An Intelligent Ambulance and Traffic Control System

Siddharth G. Gupta[1], Devesh A. Khanzode[1], Prof. S.T.Kumbhare[2], Dr. R.R.Wakodkar[3]
Third year student [1], Lecturer[2], HOD[3], Electronics & Telecommunication Engineering
Government Polytechnic, Gondia.

Abstract - This paper is based on an Automatic traffic light control system in emergency case i.e. when an Ambulance is close to Traffic light system sets the traffic light to green at ambulance side and red at other three signals. So here RFID (Radio-frequency identification) modules are used to detect passage of ambulance and clears traffic for easy access to ambulance. When ambulance is called up by patient, driver can select appropriate hospital location provided on ambulance panel. It sends its current GPS (Global Positioning System) location on previously saved mobile number of selected hospital using GSM (Global System for Mobile Communication). Along with this, patient's current condition (temp., heart bits etc.) is also messaged to the hospital before the arrival of ambulance. Here GSM is not only used for just sending message to the doctor but also used for video display of the patient in the ambulance using 3G connection. By which Doctor can analyze the condition of the patient and recommend some immediate possible therapy in ambulance before reaching hospital.

Keywords - GSM (Global System for Mobile Communication), GPS (Global Positioning System), LCD, LED, Microcontroller (89S52), RFID (Radio-frequency identification) Module & Tag, SIM 800 (3G).

1. INTRODUCTION

This particular paper is designed for the cities with heavy traffic. For example, In Bangalore, the roads are full jammed every time. Most of the time, the traffic will stretch for at least 100 meters. In this distance the traffics police can't hear the siren from the ambulance. Hence he ignores this. Then the ambulance has to wait till the traffic is cleared. Some times to clear the traffic, it takes at least 30 minutes or more. So by this time anything can happen to the patient. So this paper provides solution for the problem. Basic aim of this paper is to provide green signal automatically when the ambulance at emergency comes to any traffic post.

The road accidents in modern urban areas are increased to uncertain level. The loss of human life due to accident is to be avoided. Traffic congestion and tidal flow are major facts that cause delay to ambulance. To bar loss of human life due to accidents, we introduce a scheme called ITLS (Intelligent Traffic Light system). The main theme behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion. The idea behind this scheme is to implement ITLS which would control the traffic lights automatically in

the path of the ambulance. The ambulance is controlled by the control unit, which furnishes adequate route to the hospital and also controls the traffic light according to the ambulance location and thus reaching the hospital safely.

2. WORKING PRINCIPAL

The ambulance is equipped with GSM, GPS module and RFID TAG (active card having range up to 20-30 M). When an ambulance is called for emergency by patient, driver will select nearest hospital and then ambulance current location will be transmitted to the desired hospital selected by driver.

Now in street light, RFID receiver module is fixed in such a way so that it will receive or detect the passage of the ambulance. Once ambulance is detected traffic signal in particular direction is turned to green.

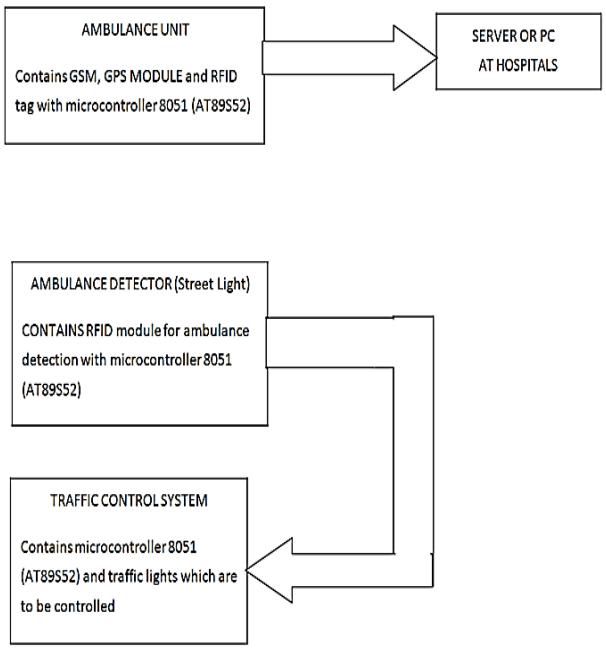

Fig 2.1 Basic Block Diagram

3. LITERATURE SURVEY

These are proposed an Implementing Intelligent Traffic Control for tracking ambulance. This system was implemented based on present criteria that tracking three conditions in those one is heavy traffic control and another one is making a root of emergency vehicle like ambulance and VIP vehicle. In this paper we are going use RFID reader & tags and 8051 system-on-chip to read the RFID tags attached to the vehicles. If the RFID tag read belongs to the ambulance tag, then GSM SIM800 is used to send message to the appropriate hospital.

