Emergency Vehicle Priority System for Smart Cities

Prof. S. S. Chopade
Department of Electronics & Tele-Communication Engineering
Sandip Foundation's sandip institute of technology and research center Mahiravani Trimbak road Nashik, Maharashtra-India

Leena R. More
Department of Electronics & Tele-Communication Engineering
Sandip Foundation's sandip institute of technology and research center Mahiravani Trimbak road Nashik, Maharashtra-India

Kumudini S. More
Department of Electronics & Tele-Communication Engineering
Sandip Foundation's sandip institute of technology and research center Mahiravani Trimbak road Nashik, Maharashtra-India

Nasreen K. Mujawar
Department of Electronics & Tele-Communication Engineering
Sandip Foundation's sandip institute of technology and research center Mahiravani Trimbak road Nashik, Maharashtra-India

Afreen K. Mujawar
Department of Electronics & Tele-Communication Engineering
Sandip Foundation's sandip institute of technology and research center Mahiravani Trimbak road Nashik, Maharashtra-India

Abstract

A steady increase in metro-city population, the number of automobiles and cars increases rapidly and metro traffic is growing crowded which leads to the traffic jam problem. This proposed system will have effective role to avoid the traffic jam. When the traffic lane waits until the green light, time setting is almost same and fixed. A-road was always crowded with vehicles and go-ahead time is short. So, "ambulance" can't pass through in the time allowed. But sub lane has few vehicles and go-ahead time is relatively long. In the concept which we have design that "Emergency Vehicle Priority System for Smart Cities" has given the priority to the Ambulance.

Keywords- Ardiuno, RF Module (HT12E & HT12D), Beacon

I. INTRODUCTION

In this concept we have given priority to the ambulance. The RF module is the heart of our project. This RF module will be in the ambulance, traffic signal and in the hospital.

When ambulance will come near to the traffic signal the traditional signal will turn into green and at the time of ambulance Departure it turns into red. At the same time there will be a separate panel built beside the traffic signal it will show the indication that ambulance have arrived that time signal turns into Blue and turn off when the ambulance is departing. After the departure of ambulance signal will conduct its normal operation. We have used beacons. At every 100 meter range the beacons will blink and it will indicate that the ambulance is coming. It is one type of indication Because of this the vehicle will know that the ambulance is coming and they will give way to ambulance.

When the ambulance is coming near to the hospital the alarm will ring which is built in the hospital and on the LCD it Displays that "Ambulance is coming". And their staff will ready with their overall setup.

II. SYSTEM DEVELOPMENT

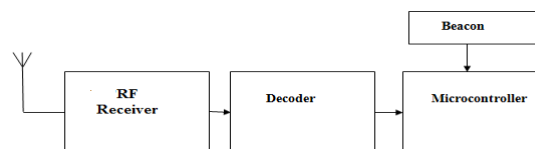### A. Block Diagram of Overall System

1) Block Diagram of Beacon

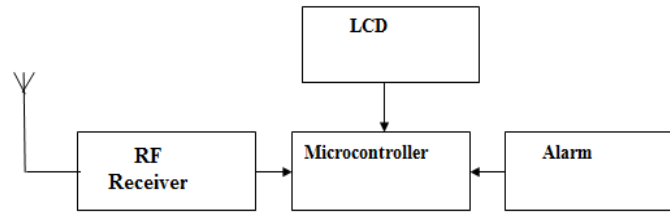Fig. 1: Block diagram of Beacon

2)   *Block Diagram of Hospital*

Fig. 2: Block Diagram of Hospital

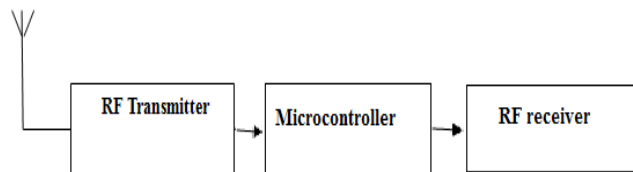3)   *Block Diagram of Ambulance:*

Fig. 3: Block Diagram of Ambulance
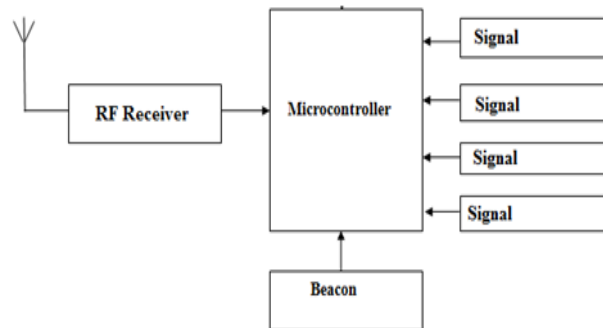
4)   *Block Diagram of Traffic Signal*

Fig. 4: Block Diagram of Traffic Signal

III. SOFTWARE REQUIREMENT

A.   Ardiuno
Ardiuno is a cross platform IDE that works in a conjunction with an Ardiuno controller in order to write, compile and upload code to the board. The software provides support for a wide array of Ardiuno boards including Ardiuno UNO, Nano, Mega Esplora, Ethernet, fio, pro or pro mini as well as Lily Pad Ardiuno. The Universal languages for Ardiuno are C & C++, thus the software is fit for professionals who are familiar with these two.

