Intelligent Ambulance with Automatic Traffic Control

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Abstract – With a large population and large amount of vehicles there is also a big trouble of car accidents or road accidents, and with these overcrowded roads there is a problem of delay in first aid service. To overcome this delay in first aid service this paper describes a solution that is "Intelligent Ambulance with Automatic Traffic Control" which includes the accident detecting, alerting and tracking mechanism with automatic traffic light controlling system such that the ambulance can achieve a free way in order to provide the first aid to patient as fast as possible. Here we also have a patient monitoring system. In health monitoring system, the patient's vital health parameters such as heart rate and body temperature is measured. These parameters are sent to a PC in ambulance via serial communication and this data will be sent to the hospital server. In traffic control system an RF transmitter on the ambulance will communicate with the RF receiver mounted on the signal post. An algorithm is used to control the traffic signals automatically based on the key pressed by the driver from keyboard in the ambulance. The information reading the current as well as future location of ambulance is sent from the ambulance itself. This information is used to optimally control the traffic.

Key Words: Intelligent Ambulance, automatic accident detection, microcontroller, Traffic Control System , Health monitoring system

1. INTRODUCTION

These days with the increase in the population and due to luxurious living there is an increase in the traffic on roads. Amidst all these frenzied life, one forgets the importance of human life .This is a very serious problem even in case of road accident one even doesn't care to call the emergency unit. On road due to high traffic people are unable to provide the free way to the emergency unit which also becomes one of the factors of late first aid to the patient due to which one can die on the way to hospital. So to overcome their negative factors and to provide the first aid to the victim this system - "Intelligent Ambulance with automatic traffic control" is proposed in this paper. This paper describes the working of accident detection and immediately alerting the emergency ambulance unit about the accident with the location co-ordinates, receiving such co-ordinates the ambulance unit or so called emergency unit respond immediately and leaves for the accident location. now while moving toward the location or while taking the patient to the hospital their may or may not occur some traffic so in order to free or release the traffic the intelligent ambulance controls the traffic light itself such that the traffic light converts in a manner so that it could receive the free way to the hospital. Intelligent ambulance also have some extra features such as while in the way to hospital before providing the first aid to the patient one can detect the patient health status like monitoring the fever or pulse rate so that the patient can get the correct first aid treatment and can save his life.

2. BLOCK DIAGRAM

The following emergency system is the combination of accident detection system in which the accident location is send to hospital emergency unit and automatic traffic control system which controls the traffic light and the health monitoring system which monitors patient health before first aid. This all is done by Atmega 16 microcontroller [1].

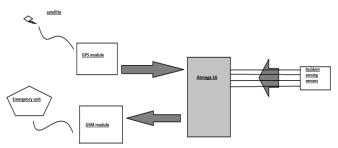## 2.1 Accident Detection and alerting System

Figure 1: Block diagram of Accident Alerting Mechanism

- ATMEGA 16 Microcontroller
- GPS
- GSM
- Sensors (pressure, vibration etc)
- Emergency unit
- Satellite

2.2 Traffic Control System

Figure 2: Block diagram of traffic control system

- Micro-controller ATMEGA 16
- Led(red, yellow, green)
- Seven segment
- Tshop sensor
- Sound sensor

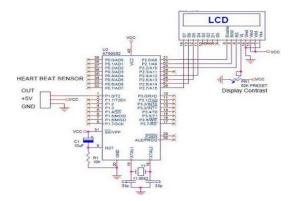## 2.3 Health Monitoring System

Figure 3: Block diagram of health monitoring system

- Heart Rate
- ATMEGA 16
- Microcontroller
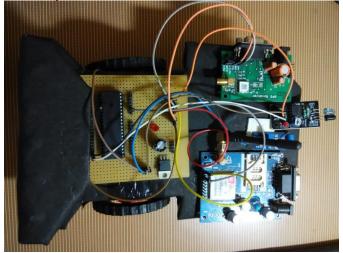- Hospital
- LCD
- Body
- Temperature

