International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER SSRN

IJIEMR Transactions, online available on 30th Jul 2022. Link :http://www.ijiemr.org/downloads.php?vol=Volume-11&issue= Spl Issue 06

DOI: 10.48047/IJIEMR/V11/SPL ISSUE 06/28

Title **Automatic Traffic Light System for Emergency Vehicles**

Volume 11, SPL ISSUE 06, Pages: 152-156

Paper Authors
Mounika, Yashwanth, Gunavamshi, Kranthi, Akhil, Pavan kumar

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

Automatic Traffic Light System for Emergency Vehicles

Mounika[1], Yashwanth[2], Gunavamshi[3], Kranthi[4], Akhil[5], Pavan kumar[6]

[1]*Assistant Professor, Dept. of Electronics & Communication Engineering, Balaji Institute of Technology and Science, Warangal, Telangana, India*

[2,3,4,5,6]*UG Student, Dept. of Electronics & Communication Engineering, Balaji Institute of Technology and Science, Warangal, Telangana, India*

Abstract: The road accidents in the present era have increased to a greater extent. The loss of human life due to accidents must be avoided. Traffic congestion and tidal flow are major factors that cause delays to ambulances. In order to save human life from accidents we introduce a scheme called Automatic Traffic Light system. The main concept behind this scheme is to provide a smooth flow for the emergency vehicles like ambulances to reach the hospitals in time and thus minimising the delay caused by traffic congestion. With the help of this Intelligent Transportation System integrated with the GPS the current scenario of traffic congestion can be solved to an extent. This scheme is fully automated and controls the traffic lights, helping to reach the hospital in time. Here we track the ambulance location using GPS units, and it sends the data to the traffic lights through an embedded system. This system controls the traffic lights and saves time in emergency periods.

I. INTRODUCTION

The accretion of traffic has led to the use of a more sophisticated Traffic management system in today's society [1]. Traffic Congestion is a major factor which forestalls the smooth flow of Ambulance and VIP vehicles [2]. To abate the inconvenience caused by the traffic, the Traffic Light Controller (TLC) is used which minimises the waiting time of vehicles and also manages traffic load. RFID based systems play a crucial role in solving the problems caused by traffic [3]. The project is a replica of a four way lane crossing in a 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 freeway without interrupting the Ambulance [4]. 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 [5].

Due to the thriving urbanisation, industrialization and population, traffic management has become a difficult task. As seen in Fig.1, with growth in traffic, there is an occurrence of a bundle of problems too, these problems include traffic jams, accidents and traffic rule violations [6]. This in turn has an adverse effect on the economy of the country as well as on the lives of many.

Traffic lights play an important role in traffic management. Traffic lights are the signalling 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 [7].

Most of the traffic lights around the world follow a predetermined timing circuit. Sometimes the vehicles on the red light lane have to wait for a green signal even though there is a dearth of traffic. It results in the loss of valuable time [8]. Traffic control at intersections is a matter of concern in large cities. Several attempts have been made to make traffic light sequences 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

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

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 [9].

As a result, emergency vehicles are stuck in traffic signals and waste their valuable time. In today's world, health hazards are a major concern [10]. Especially people in the older age group are the victims, due to the worsening traffic conditions which lead to miasma and pollution of different types.

The use of embedded technology has proved to be very beneficial in the present Traffic Light Controller (TLC) and that will minimise waiting time of vehicles and also manage traffic load. This paper exploits the emergence of new technology called intelligent traffic light controller, this makes the use of sensor networks along with embedded technology. Here traffic lights 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 [11]. If at all the Ambulance encounters a 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 [12].

The problem of traffic light control can be solved by RFID based systems. This system considers the priority of different types of vehicles and also the density of traffic on the roads by installing RF readers 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, the antenna reflects the information stored in it. The active tags contain a battery as an internal power source used to operate the microchip's circuitry and to broadcast the information to the reader. The range and cost of these tags is more as compared 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 purposes 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.

2. Usage of **(RFID)** is a method that is used to track or identify an object by radio transmission used over the web. Data digitally encoded in an RFID tag which might be read by the reader. This device works as a tag or label during which data is read from tags that are stored in the database through the reader as compared to traditional barcodes and QR codes. It is often read outside the road of sight either passive or active RFID.

