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Green Corridor for Ambulance using NRF

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Abstract: **- Traffic congestion problem is a phenomenon which contributed huge impact to the transportation system in country. This causes many problems especially when there are emergency cases at traffic light intersections which are always busy with many vehicles. A traffic light controller system is designed to solve these problems. Here in the city where there is lot of traffic, ambulances face a lot of problems reaching to the hospital. The patient on the way might die if does not proper treatment if stuck in the traffic and not given proper way. This application is now only for organ transplant because whenever there is no patient in the ambulance, the driver cannot blow the siren, which might create a problem as he will not get way and someone in need might not get the desired organ on time and die. To reduce these death tolls, we have decided to develop an application which will provide a "Green Corridor" to the ambulance. The project comprises of four modules namely: Ambulance User, Signal Manipulation. The use of NRF based wireless communication will help to locate the ambulance way and it will reduce the bulkiness of the project. As soon we get the request at the system connected to single. System will know which signal is to be opened to provide green corridor to the ambulance. In future, this prototype system can be improved controlling the real traffic situation, in fact improving present traffic light system technology.**

Keyword: Organ Transplant, NRF, Green Corridor, Traffic light

1. INTRODUCTION

The aim of this project is, INDIA is one of the most populous Country in the World and is a fast-growing financial prudence. It is seen that terrible road congestion problems in cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost bounds. Also, Indian traffic is non-lane based. It needs a traffic control solution specially for ambulance, which are different from the other Countries? In recent years, wireless networks are widely used in the road transport as they provide more cost-effective options. The project comprises of four modules namely: Ambulance User, Signal Manipulation. The use of NRF based wireless communication will help to locate the ambulance way and it will reduce the bulkiness of the project. This system will contain NRF wireless transmitter module which will send single to traffic signal receiver module. On this side we will have four different keys along with lcd module. Four different keys for four different directions of signal. LCD module will show default/welcome message on it. After pressing the key system will start sending message to the receiver side.

On this side we will have four different keys along with lcd module. Four different keys for four different directions of signal. LCD module will show default/welcome message on it. After pressing the key system will start sending message to the receiver side. The ambulance will spread the message to traffic signal and confirm the direction of ambulance. As soon as the direction of ambulance is confirmed controller unit at signal will decide which signal is to be open and which is to be closed. There will be a model containing 4 signals with led light indications same as we have in traffic signal. By default, traffic signal used to work according to traditional timer concept. But when the ambulance is coming it will activate smart mode to control singles and allow ambulance to pass clearly. It can both send and receive the data simultaneously. Each module can communicate with up to 6 other modules. It uses the 2.4 GHz band. It can send 1 to 25 bytes of raw data at the transmission rate of 1 MB.

2. MATERIALS AND METHODS

2.1 Existing system

Intelligent traffic control system using RFID and Cloud

The intelligent traffic control system using RFID and Cloud uses an android application, use of RFID (Radio Frequency Identification) and cloud database. The main disadvantage of this project is the use of RFID, because the range of RFID sensors is very limited and cannot be detected soon. Whereas in our project we are using image processing which does not require any range.[1]

Intelligent Traffic Control System for Congestion Control using Image Processing, Ambulance Clearance, and Stolen Vehicle Detection".

The intelligent traffic control system for congestion control using image processing, ambulance clearance, and stolen vehicle detection uses ZigBee. This project focuses more on traffic congestion. Also using ZigBee adds more heaviness to the project and also the problem of range continues here also.[2]

Smart Traffic Control System using Image Processing

The smart traffic control system using image processing uses image processing for traffic congestion control. This project also mainly focuses on traffic congestion.[3]

Traffic Light Control System for Emergency Vehicles Using Radio Frequency

Sensor is used to transmit signal that has been installed in every emergency vehicle to the receiver which has been placed at every traffic light intersection. When emergency vehicle reaches at the traffic light intersection, the signal code will be sent information of frequency modulation to the receiver. The receiver demodulates the received code, and the red traffic light will trigger at all the junctions. Thus,

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emergency vehicle will have special route from other vehicle to reach the destination.

2.2 Proposed system

Proposed system will have two different parts one is on the ambulance and second one is on the traffic signal.

System to Ambulance part:

This system will contain NRF wireless transmitter module which will send single to traffic signal receiver module.

On this side we will have four different keys along with lcd module. Four different keys for four different directions of signal. LCD module will show default/welcome message on it. After pressing the key system will start sending message to the receiver side.

The ambulance will spread the message to traffic signal and confirm the direction of ambulance. As soon as the direction of ambulance is confirmed controller unit at signal will decide which signal is to be open and which is to be closed.

System to Signal part:

This system will contain NRF wireless receiver module which will receive signal from the ambulance transmitter module.

