



A Review on Smart Traffic Control System For Ambulance

JyotiKumre¹, AnjaliMatre², AkankshaNasre³, ChaitaleeAkhand⁴, HimanshuPandey⁵

1Assistant professor Department of Information Technology, NIT, Nagpur
2B.E Graduate(iv year), Department of Information Technology, NIT, Nagpur
3B.E Graduate(iv year), Department of Information Technology, NIT, Nagpur
4B.E Graduate(iv year), Department of Information Technology, NIT, Nagpur
5B.E Graduate(iv year), Department of Information Technology, NIT, Nagpur

Abstract : The problem of urban traffic congestion is constantly spreading. The increase in traffic is due to growing number of vehicles and the limited expansion of roads. We propose a system for reducing traffic congestion using image processing by detecting blobs and tracking them. The system will detect vehicles through images instead of using electronic sensors embedded in the pavement. We also plan to provide a suitable solution for emergency vehicles stuck in traffic to clear the route by using IR Sensor, thus assuring timely help to those in need

Keyword: IoT, RFID, smart ambulance, traffic signa

INTRODUCTION

Population in developing countries such as India is increasing significantly. With the growth in urbanization, industrialization and population, there has been a tremendous growth in the car traffic. With growth in it, there are occurrences of a bundle of problems too, which include traffic jams, accidents etc. One of the adverse effects of traffic jams are faced by the emergency vehicles like ambulances, fire brigades etc. This problem of ambulance when getting stuck in a traffic jam can be addressed by ensuring that the lane in which the ambulance is traveling is cleared. This can be done by signaling the nearest traffic light whenever there is an ambulance approaching. One of the widely affected services due to traffic jams is that of an ambulance. Many times, ambulance consist of emergency or critical patients which need to be taken to the hospital in a minimum amount of time providing proper treatment to the patient so that chances of surviving increases in critical condition. A Patient may lose his life if there is delay in reaching an ambulance to the hospital. According to the surveys 95% of the heart attack cases can be treated, if the ambulance can reach the hospital at the current time without being stuck in traffic. For this, it is needed that the vehicles on the road make way for the ambulance. But sometimes, the ambulance gets stuck in the traffic which in turn wastes a lot of time waiting for the traffic to clear. We can overcome these limitations by the emerging technology such as IoT. (Internet of Things.) Various software implementations and hardware devices can be connected with the help of wireless networking tools or wired tools. In IoT the components are connected and controlled by the internet. Thus, the impact of IoT in today's era is significant as it helps to represent the object digitally and makes itself something greater than the object by itself. A very rapid population growth in cities has resulted in tremendous road traffic within the city. In addition, in recent times the number of deaths due to delays in the arrival of emergency vehicles has risen to greater extent. Hence emergency services such as ambulances and fire engines must be on time to avoid loss of human life. In the current traffic situation, therefore, helping an emergency vehicle move out of traffic congestion is very much important. To solve the problems given above. In this paper, we have come up with the 'Smart traffic control system for Ambulance'. The main purpose of this device is to allow the ambulance to reach a specific location without making it stop somewhere before it reaches the destination.

LITERATURE REVIEW

SUREN KRISHNAN, RAJAN THANGAVELLOO, SHAPI-EE BIN ABD RAHMAN & SIVA RAJA SINDIRAMUTTY e-ISSN: 2524 – 2534 (2021).”Smart Ambulance Traffic Control System”

Smart Ambulance Traffic Control System proposed in this paper is an integrated system of traffic light control for emergency ambulance service. The traffic lights can be controlled in a timely and efficient manner every time an emergency ambulance is approaching. The Radio-Frequency Identification (RFID) is used as an instrument to communicate with traffic lights during traffic congestion. The emergency ambulance driver needs to activate the RFID tag to allow the detection of RFID readers to control the traffic light operation at the upcoming traffic light junctions. The traffic lights in the path of the ambulance are forced to be green to allow the emergency ambulance to pass through the junction with top priority. Immediately after the ambulance has passed the junction, the control system will reset and return to normal operations.

Sudhakara H , Girish H. , Kumara Swamy N. , J. Vinay Kumar⁴ and Sachin Kumar.ISSN: 2278-0181 Vol. 9 Issue 04 (2020)

Smart Ambulance and Traffic Controlling System:”India is a developing country, the population of India is significantly growing. India stands within the 2nd place in the world in terms of population. As there will be an increase in population gradually there will be an increase in the number of vehicles, due to which the traffic congestion increases and because of which the emergency vehicles like ambulance, fire engine etc. face difficulty to reach the destination in time. Under these circumstances, a promising system that can clear the traffic sign especially in peak hours and thus provide a safe route for emergency vehicles is extremely important. In existing literature there's less focus shown on the emergency vehicles to clear the trail, to overcome this issue a RFID based system is proposed by using this technique we will manage and regulate the traffic signals at junctions which emergency vehicles approach. Thus there'll be easy passing out for the emergency vehicles in traffic congestion. The proposed framework is modeled by the means of an experimental setup using Arduino and LED displays which simulates a true time traffic scenario. This simulation results illustrate the terms of detection still as is providing passing for the emergency vehicle to hold up in peak hours.