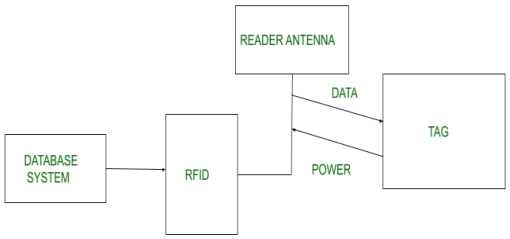

Fig: (1). RFID working diagram

There are many kinds of RFID, each with different properties, but perhaps the most fascinating aspect of RFID technology is that most RFID tags have neither an electric plug nor a battery. Instead, all of the energy needed to operate them is supplied in the form of radio

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

waves by RFID readers. This technology is called passive RFID to distinguish it from the(less common) active RFID in which there is a power source on the tag.

UHF RFID (Ultra-High Frequency RFID). It is used on shipping pallets and some driver's licences. Readers send signals in the 902-928 MHz band. Tags communicate at distances of several metres by changing the way they reflect the reader signals; the reader is able to pick up these reflections. This way of operating is called backscatter.

HF RFID (High-Frequency RFID). It operates at 13.56 MHz and is likely to be in your passport, credit cards, books, and noncontact payment systems. HF RFID has a shortrange, typically a metre or less because the physical mechanism is based on induction rather than backscatter.

There are also other forms of RFID using other frequencies, such as LF RFID (Low-Frequency RFID), which was developed before HF RFID and used for animal tracking

Fig (b): RFID tags & reader module

IoT devices are a subset of the larger concept of home automation, which includes lighting, heating and cooling, media, and security. Long-term desires could link vitality venture reserves, ensuring that lights and equipment are not destroyed. Efforts are debating and identifying a large number of IoT-related applications, which can be divided into two categories. The gadgets are first grouped together, forming an automated establishment with M2M connectivity and the potential to improve people's lives. TCC&R's activities are predicted by IoT in this class (track, request and control). For example, in nuclear families,

3. Operation

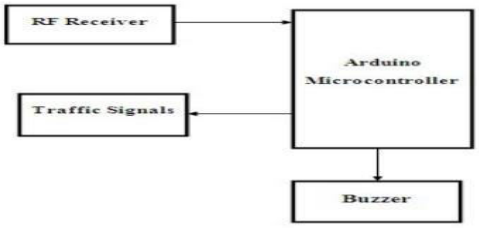

Fig (c): Schematic Diagram

Here an emergency vehicle consists of Rf tag which has a unique id, that id is read by the RFID reader or receiver module which will read data from rfid and send that data to the controller which is Arduino UNO in our case.

This input is processed by controller and searches for pre database that it is a valid emergency request or not. If the read data is valid then controller turns the way light to green and others to red but ion case of invalid data it ignores and continues normal signalling process

And also we have a buzzer that is used to alert other vehicles to give freeway to the emergency vehicle when they arrive that way it is easy for other users to recognise there is an emergency vehicle behind them so they give way to that vehicle.

4. RESULTS

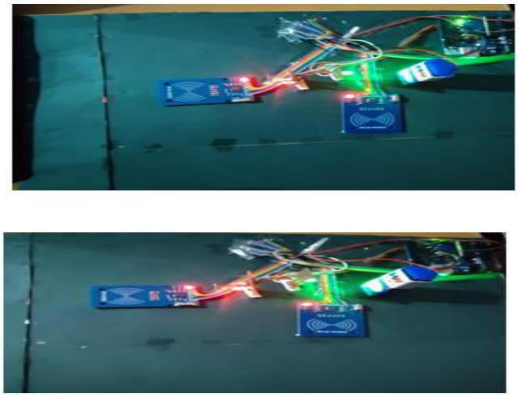

Fig (d) RFID outputs

Fig (d) RFID outputs

5. FUTURE SCOPE

Till this point of time we managed to find what is the best approach to follow to meet our objective i.e, to detect emergency vehicles and change traffic signals based on the detected input. Also we managed to find all the hardware and software requirements such as Arduino UNO , LED, Buzzer, RFID Tags & Reader. We also gathered all data that required us to proceed further in this project.

We also learnt a lot about RFID technology and AVR based controller's i.e, Arduino and its programming environment Arduino IDE.

In future we have to acquire all the stated components and start building projects in real time. Then start appropriate programming and finish the project with expected output.

