

# Automatic Rescue System for Ambulance and Authoritative Vehicles

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## ABSTRACT

The traffic congestion in urban areas can't be controlled beyond a limit. But the death rate occurring due to the delay in traffic can be controlled to an extent. This can be achieved with the help of "AARS using GPRS 3G TECHNOLOGY". Through this, we can provide a smooth flow for the ambulance by controlling the traffic light according to the ambulance location to reach the hospital. The location of the ambulance can be easily identified with the help of the GPS unit installed in it. A controller in the traffic junction can automatically control the traffic flow and thus reduces the time delay taken by ambulance to the hospitals. The traffic junction and the ambulance will have GPRS 3G modem to communicate between them. The chances of misusing the ambulance can overcome with the help of an RFID tag given to the doctor's in the respective hospitals so that the security can be attained.. This scheme is helpful for the Traffic police to control the traffic thereby helping the patients who are facing emergency.

Keywords: AARS, GPS, GPRS, RFID

## INTRODUCTION

Emergency occurs anywhere at any location, at any time, and in various ways will make one at risk. These situations require a speedy response. So it is very crucial and important to establish direct, fast and efficient software without delay. With the increasing number of population in the metropolitan areas already existing problem of poor traffic congestion has grown to an alarming event.

This problem has to be properly analyzed and the appropriate measures have to be taken. Often rural areas are devoid of the traffic congestion. The proper care is to be given to the urban areas mainly focusing on to the metropolitan cities. Even if each and every vehicle passing through the traffic has its own need, the prior importance is given to the Ambulance and other emergency vehicles which needs to wait longer time on the traffic thereby increasing the probability of risk. Transportation of a patient to hospital in emergency seems quite simple but in actual it is pretty difficult during peak hours. Optimum utilization of the time after an accident is actually the golden hours as a measure of effectiveness of an emergency response service provider system. Recovery action should be taken immediately without any time lag.

The older Technology uses the concept of AARS with GSM but it has several drawbacks such as lower data transmission, maximum site range of 35 km and SMS transmission speed is only about 6 to 10 SMS per minute.

In addition to this, in the case of giving prior importance to the ambulance and other emergency vehicles, their chances of misusing the vehicles by some people for their own benefit is very high. In order to tackle these problems, this paper has come up with a proposed system using the advanced GPRS 3G Technologies for faster data transmission and RFID for security purposes. With the help of this Intelligent Transportation System integrated with the GPS and the GPRS 3G, the current scenario of traffic congestion can be solved to an extent.

## AUTOMATIC RESCUE SYSTEM

The system uses 2 microcontrollers and the GPS installed in Ambulance identifies the latitude and longitude of the particular place thereby finding the location of the ambulance unit.GPRS 3G Modem installed in the ambulance and the traffic junction helps to communicate with each other at a greater speed and at greater coverage . Initially, the mode is set the by using MODE switch. MODE switch is used to indicate whether the situation is critical or not.

In order to achieve the security we are using an RFID tag RFID is used to identify a person in a secure access system. In RFID or Radio Frequency Identification there is a tag which has a unique ID stored in it. This RFID tag will be given to the respective hospital authoritative and when they enter the Ambulance, the tag must be shown to the RFID reader. When a tag is brought near the RFID reader, it tries to communicate with the tag , receives the data and decodes it and later the password has to be typed using Keypad. If the Password is correct the person is granted access and after the verification the Microcontroller in ambulance sends GPS value to 2nd Microcontroller via GPRS-3G Modem.

The second Microcontroller after receiving compares the GPS value in PC via RS232 in control room. If the GPS value is nearby indicating that the ambulance or the emergency vehicle is near to the traffic junction, then the corresponding signal in traffic is green for the Ambulance to pass through without waiting. Alarm is ON for indicating that the Ambulance is in a nearby location.

In order for the GPS to work, a network of satellites was placed into an orbit around the planet Earth, each broadcasting a specific signal. This signal can be achieved by a low technology aerial.

LCD Display is used for Displaying the Status of the Processing. An LCD consist of two glass panels , with the liquid crystal material sandwiched in between them. LCD doesn't generate light and so light is needed to read the display. Driver circuit is an electrical circuit used to power the LCD.

The 'AUTOMATIC RESCUE SYSTEM FOR AMBULANCE AND OTHER EMERGENCY VEHICLES' consists of 2 main units which co-ordinates with each other and makes sure that the Ambulance reaches the hospital without any delay.

The system comprises of the following units.

