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Vehicle rescue system for medical emergency

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Traffic problems, Emergency patient, Rescue System, GPS, ITS, Central unit

A B S T R A C T

Accident due to traffic problems, lot of crowd of people and vehiclesc and flow management were recognized as a big problems all over the areas, which have caused problem for the ambulance which carries the emergency patient. So that road accidents not in the city but also in villeges have been increased and loss of life due to the accidents is even more crucial and not measurable. So as a human being to avoid this we introduce a scheme called as VRSME (Vehicle Rescue system for Medical Emergency). The main aim behind this scheme is to provide a smooth flow for the ambulance to reach the hospitals without time lag and thus minimise the problems. The idea behind this scheme is to implement an Intelligent Transportation System (ITS) which would control mechanically the traffic lights in the path of the ambulance. The ambulance is controlled by main server which is the central unit or brain or our system and ambulance controls the traffic signals, thus reaching to the hospital safely. The server also determines the location of the accident spot through the sensor systems and GPS (Global Positioning System) in the vehicle which encountered the accident and thus the server walks through the ambulance to the spot. To save the life this scheme is fully automated for detecting the accident sopt, calling the ambulance, and easily pass through all the traffic signals and patient become safe.

Introduction

Today we have seen there are many cases of loss of life. These mostly due to road accidents, heavy crowd so that delay in ambulance service. So situation is very danger for all lives and this delay is due to waiting of ambulance in traffic signals. Thus we propose a new design for traffic signals and ambulance, so that all the traffic signals

in the path of the ambulance are ON at the time of arriving of the ambulance. Each and every traffic signal is having controller. With the help of controller we can automatically controls every traffic signals. With the help of RF transmitter and RF receiver we can control the traffic signals in the path of ambulance. Thus using the database of GPS the ambulance is guided to the hospital by server through shortest route and achieving the above mentioned task so that the ambulance would be able to cross all the traffic junctions without waiting and reach to the hospital without time lag and patient become safely handed to the hospital.

Intelligent ambulance rescue system

Our system consists of four main units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time lag [1]. Thus our system is divided into following four units,

- The Vehicle Unit
- The Main Server
- The Ambulance Unit
- Traffic Junction Unit

The vehicle unit installed in the vehicle senses the accident and sends the location of the accident to the main server. The main server finds the nearest ambulance to the accident spot and also the shortest path between the ambulance, accident spot and the nearest hospital using GPS. The server then sends this path to the ambulance. Also using this information the server controls all the nodes in the path of ambulance and make it ON by using the RF Transmitter and Receiver which ensures that the ambulance reaches the hospital without delay [1]. The architecture of this system is shown in figure.1

Vehicle unit

According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, controller, a user interface, GPS system and a GSM module. The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle [2]. The sensed data is given to the controller

The controller compares it with a threshold value which is an empirical value (for an accident) and if it equals or exceeds that, then the controller automatically trigger both the GSM MODULE and the GPS SYSTEM inside the vehicle [1]. The GPS SYSTEM finds out the current position of the vehicle (latitude and the longitude) which is the location of the accident spot and gives that data to the GSM MODULE. These values are taken with respect to North and East directions. The GSM MODULE sends this data to the MAIN SERVER whose GSM number is already there in the module as an emergency number. The vehicle unit is shown in the figure 2.

Main server

The main server is the central brain of our system. It communicates as well as controls every part of the system [4]. The server objectives can be mainly classified into:

Finding the nearest ambulance to the accident spot
- sending co-ordinates to the ambulance

A. Finding the nearest Ambulance to the accident spot. When a vehicle meets with accident, it immediately sends its GPS location to the Main server. The server maintains a database of the ambulances available. The server selects the nearest ambulance to the accident spot using the database containing the details of free and

busy ambulances at that point of time. Then the server scans the locations of the free ambulances in the database [3]. Therefore for performing the above functions, the server must have the following databases:

- An Ambulance database - contains list of free and busy ambulances at that time.
- A Hospital database - containing their locations (GPS coordinates) with their GSM numbers.