REFERENCE

[1] Karthik Kumar Vaigandla, Dr.N.Venu, " Survey on Massive MIMO: Technology, Challenges, Opportunities and Benefits," YMER, VOLUME 20 : ISSUE 11 (Nov) - 2021, Page No:271-282.
[2] Karthik Kumar Vaigandla and Dr.N.Venu, "A Survey on Future Generation Wireless Communications - 5G : Multiple Access Techniques, Physical Layer Security, Beamforming Approach", *Journal of Information and Computational Science*, Volume 11 Issue 9, 2021, pp.449-474.
[3] Karthik Kumar Vaigandla and Dr.N.Venu, "BER, SNR and PAPR Analysis of OFDMA and SC-FDMA," GIS SCIENCE JOURNAL, ISSN NO : 1869-9391, VOLUME 8, ISSUE 9, 2021, pp.970-977.
[4] Dr.Nookala Venu, Dr.A.ArunKumar and Karthik Kumar Vaigandla. Review of Internet of Things (IoT) for Future Generation Wireless Communications. International Journal for Modern Trends in Science and Technology 2022, 8(03), pp. 01-08.
[5] A. V. L. N. Sujith, R. Swathi, R. Venkatasubramanian, Nookala Venu, S. Hemalatha, Tony George, A. Hemlathadhevi, P. Madhu, Alagar Karthick, M. Muhibbullah, Sameh M. Osman, "Integrating Nanomaterial and High-Performance Fuzzy-Based Machine Learning Approach for Green Energy Conversion" Journal of Nanomaterials, ISSN: 1687-4129,Volume 2022,PP:1-11
[6] Nookala Venu, D. Yuvaraj, J. Barnabas Paul Glady, Omkar Pattnaik, Gurpreet Singh, Mahesh Singh, and Amsalu Gosu Adigo, "Execution of Multitarget Node Selection Scheme for Target Position Alteration Monitoring in MANET", Wireless Communications and Mobile Computing, ISSN:1530- 8669, Volume 2022, PP: 1-9.
[7] Nookala Venu, R.Swathi, Sanjaya Kumar Sarangi, V. Subashini, D. Arulkumar, Shimpy Ralhan, Baru Debtera, "Optimization of Hello Message Broadcasting Prediction Model for Stability Analysis", Wireless Communications and Mobile Computing, ISSN:1530- 8669, Volume 2022, PP: 1-9.
[8] Nookala Venu, Karthik Kumar Vaigandla, Dr.A.ArunKumar, "Investigations of Internet of Things (IoT): Technologies, Challenges and Applications in healthcare", International Journal of Research (IJR), ISSN: 2236-6124, Volume XI, Issue II, Feb 2022, PP: 143-153.
[9] Dr. Nookala Venu, "Analysis of Xtrinsic Sense MEMS Sensors" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE), ISSN:2278-8875 Vol 4, Issue:8, August 2015, PP: 7228-7234.
[10] Nookala Venu, Asiya Sulthana, "Local Mesh Patterns for Medical Image Segmentation" Asian Pacific Journal of Health Sciences (APJHS), e-ISSN: 2349-0659 p-ISSN: 2350-0964, Vol. 5, Issue 1, March 2018, PP: 123-127.
[11] Dr Nookala Venu, Mrs Asiya Sulthana "Local Maximum Edge Binary Patterns for Medical Image Segmentation, International Journal of Engineering and Techniques (IJET), ISSN: 2395-1303, Volume 4 Issue 1, Jan- Feb 2018, PP: 504-509.
[12] Dr.N.Venu, Dr.A.Arun Kumar, "Comparison of Traditional Method with watershed threshold segmentation Technique", International Journal of Analytical and Experimental Analysis (IJAEMA),ISSN: 0886-9367, Volume XIII, Issue 1, January- 2021, PP:181-187.
[13] Karne, RadhaKrishna, and T. K. Sreeja. "ROUTING PROTOCOLS IN VEHICULAR ADHOC NETWORKS (VANETs)." *International Journal of Early Childhood* 14.03: 2022.
[14] Karne, RadhaKrishna, et al. "Optimization of WSN using Honey Bee Algorithm."
[15] RadhaKrishna Karne, Dr TK. "COINV-Chances and Obstacles Interpretation to Carry new approaches in the VANET Communications." *Design Engineering* (2021): 10346-10361.
[16] Karne, RadhaKrishna, et al. "Simulation of ACO for Shortest Path Finding Using NS2." (2021): 12866-12873.
[17] RadhaKrishna Karne, Dr TK. "Review On Vanet Architecture And Applications." *Turkish Journal of Computer and Mathematics Education (TURCOMAT)* 12.4 (2021): 1745-1749.

[18] Karne, Radha Krishna, et al. "GENETIC ALGORITHM FOR WIRELESS SENSOR NETWORKS."