B.   Protel 99
Protel 99 SE is an application that is used for the designing electronic schematic and PCB layout. Schematic simulations can also be run with this application. The application canindows 8. The application is very easy to use. It has been designed signers to work with it. Protel 99SE is a complete integrated design suite that will permit you to transfer your design ideas into the final board layout. It supports various shortcut buttons for designing your schematic and PCB designs so that you can put your idea on workbench more quickly. Unlike other design tool that needed a different environment for every phase of the design, Portel 99 SE brings a single designing environment that will surely minimize the effort of the designers while transferring their concepts to the work bench.

IV. HARDWARE REQUIREMENT

A.   Ardiuno Board
Ardiuno is open source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objet that can sense and control the physical world.
Ardiuno UNO is a Microcontroller board based on the Atmel328. It has 14 digital I/P and O/P pins ,6 analog I/P, a 16 MHZ Crystal Oscillator, a USB connection, a power jack, an ICSP header and a RESET Button.

Ardiuno Mega 2560 is a Microcontroller board based on the ATmega2560. It has 54 digital I/P and O/P pins ,16 analog I/P, 4 UART (Hardware serial ports), a 16 MHZ Crystal Oscillator, a USB connection, a power jack, an ICSP header and a RESET Button.The Mega is compatible with most shields designed for the Ardiuno Duemilanove or Diecimila.

B.   HT 12E
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.

C.   HT 12D
The HT 12D ICs are series of CMOS LSIs for remote control system applications. These 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.

D.   Beacons
Beacons use Bluetooth Smart for communication. It's the latest iteration of the Bluetooth standard, optimized for energy efficiency, meaning it allows for broadcasting only small amounts of data. The maximum payload of a Bluetooth 4.2 packet is 257 bytes. It's not enough to embed media content and that's why beacons only broadcast their ID's (which in the case of the iBeacon protocol is divided into three values: UUID, Major, Minor) and information about signal power, essential for a nearby Smartphone to calculate proximity.

E.   433 MHz TX and RX
The RX – ASK is an ASK Hybrid receiver module. It is an effective low cost solution for using 433 MHz the TX-ASK is an ASK hybrid transmitter module. TX-ASK are designed by the saw resonator, with an effective low cost, small size and simple to use for designing.

F.   Control System:
The microcontroller used here is Ardinuo. This controller controls the light system.
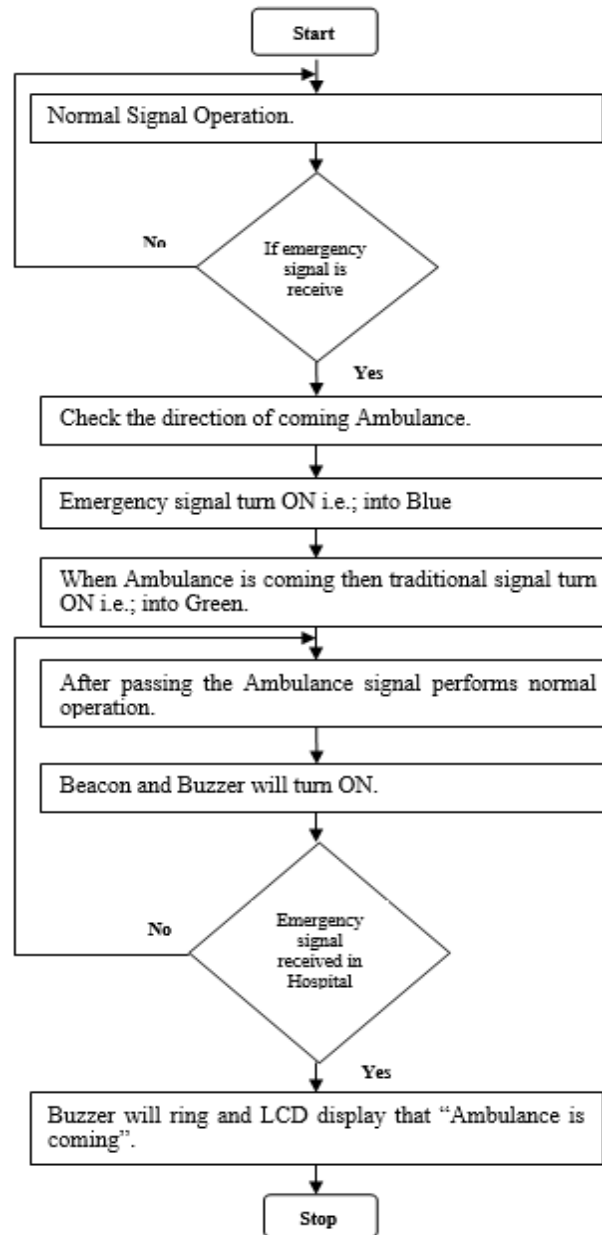
G.   Buzzer and LCD
Buzzer is used   at the signals and at the hospital. it is used for the indication that ambulance is on the way so that at the hospital unit will get ready with their setup for eg. streature, first aid, doctor etc.
LCD it is used to at hospital unit to display that the ambulance is coming.