With the help of latitude and longitude Main server can find the nearest hospital in that area and send the ambulance of that hospital.

GSM modem

GSM (Global System for Mobile communication) is a digital mobile telephony system.

With the help of GSM module interfaced, we can send short text messages to the required authorities as per the application. GSM module is provided by sim uses the mobile service provider and send sms to the respective authorities as per programmed. This technology enable the system a wireless system with no specified range limits.

GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

GPS modem

The GPS (Global Positioning System) smart receiver features the 16 channels .Ultra low power GPS architecture. This complete enabled GPS receiver provides high position, velocity and time accuracy performances as well as high sensitivity and tracking capabilities.

Benefits-

- Ultra low power consumption
- Easy and fast to install
- Superior urban canyon performance
- Low cost with high performance

RS 232

RS 232 IC is a driver IC to convert the µC TTL logic (0-5) to the RS 232 logic (+-9v).Many device today work on RS 232 logic such as PC, GSM modem , GPS etc. so in order to communicate with such devices we have to bring the logic levels to the 232 logic (+/-9v).

Ambulance unit

The ambulance unit has ARM Processor and a GSM MODEM for transmitting data to the Main Server [1]. Here we are using the temperature and pulse rate sensors to measure the various parameters of patient.
Also ambulance system having LCD to display the output or to debug the system module wise in case of system failure in order to rectify the problem.

Temperature Sensor

Temperature sensor is used to sense the temperature. We have used a Temperature sensor called LM35. This temperature sensor can sense the temperature of the atmosphere around it or the temperature of any machine to which it is connected or even can give the temperature of the human body in case if used. So, irrespective of the application to which it is used, it gives the reading of the temperature. The LM35 series

are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

Temperature sensor is an analog sensor and gives the output into form of analog signal. This signal is feed to ADC which will convert it into digital form. Once converted into analog form, the microcontroller can process the digital temperature signal as per the application.

Pulse rate sensor

The pulse rate sensor is basically used to keep track on the pulse rate of the person. In programming the maximum and the minimum point are provided for the pulse rate. If the pulse rate goes below or above the set point then the alert will be immediately issued by the microcontroller.

Signal system

Figure 4 Shows the signal system which consist of RF transmitter and Receiver. Here we have linked the ambulance unit and the traffic junction using a RF transmitter.

When Ambulance reaches to signals and if heavy traffic is there and RED signals are ON from ambulance side. At that time immediately the traffic signals are made to be green with the help of RF Transmitter and RF Receiver [1]

The GPS receiver have an 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 traffic junction has RF receiver which receives the signal (START signal) which makes the junction to work in ambulance mode. When the ambulance crosses the junction it again sends a signal (STOP signal) to the junction which again comes back to the normal mode.

This unit consists of a RF receiver which also works at 433 MHz. The junction operates as per the data transmitted by the ambulance unit. The data received by the RF receiver is transmitted to the controller at the rate of 3kbps. When the data received is 0, it operates in the normal mode. When 1 is received, the traffic signal shifts to ambulance mode and the particular direction is made green. When 2 is received, it return backs to normal mode.

ITS system provides an efficient means for the transportation planning with many advantages.

RF Transmitter and Receiver

We are using Encoder IC(HT12E) in RF Transmitter Section.

Similarly in RF receiver section we are using Decoder IC(HT12D).

The HT 12E Encoder ICs are series of CMOS LSIs for Remote Control system applications. They are capable of Encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally trinary programmable if bonded out.

The HT 12D ICs are series of CMOS LSIs for remote control system applications. This ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium

and gives output to the output pins after processing the data.