- 1) Ambulance unit
- 2) Node circuit (Traffic junction)

The GPS installed in the ambulance unit senses the location of ambulance and sends it via GPRS 3G Modem to the pc in Control room and if the value is matched, it is sent to the Traffic unit to make the signal green ensuring that the Ambulance reaches the traffic without any Time delay ,shown in fig 1

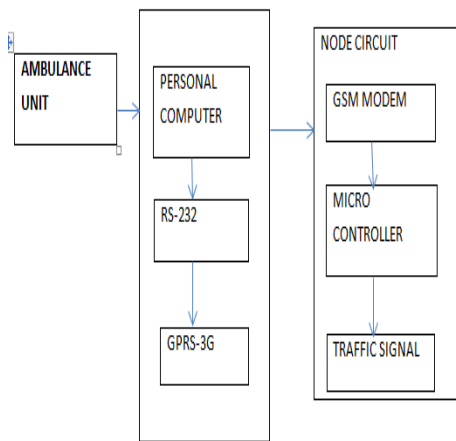


Fig 1 : Automatic Ambulance Rescue System

I) AMBULANCE UNIT

The ambulance unit comprises of RFID Tag, RFID reader, Signal Control Unit, Mode Switch ,Keypad, LCD Display, GPS and GPRS 3G and it is shown in Fig 3.

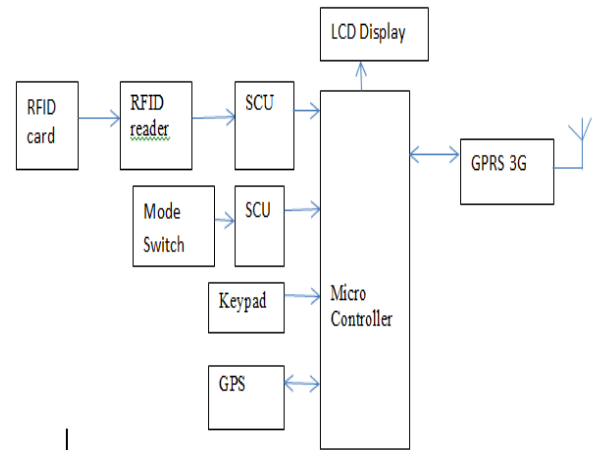


Fig 2 : Ambulance Unit

The diagram shows the ambulance unit in which initially verification process is done for ensuring the security and protection. The RFID tag is given to the appropriate hospital authorities for ensuring the security. The RFID tag has to be shown to the RFID card reader within the ambulance unit. RFID is used to identify a person in a secure access system.

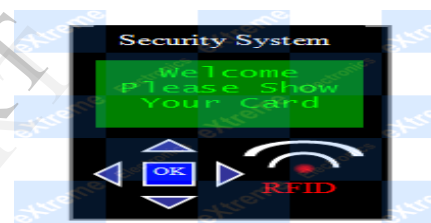


Fig 3: Security system of RFID

As soon as the RFID Tag is brought near to the system it recognizes the person and grant access to the them.

Later the vehicle will move after ensuring the security process. The keypad consists of 5 switches which are used to edit password if needed. The mode switch operates in normal mode and emergency mode. It can be used according to the situation. The signal conditioning unit accepts input signals from the analog sensors and gives a conditioned output of 0-5V DC corresponding to the entire range of each parameter. GPS system finds out the current position of the vehicle (latitude and longitude) and sends the sensed location of ambulance to the microcontroller and it sends the information to the Traffic unit via GPRS 3G Modem.

II) TRAFFIC UNIT

The second module of the Rescue system is shown in Figure 4.

The GPS value from the Ambulance unit is compared with the pc in the control room. PC

contained the database containing the GPS values of different locations.

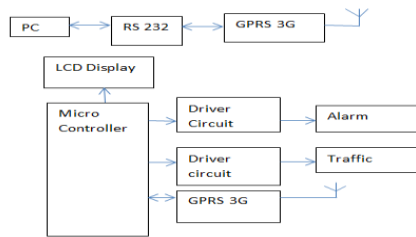


Fig 4: Traffic Unit

If the value is matched, it is sent to the microcontroller for controlling the node and it is then sent to the Driver circuit. Alarm is on for indicating that the ambulance is nearby. Then the signal is made green for the Ambulance to pass through

This paper helps in clearing the traffic for the ambulance to pass through without any delay by making the traffic signal green. But there may be some situations in which the route to the destination is heavily congested due to a large number of vehicles (around 50 vehicles) jam-packed in the road. In such cases, the GPRS-3G provides a smooth way to tackle the problem by installing a device which could monitor the traffic junctions in a city or a place so that the ambulance can easily view the heavy block in the nearby junction and can deviate from the normal path without getting into the heavy traffic. Through GPS Navigation System, we can know the different paths available to the Hospital ,distance taken for each way and the shortest path between the available alternatives. This can be clearly illustrated with the following example

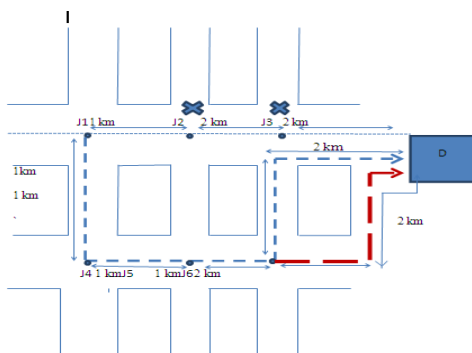


Fig 5: Proposed Idea

J1, J2, J3, J4, J5, J6 - Junctions

- Way 1      - - - - -
- Way 2      - - - - -
- Way 3      - - - - -

Destination :

Traffic Congestion :

From Fig 5, let us consider 6 junctions.

