

# Intelligent Traffic Management for Ambulance and VIP Vehicles

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**ABSTRACT-** The accretion of traffic has led to the use of more sophisticated Traffic management system in today's society. Traffic Congestion is a major factor which forestalls the smooth flow of Ambulance and VIP vehicles. To abate the inconvenience caused by the traffic, the Traffic Light Controller (TLC) is used which minimizes the waiting time of vehicle and also manages traffic load. RFID based systems play a crucial role in solving the problems caused by traffic. The project is a replica of a four way lane crossing of real time scenario. In the first part, concentrated on problems faced by Ambulances, RFID concept is used to make the Ambulance's lane Green and thus provides a free way without interrupting the Ambulance. In the second part, concentrated on problems faced by Priority vehicles, IR sensors are used to actuate the timers accordingly and thus preventing traffic congestion. In the third part, concentrated on Traffic density control, IR transmitter and receiver are used to provide dynamic traffic control and thus increasing the duration of the Green light of the lane in which traffic density is high and hence, regulating traffic.

**KEYWORDS:** IR sensors, RFID systems, Traffic congestion, Traffic light controller.

## I. INTRODUCTION

Due to the thriving urbanization, industrialization and population, the traffic management has become a difficult task. As seen in Fig.1, with growth in traffic, there is occurrence of bundle of problems too, these problems include traffic jams, accidents and traffic rule violations. This in turn has an adverse effect on the economy of the country as well as on the lives of many.



Fig. 1: Traffic in Bangalore city.

Traffic lights play an important role in traffic management. Traffic lights are the signaling devices that are placed on the intersection points and used to control the flow of traffic on the road.

In 1868, the traffic lights were only installed in London and today these are installed in most cities around the world. Most of the traffic lights around the world follow a predetermined timing circuit. Sometime the vehicles on the red light lane have to wait for green signal even though there is a dearth of traffic. It results in the loss of valuable time. Traffic

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control at intersections is a matter of concern in large cities. Several attempts have been made to make traffic light's sequence dynamic so that these traffic lights operate according to the current volume of the traffic.

Most of them use the sensor to calculate current volume of traffic but this approach has the limitation that this technique is based on counting of the vehicles and treats emergency vehicles as the ordinary vehicles which means no priority to ambulance, fire brigade or V.I.P vehicles. As a result, emergency vehicles are stuck in traffic signal and waste their valuable time. In today's world, health hazards are a major concern. Especially people in the older age group are the victims, due to the worsening traffic conditions which lead to miasma and pollutions of different type.

The use of embedded technology has proved to be very beneficial in present Traffic Light Controller (TLC) and that will minimize waiting time of vehicle and also manage traffic load. This paper exploits the emergence of new technology called intelligent traffic light controller, this makes the use of sensor network along with embedded technology. Here traffic light will be intelligently decided based on the total traffic on all adjacent roads. Thus optimization of traffic light switching increases road capacity, traffic flow and can prevent traffic congestions. If at all the Ambulance encounters the traffic jam in the route, the RFID is used as a remote to control the traffic signals. The particular signal is made Green for a predetermined amount of time and after the ambulance passes by, it regains its original flow of sequence of signalling.

The problem of traffic light control can be solved by RFID based system. This system considers the priority of different type of vehicles and also the density of traffic on the roads by installing RF reader on the road intersections. Radio frequency identification is a technique that uses the radio waves to identify the object uniquely. RFID is a technique that is widely used in the various application areas like medical science, commerce, security, Electronic toll collection system, access control etc. There are two main components of RFID:

1. RFID tag and
2. RF Reader.

Various types of tags are available but we can mainly divide them into two categories: passive tags and active tags. There are three parts of the tag: antenna, semiconductor chip and some form of encapsulation. The life of the passive tag is very long. The reader sends electromagnetic waves that produce current in the tag's antenna. In response, antenna reflects the information stored in it. The active tags contain a battery as an internal power source used to operate microchip's circuitry and to broadcast the information to the reader.

The range and cost of these tags is more as compare to passive tags. There are three kinds of RFID tags which work on the three different frequency ranges: low-frequency, high-frequency and ultrahigh frequency.