Prof. Deepali Ahir, Saurabh Bharade, Pradnya Botre, Sayali Nagane, Mihir Shah eISSN:2395-0056(2018).”Intelligent Traffic Control System for Smart Ambulance:”

The growth of industrialization and urbanization has led to an immense increase in the population invariably leading to rise in the number of vehicles on road. The resulting traffic congestion and traffic jams are the major hurdles for emergency vehicles such as ambulances carrying critical patients as these emergency vehicles are not able to reach their destination in time, resulting in a loss of human life. To solve this problem to some extent we have apparently come up with “Intelligent Traffic Control System(ITCS) for ambulances”. The proposed system clears the traffic congestion by turning all the red lights to green on the path of the ambulance, hence helping in clearing the traffic and providing a way towards its destination. The system consists of an android application which registers the ambulance on its network. In case of emergency situation, if the ambulance halts on its way, the application sends an emergency command to the traffic signal server and also the direction where it wants to travel along with this the current position with the help of Global Positioning System (GPS). The nearest signal is identified based upon the current position of the ambulance. And that particular signal is made green till the ambulance passes by and later it regains its original.

Manav Kandhari, Svetlin Antonov Volume 7, Issue 3 ISSN 2394 - 7780 (2016).

“TRAFFIC CONTROL SYSTEM FOR AMBULANCE

Overpopulation is one of the biggest problems in the world today. Speaking about facts, an increase in the number of humans means an increase in the number of cars on roads. Thus traffic management is a critical issue faced in many metropolitan cities today. There are many problems with congestion with traffic lights in many cities, especially for emergency vehicles. Lack of efficient traffic control leads to loss of lives because of ambulance delay in case of getting stuck in traffic jams. In this paper a smart traffic control system which consists of a combination of 2 independent systems 10 overcomes this problem. The first system is using a REID, smart semaphores whereas the second system is having the application of stroboscopic effect along with stroboscope lights and sensors, The combination of these two systems would easily control the traffic and will help emergency vehicles to reach their destinations on time.

Prof. Manjiri M. Kokate , Madhuri S. Dabade , Shivani S. Shete , Jeevan G. Shitre , Gunjan Kumar H. Singh Volume 5, Issue 4 E-ISSN 2348-1269, P- ISSN 2349-5138 (2018).“Intelligent Traffic Signal Control System For Ambulance

Road traffic congestion becomes a major issue for highly crowded metropolitan cities. India is the second most populated country in the world and is a fast growing economy. It is facing terrible road congestion in the cities. According to Times of India about 30 percent of deaths are caused due to delayed ambulances reaching the hospital. In the proposed system we are trying to reduce the delay for the ambulance. To smoothen the ambulance movement we came up with “ Intelligent Traffic Signals Control System for Ambulance”. We are developing a website called ”HealthCare ” for registration about the medical history of all citizens .This data will help to save time in the hospital to become ready for treatment. This data can be retrieved by using unique id and fingerprint authentication. This generated data will be sent to the particular hospital before the ambulance over there. In the second phase, we are trying to provide the green signals for ambulances by switching the signals. We are going to use technologies like GPS and RFID. Whenever the signal detects the ambulance near to the signal, the signal switches to green. As this system fully automated, it recognizes the ambulance and controls traffic signals . This system controls traffic lights and saves time in an emergency period. Thus it act as a life saver projec

Anita Acha George, Arun Krishna, Toney Dias and Asheena Sara Varghese and Divya R S ISSN 2320–088X Vol. 4, Issue. 8 (2017).“GOLDEN AID - An Emergency Ambulance System

In this paper they proposed, Golden aid is designed to control the traffic signals along the path of the ambulance, when an ambulance approaches an intersection the traffic light is switched to green and as soon as the ambulance passes the intersection the control is restored to the proper signal offset value again. Introducing an IoTbased design for the system, it can virtually be controlled from anywhere. Makes it universally controllable and increases the responsive effectiveness. It can be used in situations like traffic congestion, emergency management, VIP escort etc.Thus the system increases the possibility of saving a life.