Results and Discussion

The model of our IARS is developed partially to some extent. Considering the cost and time constraints the vehicle unit, ambulance unit and the traffic junction have been developed and also we have just created a database using visual basic in pc and we are in process of linking together the ambulance unit and the server. But for the pro-totype model we have linked the ambulance unit and the traffic junction using a RF transmitter.

Figure5 shows the vehicle unit. The unit has a GPS and GPS antenna using which we denote the actual values of latitude and longitude of accident sopt. Latitude and longitude values are taken with respect to North and East directions. That values are shown in LCD. If dashing of vehicle is from front side it will shows F, similarly if it from back, left, right it will shows B, L, R respectively.

This unit also having GSM using which we can directly send these values to main server. Main server then sends the ambulance to the accident sopt.

The Figure7 and 8 shows the ambulance unit. The unit has a controller which stores the actual values of the pulse rates of the patient and temperature of the environment and patient also. Here we are using the GSM module to send the temperature and pulse rate of the patient continuously to the main server. Also we are added 4 emergency keys in case of emergency. They noted as Emergency, Need help, Patient ok and Very critical.

Then a signal is sent to the traffic junction (shown in Figure) using RF transmitter which works at 433 MHz .The GPS receiver have an resolution of 3m and transmits the data serially at a baud rate of 9600bps. The pulse rate and temperature is sent to the hospital by using GSM in case of emergency. The LCD HD44780 is installed in this unit to continuously displays the pulse rate and temperature. Ambulance unit also having the emergency keys to send the sms in case of emergency. The traffic junction has RF receiver which receives the signal (START signal) which makes the junction to work in ambulance mode. When the ambulance crosses the junction it again sends a signal (STOP signal) to the junction which again comes back to the normal mode.

The Figure 9 shows the traffic signal junction with the four way lane model. This unit consists of a RF receiver which also works at 433 MHz. The junction operates as per the data transmitted by the ambulance unit. The data received by the RF receiver is transmitted to the controller at the rate of 3kbps. When the data received is 0, it operates in the normal mode. When 1 is received, the traffic signal shifts to ambulance mode and the particular direction is made green. After ambulance crosses the junction it return backs to normal mode.

The Figure shows the GPS module showing the coordinates. The GPS value calculated will be in NMEA standard with numerous statements. A particular statement is selected, here we took GPGGA and the longitude and latitude values are retrieved from it and displayed in the LCD by the controller.

Result Of Traffic Junction Unit:

Signal 1: Green
Signal 2: Red
Signal 3: Red
Signal 4: Red

If ambulance is at Signal 3 then, immediately the signal change to,

Signal 1: Red
Signal 2: Red
Signal 3: Green
Signal 4: Red

Conclusion

In this paper, a novel idea is proposed for controlling the traffic signals in favour of ambulances during the accidents. We found that ambulances wait longer at hospital emergency departments today than in previous years. With this system the ambulance can be maneuvered from the accident spot to the hospital without time lag. The IARS can be proved to be effectual to control not only ambulance but also authoritative vehicles. Thus IARS if implemented in countries with large population like INDIA can produce better results. The IARS is more accurate with no loss of time. .

Acknowledgment

A work of such a great significance is not possible without the help of several people, directly or indirectly. First and foremost I have immense happiness in expressing my sincere thanks to my guide, **Prof. Hate S.G.** for his valuable suggestions, co-operation and continuous guidance.

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I am very much thankful to all faculty members whose presence always inspires me to do better. My happiness culminates, when we recall the co-operation extended by friends during the completion of this seminar report.

A final and heartly thanks goes to my parents and God.

