RF - Automatic Traffic Clearance System for Ambulance using Raspberry Pi

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Abstract. Traffic congestion is one of the reasons for accidents and delay for ambulance journey to save patients life. To avoid this problem and providing solution for this we designed a smart and easily transporting system. The proposed system implemented with RF transmitter module activation. When the RF receiver signal receives the data then second section receive the data through RF receiver and turn traffic signals to green. The proposed approach is fully automated controlling the traffic lights thereby helping to reach the hospital in time. By using RF technology it can send the data to traffic system when the ambulance vehicle is at longer distance then traffic automatically turns to clear traffic for this vehicle. Then only the emergency vehicle is quickly served and can reach the destination in time.

Keywords: Raspberry Pi, Traffic Clearance System, RF, LCD.

1. Introduction

Street crossing point the executives is done through traffic lights. The wasteful traffic signal administration causes different issues, deferral of explorers, misuse of vitality and declining air quality. At times, it ought to conjointly add to transport mishaps. Proposed radio frequency as this technology uses only radio waves for its operation of identification of different objects. In another existing System ultrasonic sensor HCSR04 is used to calculate the distance for Smart Traffic system. According to all these papers, a convenient wireless communication between emergency vehicles and traffic light is by using RF. The prototype of this project is using the radio frequency of 535 MHz compared to the range of about 15 kHz to 350 GHz of frequency which have been reserved for the RF theoretically Both existing System is not able to distinguish between normal vehicles and emergency vehicles. This problem should be overcome, emergency vehicles such as ambulance fire brigade vehicles can struck in traffic. One of the loop hole in the existing System is, if traffic is block for longer time, the punching machine is place very starting and hence driver has to leave the vehicle take the RFID and go there and at last punch, after this the drive has to come quickly because signal for emergency vehicles will closed after 45 second, if it is not succeeded then the above step has to repeat and it will take time which will create delay for them. So this way the existing system will not able to resolve the problem related to traffic jam.

2. Literature Survey

Existing traffic signal administration either sends mounted projects while not considering timeframe traffic or thinking about the traffic to a truly confined degree. The mounted projects make the traffic signals equivalent timeframe in every cycle, or entirely unexpected time span bolstered recorded information. We tend to planned from existing framework any place we can see traffic signal administration causes different issues, as long deferral and misuse of vitality. to help strength, requiring significant investment period traffic information as Associate in Nursing input and progressively modifying the traffic signal period subsequently might be a should. In our work the same concept has been implemented, instead of accelerometer and flex sensor we are using a vibration sensor along with RFID tag and reader where the position of the vehicle and details of the owner are
also extracted and sent by using GSM. In the paper [2], post an idea on clearance of traffic for the ambulance, fire brigade and police vehicles to reach their destination on time to help the citizens in preventing their lives and to avoid the crimes being committed. In our work, the same concept is used where the RFID transmitter and receiver are being used to control the traffic making the ambulance to reach its destination on time. In the paper [3] they have used RFID tag and reader. RFID reader is placed before the traffic signal and the RFID tag is attached to all the vehicles. In the paper [4] has used an idea on monitoring of health condition which has been done using Internet of Things (IOT).

3. Proposed System

As we have mentioned to achieve the objectives of our work, there are two modules in this work. First part consists of identification of the number of vehicles passed through the signal and detecting the congestion of traffic. This data is analyzed and the green light of traffic signal is set. Second part consists of a transmitter and a receiver which is used near the traffic junction. Secondly, a transmitter and receiver is being used near traffic signal for the ambulance. Traffic clearance whenever the ambulance goes through the traffic signal, the particular signals that the ambulance moving switches on to green automatically.

In the proposed system contains two sections. Transmitter section will be in Ambulance vehicle with RF transmitter module activation. When the RF receiver signal receives the data then second section receive the data through RF receiver and turn traffic signals to green.
All the hardware modules we used in the proposed system explained below.