On this side we will have four different signals led along with lcd interface. LCD module will show default/welcome message on it. On receiving signal from the ambulance, it will stop all the signal and open that which is requested by ambulance.

For example if controller unit will get encoded data for signal number 1 or towards west side, controller will open signal towards west and close the remaining all signal for until the ambulance passage.

Open and clear. Along with it we can control traffic light from 500m using NRF. With this all the traffic light within the path of ambulance will give a green signal. Till ambulance/emergency vehicle passes through the signal, the signal will be green and after it will turn normal.

There will be a model containing 4 signals with led light indications same as we have in traffic signal. By default, traffic signal used to work according to traditional timer concept. But when the ambulance is coming it will activate smart mode to control singles and allow ambulance to pass clearly.

2.3 Component Consideration

The information and data for component consideration are based on the reviewed journal and patents. All type of components must be considered first to ensure that it is suitable for this project.

2.4 Choosing Component

After consideration is done, there is a section where the component should be look and fully understood about their advantages and disadvantages. The component must be chosen properly before it will be proceeded to design process. If the component is not compatible due to disadvantages, then it will go back to the consideration component process again.

2.5 Block Diagram

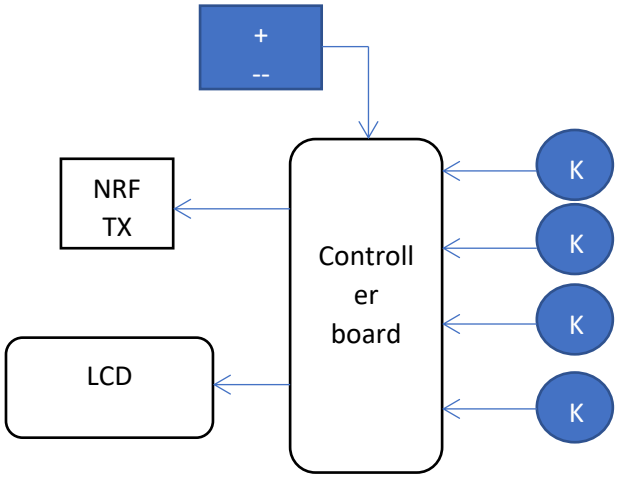

Fig. 1 The Signal side Components

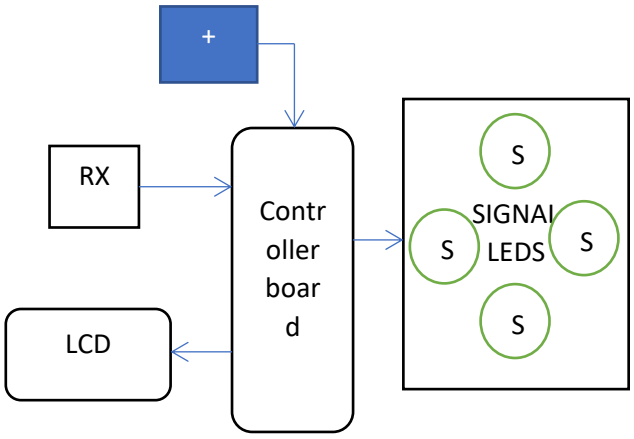

Fig. 2 The Ambulance side Components

2.6 NRF Module

The NFR is a transceiver module which means that it can both send and receive the data. These modules are very cheap, smaller in size and has a lot of specifications. Some of the specifications of these modules are as follows

Specification of NFR Module

- Power consumption is around 12mA during transmission which is even lesser than the led.
- It can operate with baud rates from 250Kbps up to 2 Mbps.
- Its range can reach up to 100 meters if used in open space and with antenna.
- It can both send and receive the data simultaneously.
- Each module can communicate with up to 6 other modules.
- It uses the 2.4 GHz band.
- It can send 1 to 25 bytes of raw data at the transmission rate of 1 MB.
- It has 125 different channels.

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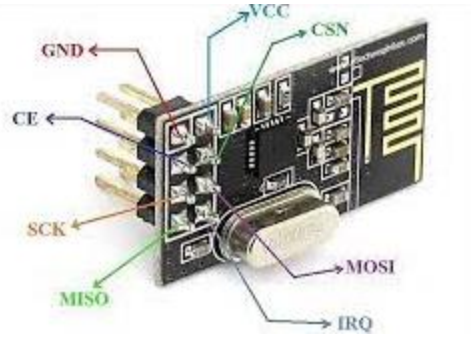

Fig. 3 Pinout of NRF Module

The operating voltage of this module is from 1.9 to 3.6V but the other pins are 5V tolerant which means that the other pins can be directly connected to the Arduino.

The MOSI, MISO and the SCK are the SPI pins and these needs to be connected to the SPI pins of Arduino.

2.7 Arduino Board

It's a basic board that uses RS232 as an interface to a computer for programming or communication. This board is easy to assemble even as a learning exercise. It has been designed to use the simplest component as possible so that it's easy to build.