Tandrima Chowdhury ,Smriti Singh ,Dr.S.Maflin Shaby ISSN 2510–7885 (2016).“An A Rescue System of an Advanced Ambulance Using Prioritized Traffic Switching

In this paper they proposed that, through GSM (Global System for Mobile Communications), it sends the location of the accident to the ambulance section. The buzzer produces sound when an accident occurs. The central unit finds the ambulance, nearest to the accident spot and also the shortest path between the location of the accident, ambulance and the nearest hospital. Here, wireless technologies are used for information transferring. When the ambulance reaches the traffic junction, the encoder converts the serial data into parallel data when it passes from the transmitter to the receiver. If the signal is red, it comes to green automatically. The decoder in the receiver section converts the parallel data into serial data when it is sent back. This helps the ambulance to cross the traffic junction as soon as possible. The prioritized traffic switching is done priority wise, i.e. if two ambulances are coming at the

same time, the ambulance which will arrive first at the traffic junction will be given the priority to cross the traffic junction before the next ambulance arrives.

Rickin Patel ,Vipul K. Dabhi ,Harshadkumar B. Prajapati ISSN-7803-7444-4/02/(2017).“- A Survey on IOT based Road Surveillance and Accident Detection System

In this paper, the proposed system based on IOT is framed with the help of a processing board to process the data and a camera module to provide the live video as input. Raspberry pi board will be used as processing module and pi camera module will provide the input data in video raw format h.264 to the Raspberry pi. The system will detect the number of vehicles passing by, accidents and predict the lane projectile of the vehicles on the road. The background subtraction using Gaussian mixture model and edge detection using canny edge is executed on Raspberry pi.

B.Janani Sarada, G.Vijayshri , T.Subha E-ISSN: 2349-7610 (2017).“Intelligent Traffic Signal Control System For Ambulance Using RFID And CLOUD

Road traffic congestion becomes a major issues for highly crowded metropolitan cities like, Chennai .Ambulance service is one of the major services which gets affected by traffic jams. To smoothen the ambulance movement this paper have come up with the solution of Intelligent automatic traffic control for ambulance . The proposed system creates a android app that connects both the ambulance and the traffic signal station using cloud network. This system makes uses RFID (radio frequency identification) technology to implement the Intelligent traffic signal control. The basic idea behind the proposed system is, if the Ambulance halts on the way due to a traffic signal, RFID installed at the traffic signal tracks the RFID tagged ambulance and sends the data to the cloud. After the acknowledgment for the user through the mobile app, the particular signal is made Green for some time and after the ambulance passes by, it regains its original flow of sequence of signaling If, this scheme is fully automated, it finds the ambulance spot, controls the traffic lights. This system control the traffic lights and save the time in emergency periods. Thus it acts as a life saver project.

Lella Sai Krishna, Samineni Vijay Chowdary, M.Pushpavalli, P.Sivakami ISSN: 2331-5526 (2017).

“Advanced Automation Control in an Ambulance under Emergency Condition

In this paper, they proposed - India is facing huge traffic congestion and the traffic disturbance in many major cities around is very severe. Mainly in urban areas, most of the people are using cars as transport when they go out. Due to this traffic blockage, there is a rise in road accidents which direction to a ruin of individual human lives. To avoid this we have implemented a scheme which can control the traffic signals automatically in its path way and reduce the amount of traffic congestion at the signal. The ambulance is implemented with embedded system units, which finds the accident spot and delivers the spot to the close by ambulance through GPS .The ambulance guides the traffic lights in the roadway to the hospital and it also checks the next consecutive signal to shorten the time loss. The vehicle unit is equipped with vibration sensor to determine the vibration if it exceeds the level .The embedded unit sense the accident happens and its sends the neighborhood ambulance unit through wireless transmission. RFID reader is needed to extricate the ambulance from other vehicles

METHODOLOGY

Ambulance Unit

This unit is further divided into 2 systems- RFID system and Strobe detection system, These systems can work both separately as well as in combination. If used separately the combination of these systems will not only be more efficient but will be more secure as it will be very difficult to hack or violate the conditions.

RFID system

This system consists of a RFID tag installed in the ambulance. It will be used as a sensor in a case of emergency. This means that whenever there will be an emergency, driver of the ambulance will activate the RFID tag which will be then detected by the RFID readers present few meters before or on the junction semaphores. These readers will then continuously pass on the signals to the junction unit where the controlling of semaphores will take place. As soon the ambulance having the active tag cross the junction, the reader will stop sending the signals and conditions will turn back to normal. Also since every road will have a separate semaphore, therefore number of RFID readers present will be same as that of semaphores. For example, at a junction of 4 roads, there will be 8 semaphores; hence there will be 4 RFID readers. The access control is detection of IDs entry to or exit from the range area of the RFID reader. After the detection via RFID, the signals are then transferred to the junction unit. A simplified flowchart of entire ambulance unit.