Assume that the ambulance is in Junction 1. To travel to the destination in the straight path, the vehicle has to cover 5 kms. Now through the monitoring device, the driver finds that the junctions 2 and 3 are with a traffic jam. Now, PS Navigation System in the ambulance can be used and this unit provides different paths, their distances and the shortest paths of the available ways in an order. It showed the 2 paths available to the Hospital. One is represented by the dash line and the distance is 6 kms. The other way by long dash line and the distance is 7kms. At this time, the drive can choose the first path from the two paths available since it is the shortest. Thus the occurrence of crash can be avoided through the proposed idea.

**SIMULATED OUTPUT**

The ambulance starts only after ensuring that the authoritative person is granted access by matching the ID of the RFID tag with the already stored reader’s database.

The program to perform this task is compiled using AVR studio4. The proposed system is designed in the proteus ISI. After compilation, the result is displayed as shown below in Fig 6

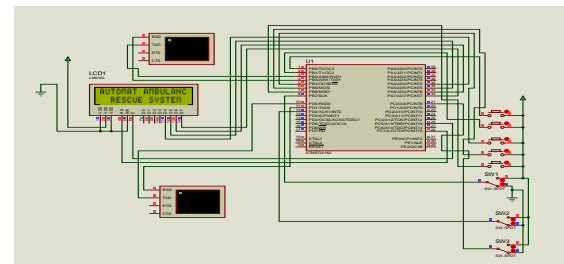


Fig 6 : Stimulated Output

**RESULT**

The model of our ITS is developed partially to some extent. Considering the cost and time constraints the ambulance unit and traffic unit have been developed and we are in process of linking the traffic unit and pc.

The Fig 7 shows the ambulance unit consisting of GPS module which tracks the position of ambulance all the time. This unit has 5v dc microcontroller which stores the actual coordinates of the locations (1km marking and the traffic signal unit). When the GPS coordinate matches with stored coordinates, it is said to have reached that place, and

then a signal is sent to the traffic unit (shown in Fig 8).The GPS receiver has a resolution of 3m and transmits the data serially at a baud rate of 9600bps.The LCD HD44780 is installed in this unit to continuously display the positional values of the ambulance.

The table 1 shows the range of GPS values of 1km marking and the traffic signal node which is stored in the ambulance unit controller and compared with its location continuously.

S.NO	LAT (STORED)	LONG (STORED)	LAT (ACTUAL)	LONG (ACTUAL)
1	7936.3400-7936.3450 (START)	07958.4404 (START)	7936.3424	07958.4404
2	7936.3568-7936.3600 (STOP)	07958.4500 (STOP)	7936.3577	07958.4500

Table1: showing GPS coordinates of stored and actual value.

The main modules of this paper are the Ambulance and Traffic units.It can be designed cost effectively and if implemented in real time,can save thousands of lives.



Fig 7: The Ambulance unit

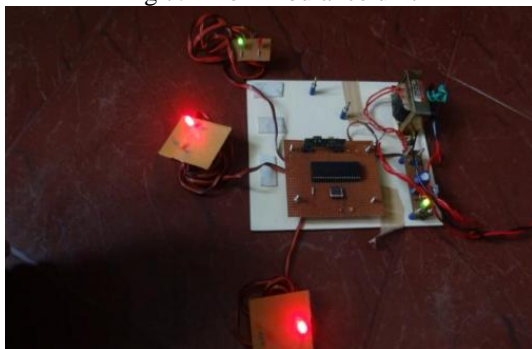


Fig 8: The traffic unit

In the traffic unit(Fig 8), the above matched GPS coordinate value is send to controller for controlling the node and it is send to the driver circuit which in turn adjust the pitching of sound produced by alarm. When the data received is 0,it operates in normal mode and when 1 is received the alarm is ON for Indicating that the ambulance is nearby. Then then signal is made green for the ambulance to pass through. When 2 are received, it returns again to normal mode.



Fig 9: GPS module displaying latitude and longitude values

Fig 9 shows the GPS module showing the cordinates.when the longitunde and latitude values are retrieved from it and displayed in the LCD by the controller.

## CONCLUSION

A new system was developed with the advanced technologies including the GPRS-3G and RFID which may proceed the ambulance to pass through the traffic without any time delay in the junction or node. This novel idea can be used for controlling the traffic signals in emergency situations so that even if there is congestion in junction we can handle it very easily. As GPRS 3G is used it can have a greater coverage up to 1 km and the transmission rate of data will be higher.

## BIOGRAPHY

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