The various components present on the Arduino boards are Microcontroller, Digital Input/output pins, USB Interface and Connector, Analog Pins, Reset Button, Power button, LED's, Crystal Oscillator, and Voltage Regulators.

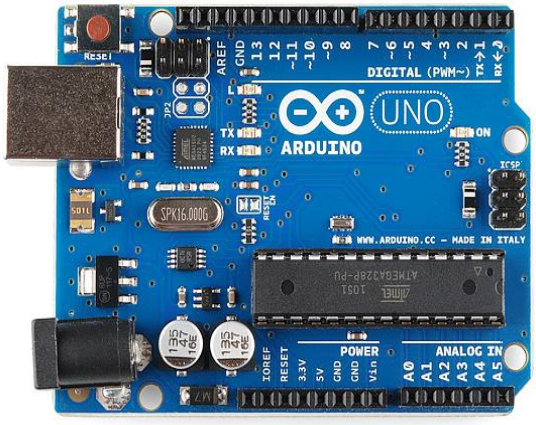

Fig. 4 Arduino Board

2.8 NRF Arduino Interfacing

NRF Arduino interfacing, we are going to simply send the data from one Arduino to another Arduino. When we will press the button connected to the first Arduino, LED connected to the second Arduino will light up.

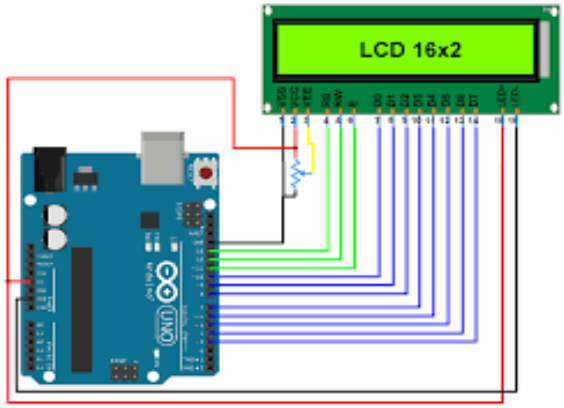

Fig. 5 Arduino LCD interfacing

2.9 LCD

An electronic device that is used to display data and the message is known as LCD 16×2. As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. So the total pixels within this LCD can be calculated as 32 x 40 otherwise 1280 pixels.

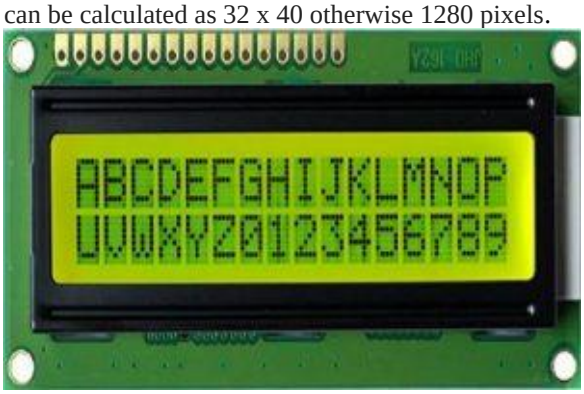

Fig 6. 16×2

2.10 Relay

A relay is an electromechanical switch used mainly for switching application either high voltage or low voltage switching, and they can be also used with microcontrollers like the Arduino for controlling high voltage devices.

The aim of relay is to serve as a guide while to interface the relay and the Arduino or the ESP 32.

Fig. 7 Relay enabled on Board

2.11 Key for Arduino Board

Keypad is used as an input device to read the key pressed by the user and to process it.4x4 keypad consists of 4 rows and 4 columns. Switches are placed between the rows and columns.

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A key press establishes a connection between the corresponding row and column, between which the switch is placed.

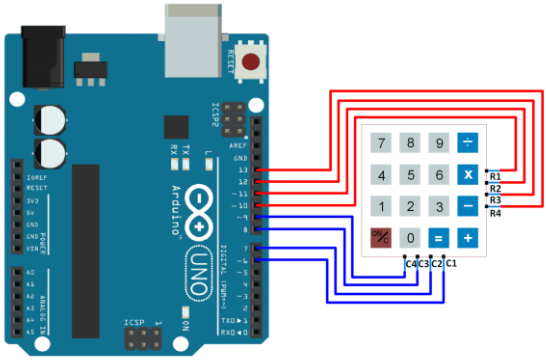

Fig. 8 Key Interfacing with arduino board

3 CONCLUSION

As the entire system is automated, it requires very less human intervention. Ambulance and Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. With Ambulance and Emergency vehicle clearance, the traffic signal turns to green if the Ambulance and Emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. In future, this prototype system can be improved by controlling the real traffic situation and the study can be done by investigating the length, reception and transmission issue for the system to be operated with this traffic light system.

4 REFERENCES

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