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IJIEMR Transactions, online available on 9th June 2020. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-09&issue=ISSUE-06

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Volume 09, Issue 06, Pages: 12-17

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TRAFFIC CLEARANCE FOR AN EMERGENCY VEHICLE BY USING RF MODULE

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Abstract

The traffic lights are also known as traffic signals which are used to provide assistance in controlling city traffics and streamlining the current traffic situations. The traffic lights are used since 1868. They are used by traffic sergeant to avoid congestion and to maintain the proper flow of city traffic. As years passed, these lights are evolved with automatic controls, Pedestrian supporters and so on. There are several standards followed in implementation and design. The smart traffic light controller is designed to develop a traffic signal based on avoidance of traffic congestion and also innovative control to clear the traffic for an emergency vehicle. The emergency vehicle would have a transmitter within it, which would transmit a signal to the receiver side, this will enable a green signal in the corresponding pole. The light of the signal is controlled by timers which are built-in by discrete components. The timers are controlled using Arduino boards. The implementation is made simplified by readily available components. The complexity of the control mechanism is also simpler. Accuracy of data transmission and reception is good in the desired or specified range of operation. Traffic congestion problem is a phenomenon which contributed a huge impact on the transportation system in our 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 assistance system is designed in order to solve these problems. This system was designed to be operated when it received signal from emergency vehicles based on radio frequency (RF) transmission and used the Programmable Arduino UNO microcontroller to controls the LEDs used in the traffic signals. The use of hazard LED in the system which helps the emergency vehicles to pass the traffic easily. This system will reduce accidents which often happen at the traffic light intersections because of other vehicle had to huddle forgiven a route to an emergency vehicle. As a result, this project successful analyzing and implementing the traffic assistance system for emergency vehicles.

Keywords: Traffic Management, Emergency Vehicle priority, Radiofrequency Communication.

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CHAPTER I
INTRODUCTION

The traffic signals are positioned at road junctions and Pedestrian crossings. In general, the traffic signals have two main lights red and green. To support people with red-green colour blindness, red contains orange as hue and green contains blue. For our experimental considerations, we take red and green into account. Red indicates the stop command, green indicates the go command and the yellow indicates to get prepared. There is a blinking yellow condition where the user needs to precede the signal with caution. An Emergency vehicle is designed or authorized to respond during an emergency or life-threatening situations. We have considered an ambulance in our experimental procedure. The ambulances are permitted to break conventional road rules to reach their destinations in time. Their breakpoints include violation of traffic junctions and violating road speed rules. The ambulances come under the category of emergency medical vehicles. The ambulances are provided with various lifesavers, first aids and assistive devices. As the above shortcomings or violations are to be rectified, the emergency vehicles have to establish a relationship with the traffic junction. The communication between the fixed receiver and the isolated movable transmitter has to be established wirelessly. The main objective of our work is to implement a smarter system for avoiding the congestion of stagnating vehicles, to assist the emergency vehicles and to provide scope for improvement in smarter traffic systems.

CHAPTER II
EXISTING AND PROPOSED SYSTEM

2.1 Existing System

At present, traffic congestion is a major problem. The smart traffic controller controls the signal based on the path of the emergency vehicle. If the emergency vehicle is sensed, then the traffic signals are enabled according to the path of the ambulance. If the road consists of four junctions and when the emergency vehicle arrives at the first junction then the signal 1 is enabled, automatically consecutive signals are enabled one by one. In case if the emergency vehicle arrives at the second junction, the signal 2 is enabled by resetting S2 and then signal 3 and 4 also gets enabled after a particular time, where signal 1 is disabled at this case. After the emergency vehicle crossed, the signals are reset to start from the first iteration to avoid traffic congestion. When normal vehicles move with a constant speed, then there is no delay in crossing poles.