In this project:

1. For demonstration purpose three roads are considered.
2. In this prototype RFID reader used is of low frequency.

Only road 2 is considered to be the route travelled, more frequently, by VIP vehicles and Ambulances.

## II. LITERATURE SURVEY

The paper titled "Implementing Intelligent Traffic Control System for Congestion Control Ambulance Clearance and Stolen Vehicle Detection" [1], tells about intelligent traffic control systems to pass emergency vehicles smoothly. Each individual vehicle is equipped with special Radio Frequency Identification tags, RFID reader is used to read the tags attached to the vehicle. It also determines network congestion and hence the green light duration for the path. Also in this project a message will be sent using GSM SIM 300 to the police control room unlike in our project. The project is implemented only for single road where as our project depicts Multi-road junctions.

The paper titled "Design and Implementation of a Robotic Car to Recognize Traffic Science" [2], gives information about the traffic congestion and tidal flow which are the main causes for delay of ambulance. Here the location of the ambulance is traced using GPS units and it sends the data to the traffic lights through the embedded systems. The

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project is implemented using MATLAB programming environment and AT89C52 microcontroller is used where as our project is implemented using RENESAS microcontroller. This project controls traffic congestion using Robotic Car where as our project uses RFID reader to control traffic for Ambulances and VIP vehicles.

The paper titled “Automatic Vehicle Identification System based on RFID” [3], is based on the explication of the identification principle, the system structure and the characteristics of the RFID. This paper introduces the structural, technical targets and applications of AVI system based on the RFID giving a unique advantage in data collection and data transmission. This project is only based on AVI system where as our project is based on traffic congestion management.

### III. DESIGN METHODOLOGY

Many embedded systems have substantially different designs according to their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of a single microcontroller, comparator, LED's, and RFID reader.

The microcontroller located at the center of the block diagram forms the control unit of the entire project. Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided by the output of the sensors.

#### A. Block Diagram:

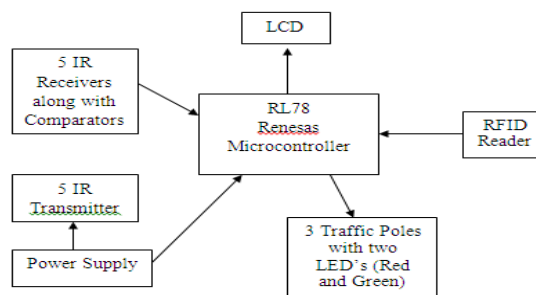


Fig.2: Block diagram

As shown in Fig.2, the intelligent traffic management system for ambulance and VIP vehicles mainly consists of the following parts :

- Renesas microcontroller ( RL78 series )
- RFID Based System
- LM358 comparator
- IR sensors-5 pair of IR transmitter and receiver
- LED
- LCD

Fig.3 shows RL78 microcontroller (MCUs) from Renesas Electronics which are an advanced family of general-purpose and application-specific MCUs, combining true low power and high performance operation. The RL78 is designed specifically for ultra-low-power applications. The innovative Snooze mode allows serial communication and ADC operation in standby, which makes it best-in-class for battery powered designs.

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Fig. 3: Renesas Microcontroller IC

## B. Layout:

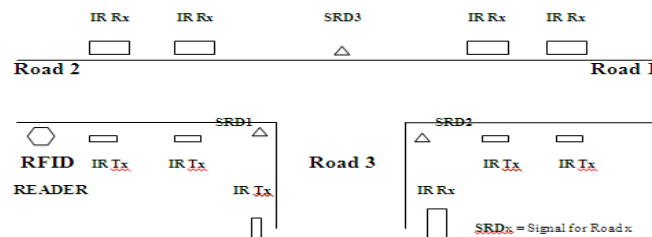


Fig.4: Layout

Consider the Fig.4, by default green signal will be activated for a particular road for 5 seconds. Whenever the first IR receiver on a particular road is blocked, green signal will be displayed for 10 seconds. If the second IR receiver on a particular road is blocked, green signal will be displayed for 15 seconds. Whenever ambulance or VIP vehicle passes on a particular (here road 2 for demo), green signal will be displayed for 20 seconds.

