

# Arduino Based Rf Based Automatic Traffic Route Clearance System for Ambulance

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## Abstract

Traffic congestion is the one of the reasons for accidents and delay for ambulance journey to save patients life. Due to that ambulances reach the hospital. To avoid this problem and providing solution for this we are designing 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:** RF technology, traffic system, ambulance.

## 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 the 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 holes 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.

Today's world is developing at a rapid speed. Everyday a new technology is discovered and developed. At the same time many problems are being faced by people in smart cities. Some of these problems are heavy traffic jams due to which loss of lives occur if the arrival of ambulance to the hospital is delayed. Also, many a times, even if the ambulance arrives at the hospital, the doctors may delay in treating the patient due to several reasons such as the hospital may not have the required facilities to treat the patient, it may not have the specialist required for that particular incident and many other. Current traffic control techniques include strobe emitter, siren detectors, magnetic loop detectors buried in the road, infrared and radar sensors on the sides of the road. All these techniques provide limited traffic information to make way for the ambulance. Another technology named RFID is a wireless technology that uses radio frequency electromagnetic energy to carry the information

between the RFID tag placed on the ambulance and the RFID reader placed on the traffic signal pole. The disadvantage of this system is that it only works within certain ranges. Technologies like zigbee and GSM can also be used in traffic control but in the zigbee technology, the usages of number of channels vary depending on the radio frequency range. The GSM operates only over a subscription to a mobile operator, just like mobile phone. To overcome these disadvantages an android application is being developed. The main objective of this application is to control the traffic, allowing an ambulance to arrive at a particular location without stopping anywhere until the destination is reached. The proposed application consists of four modules: the user module, the traffic hub module, the hospital module and the ambulance module. The user module provides the details of the patient. The ambulance module finds the location of the user after receiving the details of the user. The traffic module clears the traffic on receiving the user information. The hospital module makes prior arrangements to treat the patient on receiving the details of the user. The details of the user, the information given by traffic control room and the hospital are maintained by the server. The proposed application will also use GPS system to track the location of the ambulance which will give a clear picture to the traffic hub/policeman for clearing the traffic and to the user-selected hospital for making preparations to treat the patient as per the user's details. Time management as well as cost management is ensured through this application as a lot of time is saved at signals and shortest distances. are tracked with the help of GPS. This proposed application can be used by all types of ambulances and hospitals.

Traffic congestion and tidal flow management were recognized as major problems. In India as the population is being increasing day by day the traffic is also increasing with proportionality. So, the traffic signals need good coordination for the smooth flow of traffic during the peak hours. Moreover, road accidents in the city have been incessant and to bar the loss of life due to the accidents is even more crucial. In this fast-moving world we are in a compulsion to rush our self which makes the traffic congestion and accident an inevitable one. In foreign countries, they successfully save human life, because whenever an ambulance comes, they move aside to clear out the route till the ambulance passes through. On the other hand, in INDIA, whenever an ambulance comes it is controlled manually at the traffic junction by a traffic officer. Nowadays all systems are working automatically. So, we proposed system called "traffic clearance for emergency vehicles using blue mode". Population is largely increasing worldwide. Obviously, the reason for mobility is high, traffic problem is also, and unwanted changes in the environment are becoming major problems. Till relatively recently, substructure improvements have been the first stage to fight with such problems. Every traffic junction will have a sensor detecting the ambulance before traffic signal and will display the blue light with LCD which will help to clear the route for ambulance. As the IR sensor is detecting the ambulance passing through it, it gives command to microcontroller due to which there is display LCD's and blinking of LED's. If blue LED blinks simultaneously green will blink which will indicate other people to make side for ambulance.[3] Thus we propose a EARCS (Emergency Ambulance Route Clearing System) design for controlling the traffic and achieving the above-mentioned data so that the ambulance would be able to cross all the traffic signals without waiting. The time loss and resource loss due to this traffic problem can be solved to a great extent by a novel idea proposed here i.e., by using 'EARCS' technology along with the applications of 'IR SENSORS' systems where EARCS is used for object density detection, for the shortest path detection of ambulance to communicate to other vehicles within a certain range so that route can be clear for ambulance to reach the hospital in golden hours. The tendency of international logistics globalization has promoted the development of port logistics. The rapid increase of the amount of vehicle that passes through ports is putting high demands on the efficiency of port logistics. 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, which are Different from the other Countries. Smart management of traffic flows can reduce the negative effect of congestion.