2.2 Proposed System

Traffic Density Control to reduce the problem of traffic congestion which is a very severe problem nowadays. A scheme using microcontroller, in which timings of green light and red light are assigned based on the density of the traffic present at that time. This can be done by using a LASER diode and photodiode. Traffic Signals based on

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Density with Innovative Clearance for Ambulance. During normal timings, the signal timing changes automatically by sensing the density at the junction. The movement of approaching an ambulance which is in an emergency would have an android device that would override the set timing prompting instantaneous green signal in the desired direction while blocking the other lanes by the red signal for some time. Microcontroller AT89S52 is the brain of the project which initiates the traffic signal at a junction. The led are automatically on and off by making the corresponding port pin of the microcontroller high. At a particular instant, only one green light holds and other lights hold at red. During the transition from green to red, the present group yellow led and the succeeding group led changes to green. This process continues as a cycle. IR sensors are used in the line of sight configuration across the roads to detect density at the traffic signal. The density of vehicles is measured on which timings are controlled accordingly. Clearance to the emergency vehicle is activated by a Bluetooth operated by the android device from the emergency vehicle. The main objective of the proposed Model is to prevent the ambulance from getting stuck in traffic congestion. If the Ambulance gets caught up in traffic congestion, there is a risk of patient death. By using this system, traffic congestion can be prevented. In this paper, we have designed an intelligent traffic management system that can clear traffic congestion using Wireless Communications technology. The proposed system consists of Arduino module, Android GSM mobile, LCD, transmitter and receiver module. Whenever an Ambulance comes near the road intersections automatically the traffic signalchanges and gives way for the ambulance to pass through the road intersection without any difficulty. The existing system simply suggests an alternative route at huge traffic situations. This system can immediately stop vehicles in all other lanes and allow the ambulance to pass through safely and quickly. The improvement in the system can be made by introducing authentication systems for the isolated transmitter module. The smartness of the proposed system could be improved by providing mobile access and density analysis by image processing techniques. The proposed system is implemented by using RF transmitter-receiver and Arduino boards.

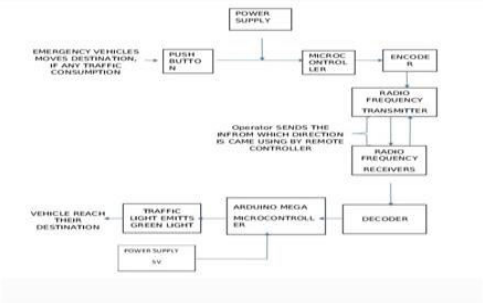

Fig 1:- Block Diagram

2.2.1 Arduino

Arduino Mega 2560. It is a microcontroller board based on Atmega 2560 microcontroller. Arduino Boards have revitalized the automation industry with their easy to use platform where everyone with little or no technical background can get started with learning some basic skills to program and run the board. I have updated articles previously on Arduino Uno, Arduino Nano, an Arduino Pro Mini. All these boards function similarly in one way or the other. There are some basic features like PCB layout design, size, number of analogue pins and

breadboard-friendly nature that make them different from each other. In terms of coding, all these boards are programmed in Arduino IDE software and you don't need to attach extra components or devices to put them in the running condition. Everything is already built on the board that makes this device readily available. Just plug and play with the board as per your requirement.

2.2.2 HT 12 ENCODER

Encoders provide motion control information on position, count, speed and direction. As the encoder shaft rotates, output signals are produced, proportional to the distance (angle) of rotation. The signal may be in the form of a square wave (for an incremental encoder) or an absolute measure of position (for an absolute encoder). Due to the performance and reliability advantages of the semi-conductor technology they incorporate, optical encoders are the preferred solutions in many common computers, industrial and automotive applications. Optical encoders also benefit from the ease of customization, are suitable to numerous environments, and suffer no effects from high levels of stray magnetic fields. The basic construction of an incremental encoder is shown to the left. A beam of light emitted from an LED passes through a transparent disk patterned with opaque lines and is picked up by a photodiode array. The Photodiode array (also called a photosensor) responds by producing a sinusoidal waveform which is transformed in a square wave or pulse train. Incremental encoder often called a tachometer, is normally used in systems that rotate in one direction only and require simple position and velocity information. Quadrature encoders have dual channels (A and B), phased 90 electrical degrees apart.These two output signals determine the direction of rotation by detecting the leading or lagging signal in their phase relationship.