All IR transmitter sensors communicate with IR receivers, on the opposite side of the road, in a line-of-sight propagation method. Every RFID tag has an eight digit unique serial number. These RFID tags are mounted on the vehicle. Whenever the vehicle passes on Road 2, the RFID reader acquires the tag serial number through EM (Electro-Magnetic) waves. Embedded within the microcontroller is a database consisting the tag number of the particular vehicle. So whenever, an ambulance or VIP vehicle passes on Road 2, the serial number of the tag attached to there is acquired and the corresponding vehicle whether VIP or ambulance is displayed on LCD. In the above block diagram LCD is utilized to demonstrate the working of the entire unit.

IR data transmission is also employed in short-range communication among computer peripherals. These devices usually conform to standards published by IrDA, the Infrared Data Association. Remote controls and IrDA devices use infrared LEDs to emit infrared radiation that is focused by a plastic lens into a narrow beam. The beam is modulated, i.e. switched on and off, to encode the data. The receiver uses a silicon photodiode to convert the infrared radiation to an electric current. It responds only to the rapidly pulsing signal created by the transmitter, and filters out slowly changing infrared radiation from ambient light.

Infrared communications are useful for indoor use in areas of high population density. Infrared is the most common way for remote controls to command appliances.

Radio Frequency Identification (RFID) is a generic term for non-contacting technologies that use radio waves to automatically identify people or objects. There are several methods of identification, but the most common is to store a unique serial number that identifies a person or object on a microchip that is attached to an antenna [4]. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in combination with an "RFID

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reader. An RFID reader is a network connected device (fixed or mobile) with an antenna that sends power as well as data and commands to the tags. The RFID reader acts like an access point for RFID tagged items so that the tags' data can be made available to business applications.

### C. Software used:

1. CubeSuite+ Tool
2. Renesas Flash Programmer

CubeSuite+ is an integrated development environment (IDE) for the microcontrollers (RX, V850, R8C ,RL78, 78K0R, and 78K0).

By integrating the necessary tools for each development phase, it is possible to perform all phases in software development using just this product, without the need to use many different tools separately. Emphasis is placed on making the tools work together, improving development efficiency in many different situations. As an example, the output from the design phase is automatically reflected in the debug phase. CubeSuite+ also has an update feature to automatically obtain this product upgrades via the network, making it simple to maintain the environment required for software development (free downloadable tools excluded).

An integrated development environment is a development environment integrating the necessary tools for all phases of software development, including design, implementation (coding and building), and debugging, into a single platform framework.

## IV. RESULTS

This project will provide minimum waiting time for vehicles and also manage traffic load. The traffic light will be intelligently decided based on the total traffic. When the RFID on the ambulance is detected by the receiver the traffic lights are controlled based on the timer. Fig.5 depicts the model of intelligent traffic management for ambulance and VIP vehicles with LCD display and traffic signalling lights. Fig.6 depicts the LCD display of traffic density on road 3.

This system will definitely help traffic police to give the way to the ambulance when there is heavy traffic on the road. The design and implementation of this technique is directly targeted for traffic management so that emergency vehicles on road get clear way to reach destination in less time and without any human interruption.