Readings of Latitude and Longitude which are displayed on LCD are as follows

Latitude	Longitude	Direction of accident
1832.7030	7355.4436	Back/B
1833.0873	7355.5945	Right/R
1827.5169	7351.5438	Left/L
1832.8671	7355.4958	Forward/F
1827.4558	7351.6429	Back/B

Readings of Ambulance which are displayed on LCD are as follows at different times

Temperature	Pulse Rate
27.0	0072
18.3	0078
21.8	0078
19.6	0072
24.4	0078
28.6	0072

Fig.1 Architecture of system

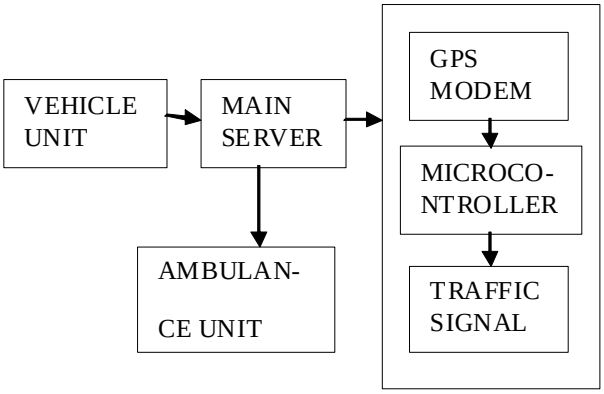


Fig.2 Vehicle unit

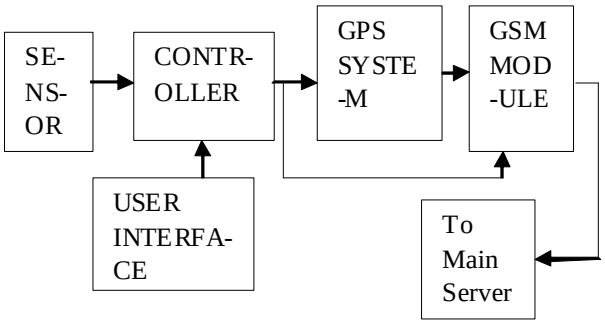


Fig.3 Ambulance unit

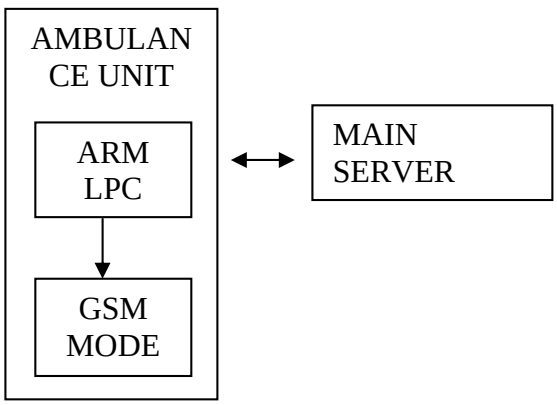


Fig.4 Signal system

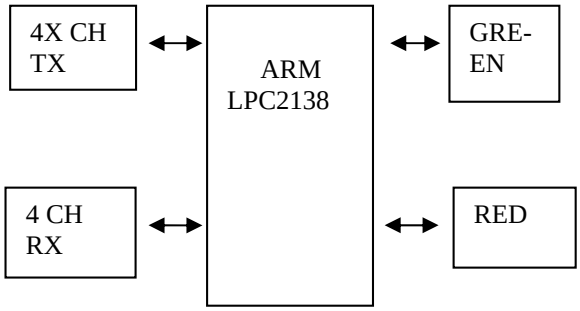


Fig.5 Vehicle Unit

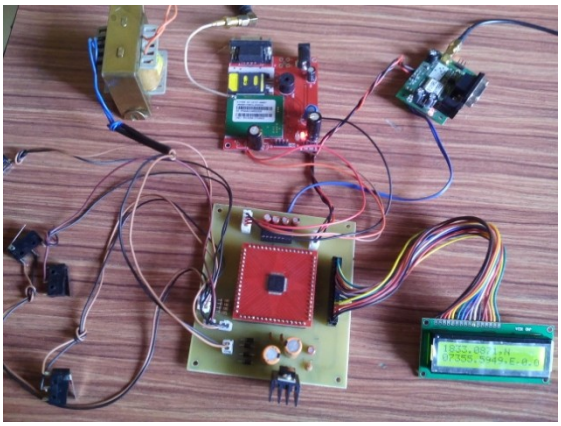


Fig.6 GPS Antenna

Fig.7 Ambulance Unit

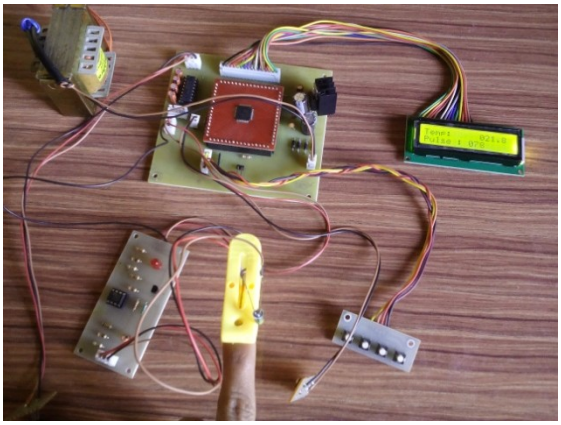


Fig.8 Ambulance Unit with GSM

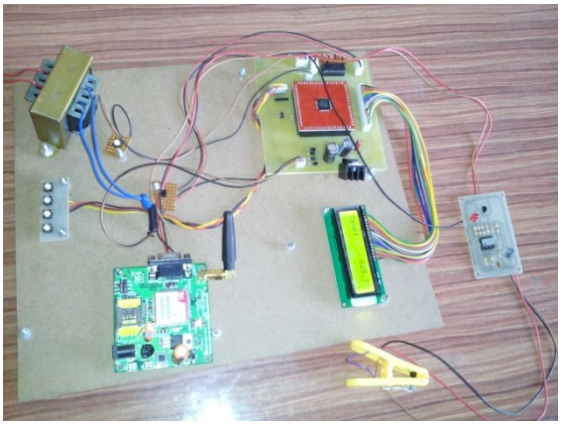
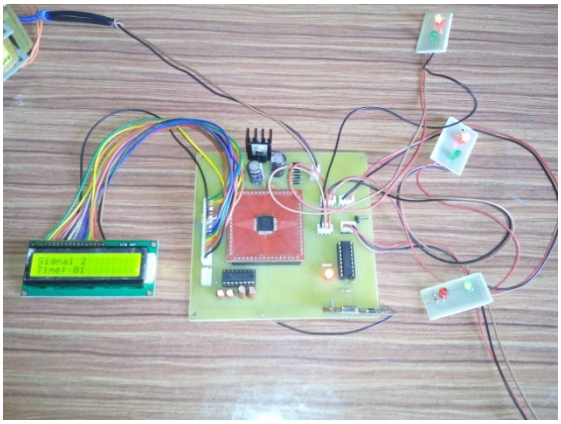


Fig.9 Traffic Junction Unit



References

1. K. Athavan, S. .Aagadeeshwaran, G. Balasubramanian, N.Dinesh, G. Abhilash, G. Gokul, *"AUTOMATIC AMBULANCE RESCUE SYSTEM"*, Proceedings of 2nd International Conferance on International Journal of Advanced Technology & Engineering Research, pages: 86-89, 2012.
2. Wang Wei, Fang Hanbo, "*Traffic accident auto-matic detection and remote alarm device*", Proceed-ings of International Conference on Electric Infor-mation and Control Engineering, pages: 910-913, 2011.
3. Katsunori Tawara, Naoto Mukai, "*Traffic signal control by using Traffic congestion prediction based on Pheromone Model",* Proceedings of 22nd IEEE International Conference on Tools with Ar-tificial Intelligence, pages:27-30, 2010
4. Xiaolin Lu, "*Develop Web GIS Based Intelligent Transportation Application Systems with Web Ser-vice Technology*", Proceedings of 6th International Conference on ITS Telecommunications, pages: 159-162, 2006.