## 2. Literature survey

Automatic Lane Clearance System for Emergency Vehicles, A new model proposed in this paper which provides the functionality of one path clearance i.e., the ambulance going path will be cleared is Developing a Smart Traffic Management System for Ambulance Rescue, Congestion Control, Control Signal Violation a Stolen Vehicle Tracking. Thus, we also provide facility for congestion control by sensing the traffic density using IR Sensor. This will be reflected on the particular signal. The Stolen Vehicle Tracking System will help us to keep a track of Stolen Vehicles and report them to the authorities. Another application provided by our project is that if any vehicle violates the signal, they will receive a warning message on their phone from the control room and if they trespass the violation limit then their licence will be terminated [1]. Intelligent Traffic Control Management System. The first application and the most widespread problem is that traffic congestion. Here we introduce a RFID technology to overcome this traffic congestion problem. The second application in traffic management is detection of the stolen vehicle. The stolen vehicle will be detected by the RFID tag which will be attached to the vehicle once the complaint will be registered in the control room. And the owner will get the information about his vehicle which has been stolen through GSM technology. The third application is clearance for the emergency vehicle in that heavy traffic congestion. That is, the arrival of the ambulance is to be communicated to the nearest traffic signal, so that it can turn the light to green and hence clear the traffic. [2]. Design of an Automated Traffic Control System for Emergency Vehicle Clearance, this system aims at providing clearance to Emergency vehicles like ambulance, fire engine that need to reach their destinations at the earliest. Our project not only provides sufficient amount of time for ambulance to pass the signal without hindrance but even allows a smooth traffic movement in other roads joining the junction. The proposed "Automated Traffic light controller" system provides clearance to Emergency vehicles using Radio Frequency Identification (RFID) module that consists of RFID tag and an RFID reader and a GSM modem [3]. Dynamic Traffic Control System using RFID Technology: A Systematic Review, Traffic congestion often causes loss of time, time delay, missed opportunities, etc. To overcome these problems proposed system uses the RFID technology where RFID tag is attached to each vehicle and as and when vehicle reach the traffic junction the RFID reader will read those RFID tags. Depending upon the count of vehicles green passage will be set dynamically and the proposed system provides special privileges for emergency vehicles like police vehicle, ambulance, VIP vehicles, etc. RFID also enforces law against stolen vehicles [4]. Intelligent Traffic Management System It is quite obvious, going by the current state of affairs, that our roads are not desirable places to be and a solution dedicated to ensure smooth flow of traffic will go a long way in making road travel a lot more convenient. It has been identified that the challenge mainly lies in channelizing traffic from heavy traffic zones into alternate routes thereby making optimum use of road space, in turn ensuring smooth flow of traffic. In this regard a simple mechanism which makes use of RFID technology has been described. The add on applications of this system such as tracing of stolen cars, vehicles that evade traffic signals/tickets, toll collection or vehicle taxes also make this system even more important because many other equally relevant road traffic issues are addressed [5].

Automatic Lane Clearance System for Emergency Vehicles As the entire system is automated, it requires very less human intervention. Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. With emergency vehicle clearance, the traffic signal

turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Currently, it is implemented system by considering one road of the traffic junction [6]. Traffic Management for Emergency Vehicle Priority Based on Visual Sensing, this paper has presented an approach to schedule emergency vehicles in traffic. The approach combines the measurement of distance between the emergency vehicle and intersections using visual sensing methods, vehicle counting and time sensitive alert transmission within the sensor network. The distance between the emergency vehicle and the intersection is calculated from visual data using Euclidean distance, Manhattan distance and Canberra distance techniques for comparison. The experimental results have shown that the Euclidean distance outperforms other distance measurement techniques and is suitable for real-time applications [7]. Traffic Clearance for Emergency Vehicles Using Priority Mode, the main motto behind our project is to provide a smart way of controlling traffic light timing during a peak hour and also to provide smooth flow for the ambulance to reach the hospital in time. We are going to implement a new mode called “ambulance mode” which would control the traffic lights in the path of the ambulance. This scheme is fully automated thus it controls the traffic lights, helping to reach the hospital in time. This is not preferred only for ambulance. It is preferable for other emergency vehicles such as fire engine [8]. Intelligent Traffic Control System for Emergency Vehicle, the proposed design is based on a traffic controlling, which allow high priorities vehicles like ambulance. Each ambulance is configured with Zigbee module (placed at a predefined location). In this module PICAT89C52 system-on-chip module uses to read the ZIGBEE module attached to the vehicle. It recognizes the time span of green light of respective path. As the ambulance is heading toward the junction, the green signal will turn ON. The signal will turn ON by communication with the traffic controller which is placed at junction. With the help of ZigBee modules and PICAT89C2051, System on chip wireless communication takes place between ambulance and traffic controller. The module is tested and the experimental results were found is expected [9]. In early days, the traffic is controlled manually by police officer. They decide when the vehicle has to cross the road and also provide importance to the emergency vehicle. Then in Intelligent Traffic Management System, the traffic is controlled automatically by each lane 120 seconds of green light is set on. Before green light, yellow light flashes for 20 second, signifying to start your vehicle and be ready to go. The disadvantages of this system are it does not provide timing based on priority because of that people has to wait for long time even though there is no traffic and also does not recognize and prioritize the emergency vehicle.[10] They consists of two parts: wireless sensors network (traffic sensor nodes (TSN) groups) and a control box. In this they collected traffic data with help of sensors and control the traffic. [12] Describes the concept of traffic clearance in which the time delay (6s) between the switching of signals is based on the congestion of vehicle. In our project we use 10s for green light to be left ON. If the congestion increases this duration will be extended to 20s. [13] Describes about densit- based traffic clearance. Initially we started this project only for ambulance mode but we thought of using this concept for normal mode also by using the knowledge of this paper. [14] Portrays area occupied by the edges of vehicle will be considered to estimate vehicles density using image processing. We make use of this concept in our project to clear the traffic congestion in normal mode. Due to insufficient time, we have used IR sensor instead. Keeping this paper as reference we can extend our project by placing camera at junction in four ways. [15] Traffic is cleared using green wave system. The green wave is the synchronization of the green phase of traffic signals. The disadvantage of this system is that if green wave is disturbed the traffic will collapse. [16] Way for ambulance in lane is provided through RFID technology. The system may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance. [17] Uses two RFID readers which will identify traffic density on two roads. When emergency vehicle is on lane it turns traffic signal to green.[8] The

images sequences from a camera are analyzed using various edge detection and object counting methods to obtain the most efficient technique to provide smooth flow for the vehicle using "Lab VIEW stimulation".

### 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 signal that the ambulance moving switches on to green automatically.

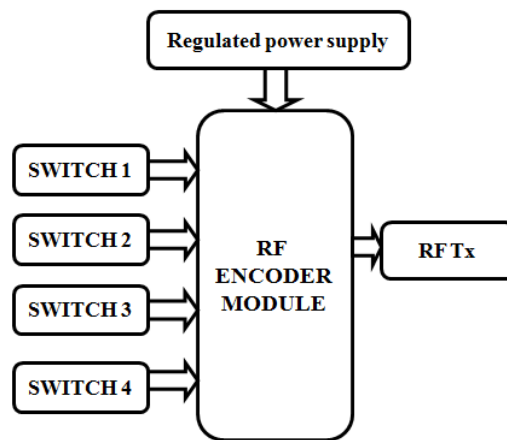


Fig. 1: Block diagram of Transmitter.

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.