3   Working

The whole system is developed for the providing the first aid facility to the patient in case of emergency an early stage.
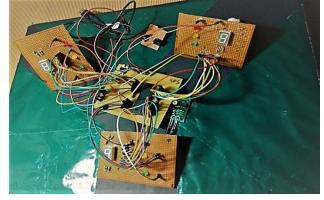
3.1 Accident Detection system

Here once any accident take place, the equipment built in the system itself detect the accident with the help of different sensors [2] such as Ir sensor, vibration sensors etc. On sensing the accident the system (micro controller) [3], which is continuously receiving the Gps co-ordinates send the message alert to the concerned authority about the accident.

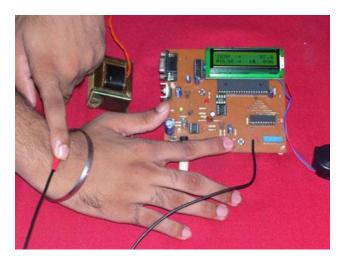
3.2. Automatic traffic control

On the way to the accident spot or to the hospital ambulance may or may not stuck in traffic jams. Since we are living in society with massive population and with heavily crowded roads, So to overcome this traffic jams or to take the patient to hospital at early this system helps a lot. Here the ambulance itself informs the nearby traffic light about the incoming of ambulance with the help of Ir led and ambulance buzzer. Traffic lights with the Tshop sensor and the sound sensor converts its light pattern in such a way that the ambulance can get the free way to reach the hospital.

3.3 Health monitoring system

- Heart rate

At this point, very little work has been done to systematically identify which biomedical signals (and signal qualities) actually are necessary for specific telemedicine procedures in EMS. More research directed to the aspect of signal delay would drastically improve the support a telemedicine system can offer to a physician who has to decide for a treatment method that heavily relies on the availability of

biomedical signals within a certain maximum delay; this very specific maximum delay then defines real-time for the case at hand, which can automatically be assessed by the telemedicine system.

The activity of the heart is characterized by rhythmical contractions of ventricles and atria, allowing the oxygenation of the body organs. This regular functioning is due to electrical impulses that stimulate the muscular mass of the heart cavities to contract. With the passing of time, the cardiac activity can suffer from possible faults .Heart rate measurement gives the rate at which blood is pumped from the heart per minute by human cardiovascular system. This technique demonstrates how to measure the heart rate by sensing the change in blood volume in the finger blood vessels. It consists of an infrared LED that transmits an IR signal through the fingertip of the subject, a part of which is reflected by the blood plasma. The reflected signal is detected by a photo diode sensor. The changing blood volume with heartbeat results in a train of pulses at the output of the photo diode, the magnitude of which is too small to be detected by a microcontroller.

- Body Temperature

IC LM35 is used as a temperature sensor with an output voltage (10mV=1°C) linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range.
Figure 5: Result of Temperature Measurement

4 CONCLUSIONS

In this paper, a system is described which will continuously monitor the patient's health parameters and simultaneously will control the traffic signal in case is any accident or emergency is discovered all by the emergency unit basically performed by emergency ambulance. If the doctors do not have sufficient medical history of the patient, they may not be able to give proper treatment to the patient. This system tries to prevent just that. In health monitoring system, the patient's vital health parameters such as Heart Rate and Body Temperature are monitored. This information is sent to the hospital for analysis.

Many traffic control systems propose an autonomous solution which does not consider the future path of the ambulance. In this paper, the traffic control algorithm considers the current & destination location of the ambulance to control the traffic lights. This will help in optimization of the time taken by the ambulance to reach the hospital. Also, the monitoring of the patient will help the doctors to give him the necessary treatment for the time being. A network between consecutive signal posts may be established to control high intensity traffic. A possible re-routing feature can be added based on traffic density, by establishing a dialogue between the ambulance and the signal post.

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