A. Regulated Power Supply

In this section of RPS we need 5v dc to work RPI processor. This RPS module is getting the required voltages from higher voltages with the help of filters and voltage regulators. 12v alternating current received by 230 v alternating current step-down by transformer, Bridge rectifier used to converts AC voltage to DC voltage. 1000 micro farad Capacitor for filtering the noise and voltage regulator 7805 used to provide 5v DC for operating the RPI processor.

B. Raspberry Pi

Raspberry pi processor used to integrate the all input and output peripherals, process the input data and control the output modules. This processor having 4 USB ports for integrating output modules. 1GB RAM which is high speed process the data. 3.5mm audio socket for output voice, CSI camera port for interface camera, micro SD card for operating system storage, 1.2GHz speed 64 bit Broadcom processor. This processor having 40 GPIO pins. All input sensors and output modules are interfaced to processor. Python programming used to implement RPI based applications.
C. RF Transmitter/Receiver module

RF Transceiver module is an ultra low power 2Mbps module using 2.4 GHz RF based communication covering a distance of up to 300m. In congested areas, there are packet losses and latency issues. Information is sent as traffic messages or alert messages to reduce accidents and traffic congestion. Receiver module receives the data and send to transmitter. This RF communication easily transmits the data.

D. Traffic LED system

This Traffic LED system module contains 3 LEDs red, green; yellow to indicate as traffic system. Normally it auto rotating the LED signals with time duration. We designed 9 LED array PCB and placed all led. These LED work with 5v Power Supply Attached with 330OHN Resistor.
E. LCD Monitor

A liquid Crystal Display commonly abbreviated as LCD is essentially a display unit built using liquid technology. LCD module is 32 character displays, which is 16x2 models. Having 16 characters in row. LCD module interfaced to microprocessor with 16 pin configuration. LCD has 16 pins in series. Each pin is programmed to do here: Pins 1 and 16: Power and ground are these. Pin 3: This is used to change the LCD's brightness. Pins 4–6: Used for LCD service. Pins 7–14: Used as line of info. Pins 15–16: Used to control backlight to the LCD.

Fig. 7. 16X2 LCD

F. Software

In embedded system software module plays important role for any electronic automation. This proposed article we use Python IDE for programming development, debugging and compilation process. Python is effective scripting language for real time applications. Raspberry Operating System is used in Raspberry pi modules.

G. Results And Discussion

Fig.8. Hardware setup of traffic system
Hardware setup module of traffic clearance system. This is implemented by Raspberry pi Module with having RF receiver antenna to control the traffic lights. This proposed hardware model is integrated input wireless module RF Receiver which operated 433MHz frequency and output modules LED Traffic signal board. All the input and output modules are integrated to Raspberry pi processor according to the predefined time the system will be function. We used 5v regulated power supply to power this hardware setup.

![Hardware Receiver output](image1)

**Fig.9. Hardware Receiver output**

Powered on implemented output of the traffic system. This is implemented by Raspberry pi Module with having RF receiver antenna to control the traffic lights. Normally we programmed that for every 10 sec the traffic signal change between RED to GREEN for to show the basic operation of the traffic system. When the RF receiver receive the data then any case of traffic signal should change to green indication to clear traffic for emergency vehicle called ambulance.

![Hardware Transmitter output](image2)

**Fig.10. Hardware Transmitter output**

Transmitting section of RF system with four switches indicate that information for the traffic control signal by the ambulance. This RF transmitter is attached to emergency vehicle ambulance.
As a prototype we are demonstrating the four directions of NORTH, SOUTH, EAST and WEST we kept four switches. One of the switches in RF transmitter section indicated one traffic direction. If we press the first button data send to receiver then whichever the traffic signal is working don’t care automatically traffic signals will indicate green signal corresponding direction.

4. Conclusion

We designed and implemented RF Based Automatic Traffic Route Clearance System for Ambulance Using Raspberry Pi done successfully. This system implemented with transmitting and receiver section with RF wireless communications. In the proposed system contains two sections. Transmitter section will be in Ambulance vehicle with RF transmitter module activation. When the RF receiver signal receives the data then second section receive the data through RF receiver and turn traffic signals to green. It save the time and save life of the patients with this smart system.

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