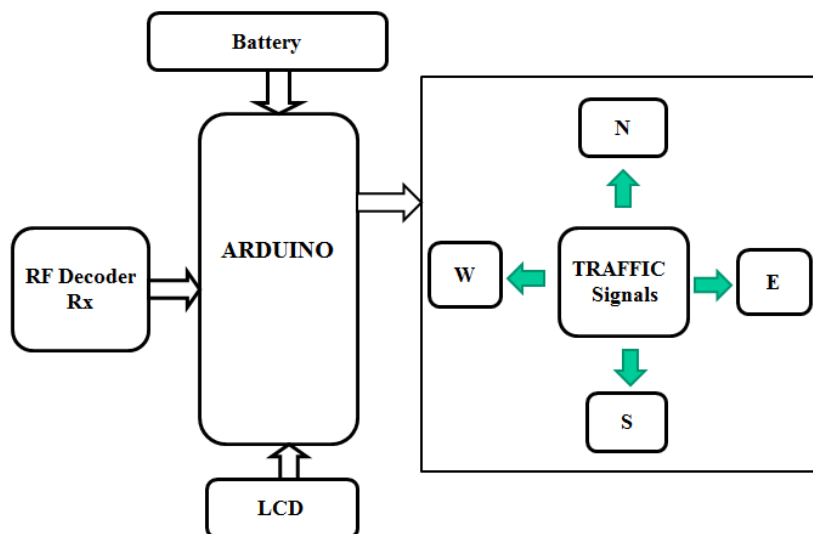


Fig. 2: Block diagram Receiver.

### 3.1 Arduino IDE

#### What is Arduino IDE?

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

A program for Arduino hardware may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their 8-bit AVR and 32-bit ARM Cortex-M based microcontrollers: AVR Studio (older) and Atmel Studio (newer).

#### 3.2 Schematic diagram

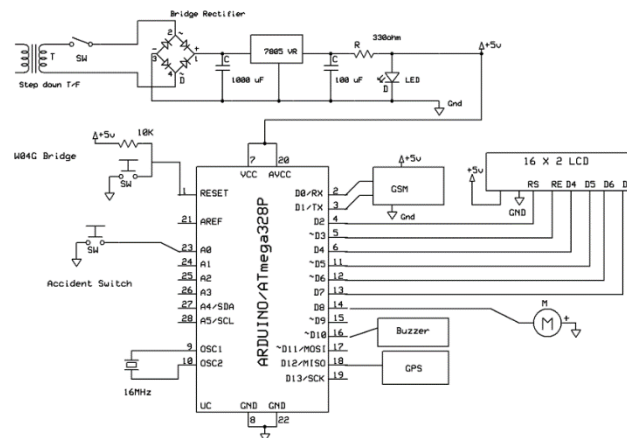


Fig. 3: Schematic diagram of proposed system.

### 4. Results

Hardware setup module of traffic clearance system. This is implemented by ARDUINO 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 ARDUINO processor according to the predefined time the system will be function. We used 5v regulated power supply to power this hardware setup.

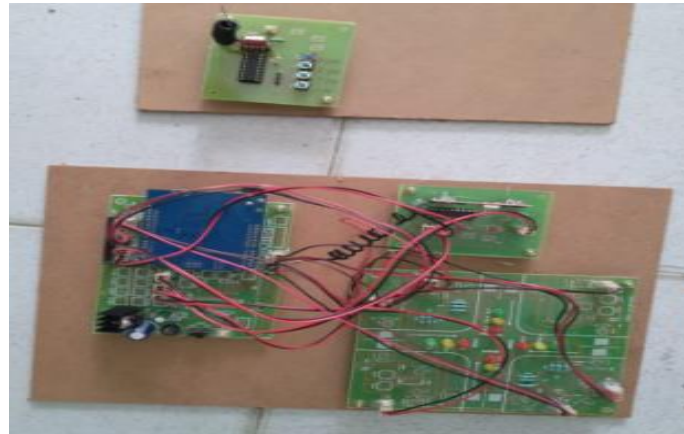


Fig. 3: Hardware Receiver output.

Powered on implemented output of the traffic system. This is implemented by ARDUINO 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.



Fig. 4: 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.

## 5. Conclusion

We designed and implemented RF Based Automatic Traffic Route Clearance System for Ambulance Using ARDUINO done successfully. This system implemented with transmitting section 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 saves the time and save life of the patients with this smart system.

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