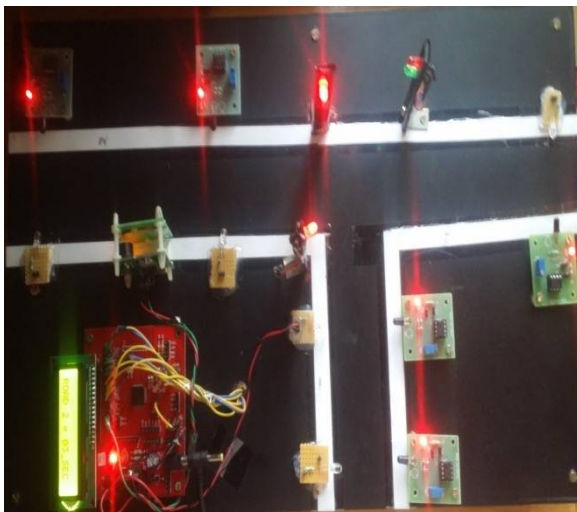


Fig. 5: Model connection

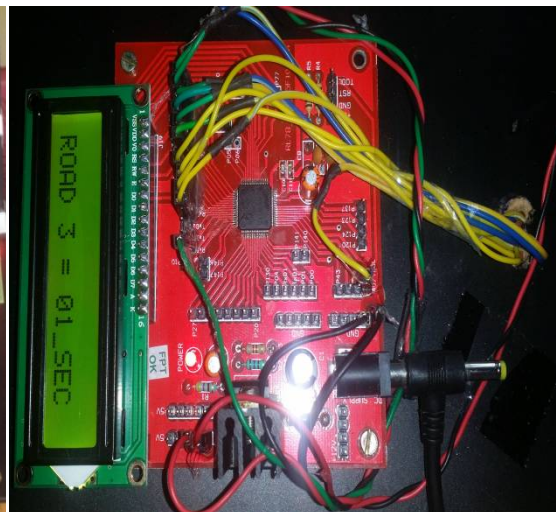


Fig. 6: LCD Display of traffic density on road 3

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## V. CONCLUSION & FUTURE SCOPE

The proposed work considers not only the priority of the vehicles but also the density of the vehicles on the road and controls the traffic light sequence efficiently and more accurately and the accuracy of the RFID is more than Camera's so it also improves the performance of traffic light Violation Detection System. Also as a future scope the condition of patient can be monitored and this information is sent to the respective doctor so that doctor can prepare for the next process before the patient reach to the hospital. Traffic lights can be increased to N number and traffic light control can be done for whole city by sitting on a single place. In ambulance system, the data of the patient in the ambulance can be sent to the Hospitals via GSM technology. Thus, it can provide early and fast treatment of the patient.

## REFERENCES

- [1] Rajeshwari Sundar, Santhosh S Hebbar, Varaprasad Golla, "Implementing Intelligent Traffic Control System For Congestion Control Ambulance Clearance and Stolen Vehicle Detection", IEEE Sensors Journal, VOL.15, NO.2, pp 151-156, February 2015.
- [2] Hassom Moazzam, Muhammad Usman Asad, Ghulam Abbas, Umar Farooq, Jason Gu, "Design and Implementation of a Robotic Car to Recognize Traffic Science", IEEE 28<sup>th</sup> Canadian Conference on Electrical and Computer Engineering, Canada, pp 86-91, May 3-6, 2015.
- [3] Chong hua Li "Automatic Vehicle Identification System based on RFID", Anti Counterfeiting Security and Identification in Communication (ASID), pp 281-284, 2010.
- [4] Elisabeth ILIE-ZUDOR "The RFID Technology and Its Current Applications", MITIP, ISBN 963-86586 57, pp.29-36, 2006.
- [5] Sachin Jaiswal, Tushar Agarwal, Akanksha Singh and Lakshita, "Intelligent Traffic Control Unit", ISSN 2277-2626 International Journal of Electrical, Electronic and Computer Engineering 2(2): 66-72(2013).
- [6] R. Want, "Enabling Ubiquitous Sensing with RFID," Computer, vol. 37, issue no. 4, pp. 84-86, 2004.
- [7] Sarika B. Kale, Gajanan P. Dhok, "Design of Intelligent Ambulance and Traffic Control", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-5, April 2013.
- [8] Xu Li, Wei Shu, Minglu Li, Hong-Yu Huang, Pei-En Luo, Min-You Wu, "Performance Evaluation of Vehicle-Based Mobile Sensor Networks for Traffic Monitoring", IEEE transactions on vehicular technology, vol. 58, no. 4, pp. 1647-1653, May 2009.
- [9] Wen and Yang, "A dynamic and automatic traffic light control system for solving the road Congestion problem", WIT Transactions on the Built Environment (Urban Transport), Vol. 89, pp 307-316, 2006.
- [10] Harpal Singh, Krishan Kumar, Harbans Kaur, "Intelligent Traffic Lights Based on RFID", International Journal of Computing & Business Research, ISSN 2229-6166.
- [11] Faisal A. Al- Nasser, Hosam Rowaihy, "Simulation of Dynamic Traffic control system based on Wireless sensor network", IEEE Symposium on Computers & Informatics, pp 40-45, 2011.
- [12] Amrita Rai and Govind Singh Patel, "Multiple Traffic Control Using Wireless Sensor and Density Measuring Camera", Sensors & Transducers Journal, Vol. 94, Issue 7, pp. 126-132, July 2008.