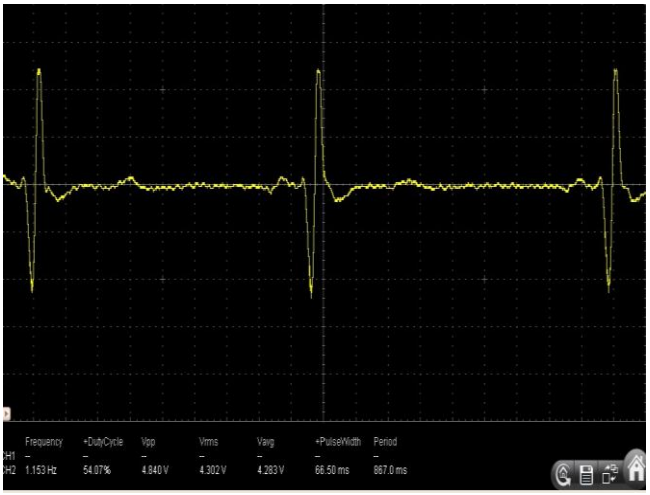

Fig 6: ECG Waveforms

The fig 6 above shows the result of output waveform of ECG sensor unit.

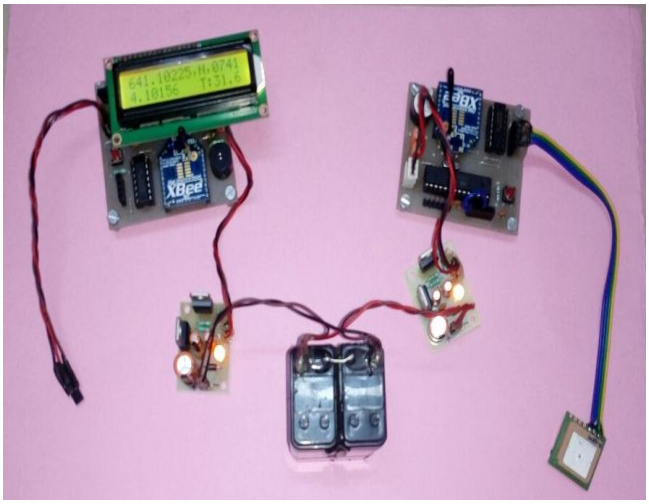

Fig 7: Output display of GPS module and Temperature sensor

The fig 7 above shows the results of output display of GPS module and Temperature sensor units.

3. CONCLUSION

The aim of the paper is to give an overview of vehicle accident detection, provide smooth flow to an ambulance and monitoring the physiological parameters of the victim. Using this system the delay in reaching hospital of the victim can be minimized and loss of life of the victim can be minimized in their golden hours. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy. This system is verified to be highly beneficial for not only to the ambulance but also to the authoritative vehicles and also to the automotive industries.

ACKNOWLEGEMENT

We are extremely grateful and remain indebted to our guide **Prof. Yuvraj Patil** and head of department **Prof. Nigvekar** for being a source of inspiration and for their constant support. We are thankful to them for their constant suggestions, which benefited us a lot while developing this project paper "**Automatic ambulance rescue and Physiological parameter monitoring System**".

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