H.   Algorithm
1)   Start
2)   Normal Signal Operation.
3)   Check if emergency signal is receive.
4)   Go to step 2.
5)   Check the direction of coming Ambulance.
6)   Emergency signal turn ON i.e.; into Blue
7)   When Ambulance is coming then traditional signal turn ON i.e.; into Green.
8)   After passing the Ambulance signal performs normal operation.
9)   Beacon and Buzzer will turn ON.
10) Check if Emergency signal received in Hospital. Then Buzzer will ring and LCD displays that "Ambulance is coming".
11) Go to step 10
12) Stop.

I. *Flowchart*

```
                          ┌─────────┐
                          │  Start  │
                          └─────────┘
                               │
        ┌──────────────────────┴──────────────────┐
        │   ┌─────────────────────────────────┐   │
        │   │ Normal Signal Operation.        │   │
        │   └─────────────────────────────────┘   │
        │                  │                        │
        │            ┌─────┴─────┐                  │
        │     No     │If emergency│                 │
        │────────────│ signal is │                 │
        │            │ receive   │                 │
        │            └─────┬─────┘                  │
        │               Yes │                       │
        │   ┌───────────────┴─────────────────┐    │
        │   │ Check the direction of coming    │    │
        │   │ Ambulance.                       │    │
        │   └──────────────────────────────────┘   │
```

Start

Normal Signal Operation.

If emergency signal is receive — No / Yes

Check the direction of coming Ambulance.

Emergency signal turn ON i.e.; into Blue

When Ambulance is coming then traditional signal turn ON i.e.; into Green.

After passing the Ambulance signal performs normal operation.

Beacon and Buzzer will turn ON.

Emergency signal received in Hospital — No / Yes

Buzzer will ring and LCD display that "Ambulance is coming".

Stop

V. FUTURE SCOPE

In future work, we will use real dynamic road section to estimate the unknown traffic volumes and apply to real traffic. When more than one emergency car came then most of the system fails. They give green signal to both which lead to traffic conjunction problem and also leads to accidents.

VI. CONCLUSION

The Emergency Vehicle Priority for Smart Cities is more reliable, highly accurate and others higher performance over the controllers that were used earlier. The easy availability of good design tool and software engineers has been two key factors in fuelling the growth of embedded system. The Emergency Vehicle Priority System Path Clearance is just a small part; looking at the bigger picture it has large-scale application in ITS (Intelligent Transportation System).

ACKNOWLEDGMENT

REFERENCES

[1] Wenjie Chen, Lifeng Chen, Zhanglong Chen, and Shiliang Tu.Wits. "A wireless sensor network for intelligent transportation system." in International Multi-Symposiums of Computer and Computational Sciences Conference (IMSCCS'06), pages 635– 641, April 2006.
[2] Rajat & Nirbhay Kumar (2007) "RFID Resolution: Your cars will be tagged", The Economics Times, 25 September.
[3] Elisabeth ILIE-ZUDOR "The RFID Technology and Its Current Applications", MITIP 2006, ISBN 963 86586 5 7, pp.29-36.
[4] R. K. Kamalanathsharma, "Traffic Adaptive Offset-Based Preemption for Emergency Vehicles," Master of Science in Civil and Environmental Engineering, 2010.
[5] Karmakar, N., Handbook of Smart Antennas for RFID Systems, Wiley-IEEE Press, Pages: 13 -56
[6] USDOT, Traffic Signal Preemption for Emergency   Vehicles, U.S. Department of Transportation, 2006.