The system is based on a simple principle of RFID tracking of vehicles to improve traffic flow and safety. It can operate in real-time and fully automated, saving costly constant human involvement. RFID controls traffic to avoid problems that usually arise with standard traffic control systems. The focus of this work is to reduce the delay in arrival of the ambulance to the hospital, by automatically clearing the lane in which ambulance is travelling before it reaches the traffic signal. This can be achieved by turning the traffic signal, in the path of the ambulance, to green when the ambulance is at a certain distance from the traffic signals. The use of RFID distinguishes between the emergency and non-emergency cases, thus preventing unnecessary traffic congestion. The communication between the ambulance and traffic signal post is done through the RFID. The system is fully automated

and requires no human intervention at the traffic signals.

4. PROPOSED SYSTEM

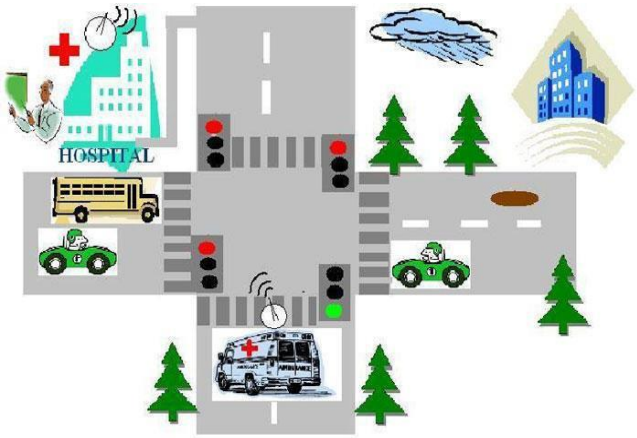

Fig 4.1 Logical Block Diagram

As we can observe there is a square shown in above diagram, consisting of four different lanes. An ambulance is on first lane. The patient is carried in the cardiac van, whose various parameters are being measured by the sensory units inside the van. These parameters are constantly being sent to the hospital unit via GSM, in the form of a message (SMS). The hospital you can see is at the side of road and it is receiving these SMS's via a dedicated mobile phone. The information is shown on the pc connected to this mobile phone via data cable. The software used here can be designed using any software language i.e. Visual basics etc. At the same time, traffic controller is also making the first lane signal green and all other signals to red. Microcontroller timers and counters are used for controlling. Logical block diagram provides logic behind the project and gives complete overview of project. In this fig. all three units i.e. Ambulance, Hospital and Traffic signal units are shown.

5. HARDWARE MODULES

5.1 Microcontroller (89S52)

A Microcontroller is an entire computer manufactured on a single chip. 8051 Microcontroller is an 8 bit Microcontroller with a Flash memory of 4KB for storing the program and RAM of 128 bytes and can support up to 64KB of External Memory. It has 4 input/output ports i.e. PORT 0 (pin 39 to 32), PORT 1 (pin 1 to 8), PORT 2 (pin 21 to 28) and PORT 3 (pin 10 to 17). It has one UART capacity with one RX_D & TX_D. It will operate on 5V DC supply.

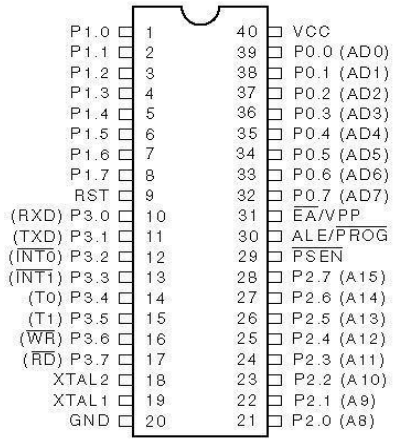

Fig 5.1.1 Pin Diagram of 89S52

5.2 RFID Reader and Tag

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at

hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

This module directly connects to any microcontroller through UART or through a RS232 converter to PC. It gives UART/Wiegand26 output. This RFID Reader Module works with any 125 KHz RFID tags.