Fig2: HT-12 Encoder

2.2.3 HT 12 Decoder

HT12D is a 212 series decoder IC (Integrated Circuit) for remote control applications manufactured by Holtek. It is commonly used for radio frequency (RF) wireless applications. By using the paired HT12E encoder and HT12D decoder we can transmit 12 bits of parallel data serially. HT12D simply converts serial data to its input (may be received through RF receiver) to 12 bit parallel data. These 12 bit parallel data is divided into 8 address bits and 4 data bits. Using 8 address bits we can provide 8-bit security code for 4-bit data and can be used to address multiple receivers by using the same transmitter. HT12D is a CMOS LSI IC and is capable of operating in a wide voltage range from 2.4V to 12V. Its power consumption is low and has high immunity against noise. The received data is checked 3 times for more accuracy. It has a built-in oscillator, we need to connect only a small external

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resistor. As HT12E, it is available in 18 pin DIP (Dual Inline Package) and 20 pin SOP.

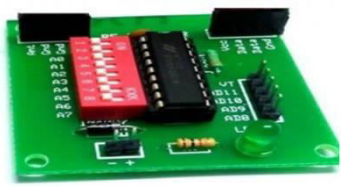

Fig 3:- HT-12 Decoder

2.2.4 RFID Reader module

RFID Reader may be a module that reads the ID information stored in RFID TAGS. This ID information is exclusive for every TAG which cannot be copied. This module directly connects to any microcontroller UART or through an RS232 converter to PC. It gives UART/Wiegand26 output. Where this Frequency Identification module works with any 125 kHz RFID tags. which also need future authentication to get accessed in the RFID configuring setup. It is employed like all other sensor modules. First, we select the mode of communication between the MODULE and CONTROLLER. Next, we'll program the controller to receive data from the module to display. Next power the system. When a tag is brought near the MODULE it reads the ID and sends the knowledge to the controller. The controller receives the knowledge and performs action programmed by us.

CHAPTER III
RESULTS

Fig 5:- Result

CHAPTER IV
CONCLUSION

It is evident from the implementation that the system works well in the desired range of operation. The range is improved by introducing antenna to RF Transmitter and Receiver. The simulation result synchronizes hundred per cent in hardware implementation. The cost of implementation is also lesser when compared with conventional proposed systems. The transmitted operations are exactly received and the desired action of traffic control is established with one hundred per cent accuracy. Traffic jams at intersections pose a major delay for emergency services. By the use of the proposed technology, efficiency of emergency services can be greatly improved. This system will help in saving lives. Emergency services should work with the traffic control system in order to make this system work. As a conclusion, this project has achieved the main objective stated earlier which is analyzing and implementing the wireless communication; the radio frequency (RF) transmission in the traffic light control system for emergency vehicles. The prototype of this project is using the frequency of 434 MHz compared to the range of about 3 kHz to 300 GHz of frequency which has been reserved for the RF theoretically. Besides, the functionality of this project proved that the other objectives have been successfully attained which are designing an emergency sequence mode of a traffic light when emergency vehicles passing by an intersection and changing the sequence back to the

normal sequence before the emergency mode was triggered. The sequences for this project have been developed using the programming in the Arduino. 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

FUTURE SCOPE

Some other features that can be incorporated into the system are as follows: If one of the readers in any path fails, the system can still work. In such cases, when the other reader in that path tracks a vehicle, the CDPS checks whether it has just crossed the readers in another path converging at the crossing or not. From this, the direction of travel can be obtained. For this, the CCS must regularly share Handshaking Acknowledgement signals with all the readers to find out whether they are working properly or not.

The two readers in each path are placed on opposite sides. If any road needs to be broadened or any other maintenance work needs to be done, then one of the readers can be temporarily removed and the system made to work on a single reader in that road. If any or both of the roads are two-way

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