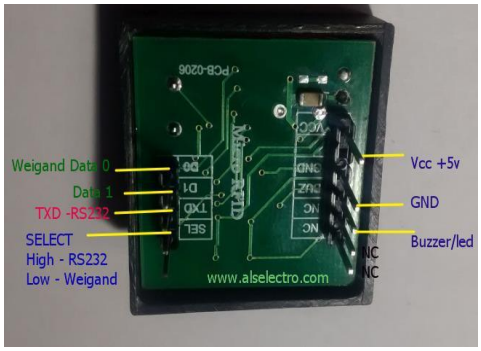

Fig 5.2.1 Pin Diagram of RFID

Table 1 Pin Description of RFID

1	VCC	5V
2	GND	GND
3	BEEP	BEEP AND LED
4	ANT	NO USE
5	ANT	NO USE
6	SEL	HIGH IS RS232,LOW IS WEIGAND
7	RS232	RS232
8	D1	WEIGAND DATA 1
9	D0	WEIGAND DATA 0

Fig 5.2.2 RFID Tag

RFID tags can be passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation.

5.3 GPS (Global Positioning System)

Once a GPS module is powered, NMEA data (or another message format) is sent out of a serial transmit pin (TX) at a specific baud rate and update rate, even if there is no lock. To have your microcontroller read the NMEA data, all that is needed is to connect the TX pin of the GPS to the RX (receive) pin on the microcontroller. To configure the GPS module, you will need to also

connect the RX pin of the GPS to the TX pin of the microcontroller. It is common for the microcontroller to parse the NMEA data. Parsing is simply removing the chunks of data from the NMEA sentence so the microcontroller can do something useful with the data.

Fig 5.3.1 GPS Module

5.4 GSM (Global System for Mobile Communication)

SIM800C is a complete Quad-band GSM/GPRS solution in a SMT type, which can be embedded in the customer applications. SIM800C supports Quad-band 850/900/1800/ 1900MHz; it can transmit voice, SMS and data information with low power consumption. With tiny size of 17.6*15.7*2.3 mm, it can smoothly fit into slim and compact demands of customer design.

Features:-

- Communications module type: GSM
- Transmission: GPRS Standard : 2G
- Frequency: 1800MHz,1900MHz,850MHz,900MHz
- Transfer rate : 85.6kbps
- Supply voltage : 3.4-4.4V DC
- Operating temperature :- 40-85°C
- Dimensions:17.6 x 15.7 x 2.3mm

Fig 5.4.1 GSM Module

6. AMBULANCE, TRAFFIC AND HOSPITAL UNIT

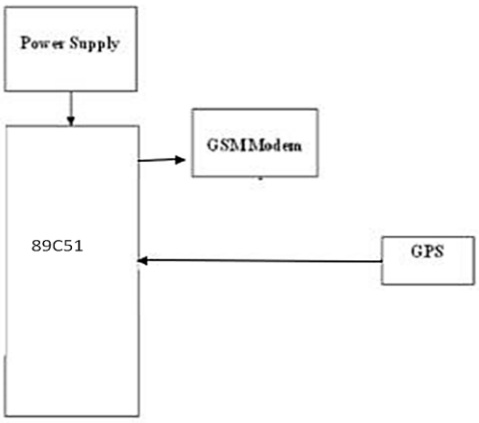

Fig 6.1 Ambulance Unit

The GPS provides latitude and longitude information about ambulance location and send to hospital through SIM800.

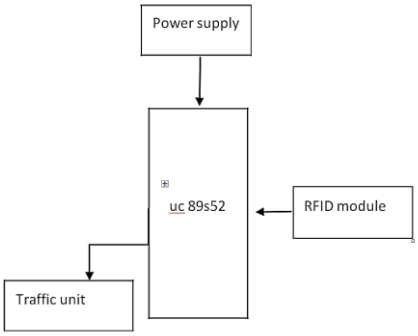

Fig 6.2 Traffic Unit

RFID module is placed inside the street light and used to read the RFID tag present inside the ambulance. If it matched with registered RFID tag number then it sends signal to Traffic unit to turn on particular lane to green light.

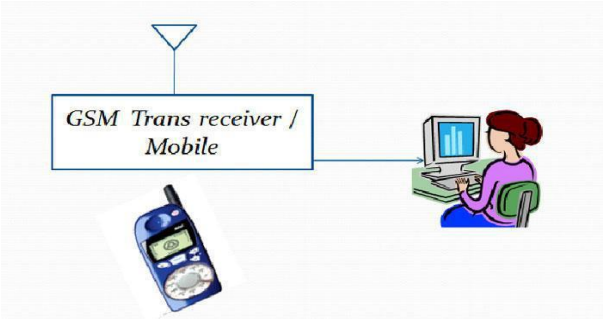

Fig 6.3 Hospital Unit

One of the receiver units is hospital unit. This unit includes GSM transreceiver. In this setup, GSM is used as source of information to hospital from ambulance. GSM is duplex unit and capable of transferring data. Parameters of ambulance location measured in ambulance by GPS are received by GSM receiver with delay of 5 minute. These parameters should be displayed on screen, so GSM has accompanied with mobile which is compatible for storing and displaying received data in appropriate form which is very user friendly.

7. CONCLUSION

The following paper will help to assuage blockage of emergency vehicles in traffic by the usage of electronics and communication technique. Traffic signal pre-emption (also called traffic signal prioritization) is a type of system that allows the normal operation of traffic lights to be pre-empted, often to assist emergency vehicles The most common use of these systems is to manipulate traffic signals in the path of an emergency vehicle, stopping conflicting traffic and allowing the emergency vehicle right-of-way, to help reduce response times and enhance traffic safety. The overall paper along with the process of traffic light control also shows the message and visual communication using GSM with 3G connection in Ambulance.

REFERENCE

[1] Claudio De Capua, Antonella Meduri, and Rosario Morello. "*A Smart ECG Measurement System Based on Web-Service Oriented Architecture for Telemedicine Applications*" IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 59, NO. 10, OCTOBER 2010.

[2] Ankit Jha, Lalit Kanwar, Mayur Solanki, Shyam Sunder Joshi, Smt. Sarita Chauhan "*An Advance Intelligent Ambulance With Online Patient Monitoring System*" , IPASJ International Journal of Electronics & Communication (IIJEC) Volume 3, Issue 4, April 2015 ISSN 2321-5984.

[3] Md. Manirul Islam, Fida Hasan Md. Rafi, Mohiuddin Ahmad and Abu Farzan Mitul,T. M. N. Tunku Mansur, M. A. Rashid "*Microcontroller Based Health Care Monitoring System Using Sensor Network*", 2012 7th International Conference on Electrical and Computer Engineering 20-22 December, 2012, Dhaka, Bangladesh.

[4] Bor-Shyh Lin, Willy Chou, Hsing-Yu Wang, Yan-Jun Huang and jeng-Shyang Pan, "*Development of Novel Non-Contact Electrodes for Mobile Electrocardiogram Monitoring System*", IEEE journal of Translational Engineering in Health and Medicine, Digital Object Identifier 10.1109/JTEHM.2013.2253598.

[5] Rajeshwari Sundar, Santhoshs Hebbar, and Varaprasad Golla "*Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection*", IEEE sensor journal, VOL. 15, NO. 2, FEBRUARY 2015.

[6] Sarika B. Kale, Gajanan P. Dhok "*Design of Intelligent Ambulance and Traffic Control*" , International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-5, April 2013.

[7] Bharadwaj. R, Deepak.J, Baranitharan. M, V. Vaidehi "*Efficient Dynamic Traffic Control System using Wireless Sensor Networks*" ,2013 International Conference on Recent Trends in Information Technology (ICRTIT).

[8] Soufiene Djahel, Mazeiar Salehie, Irina Tal and Pooyan Jamshidi , "*Adaptive Traffic Management for Secure and Efficient Emergency Services in SmartCities*" Work in progress session at Percom 2013, San Diego,19March2013.