Strobe detection system

It is estimated that more than 90% of the sensory input to a motor vehicle driver is obtained visually. Thus, visual warning systems are likely to be crucial in alerting drivers to the approaching ambulance. When an emergency vehicle approaches a junction, it needs the light to be green. Each emergency vehicle has a special strobe light that triggers the traffic light which will behave as the indicator light for the traffic signal. When the sensor is triggered, the traffic light shows green for the approaching emergency vehicle. Thus sensors will be directly connected to the microcontroller present in the junction unit. As soon the emergency vehicle passes the junction, the sensors will be turned off and the traffic sequence will get back to normal.

Junction unit

Junction unit must be installed at the crossroads and consist of semaphores or traffic signals present on every side of the road. The sequence of these signals will be controlled by the Programmable Integrated Circuit (PIC) microcontroller interfaced with a transceiver.

Working of the junction unit is processed in steps. Initially the signals sent by the RFID reader or sensors are collected by the transceiver interfaced with the microcontroller. After recognizing the received signals, the microcontroller activates the emergency mode and the sequence of the semaphores present at the junction must change. The sequence is getting back to the normal mode

only when the transceiver stops receiving the signal from the RFID reader or the light sensors. The sequence of traffic signals is working differently in the two modes.

assumption of the APT is that there should not be arbitrage in the market and the investors can earn only normal profit. Jarque bear test is used to test the normality of data.

PROPOSED APPROACH

Our proposed Smart Ambulance Traffic Control System (SATCS) uses RFID as a main core of communication between the ambulance and the traffic light junction. The RFID consists of scanning antenna, RFID reader and RFID tag which contains the information of the traffic signal (Jagadeesan, Azhagiri, Maheshraj, Sanjay, & Srikanth, 2019). RFID Transmitter (Tx) in an ambulance will send a signal to RFID Receiver (Rx) placed at the nearest upcoming traffic lights junction. Once the signal is received at the traffic light junction, the Near Field Communication (NFC) module and microcontroller will perform a quick check first to identify the route of the upcoming ambulance and will freeze the current flow of traffic if the ambulance is on a red lane. Then, traffic control will change the traffic lights to green along the ambulance path. Figure 1 shows the communication process between traffic light and ambulance via RFID signal. Immediately after the ambulance has passed the traffic light junction, the control unit will restore the previous traffic flow according to their priority. The block diagram that forms a fundamental design of our proposed system.

The process flow of the oncoming ambulance route in our SATCS. The SATCs is activated by the oncoming ambulance RFID Tx to facilitate the traffic light control. Once the signal is received from the oncoming ambulance RFID Tx, the microcontroller at the traffic light will perform a check on the oncoming ambulance lane. If the oncoming lane is red, the signal will then be forced to change from red to green to allow traffic flow in front of the ambulance to clear the path to give way to the ambulance to pass through. All other lanes will be in red light to stop the traffic flow. Once the ambulance passes through the junction, the microcontroller then will reset to normal operations. The following are the features of the project.

- Monitoring and controlling traffic lights on specified path to hospital.
- ii. Tackle the emergency conditions.
- iii. The ambulance to reach a specific location without making it stop somewhere before it reaches the destination

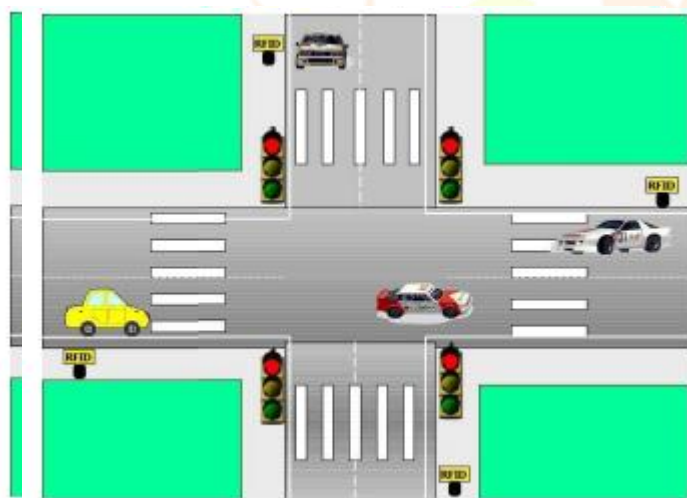
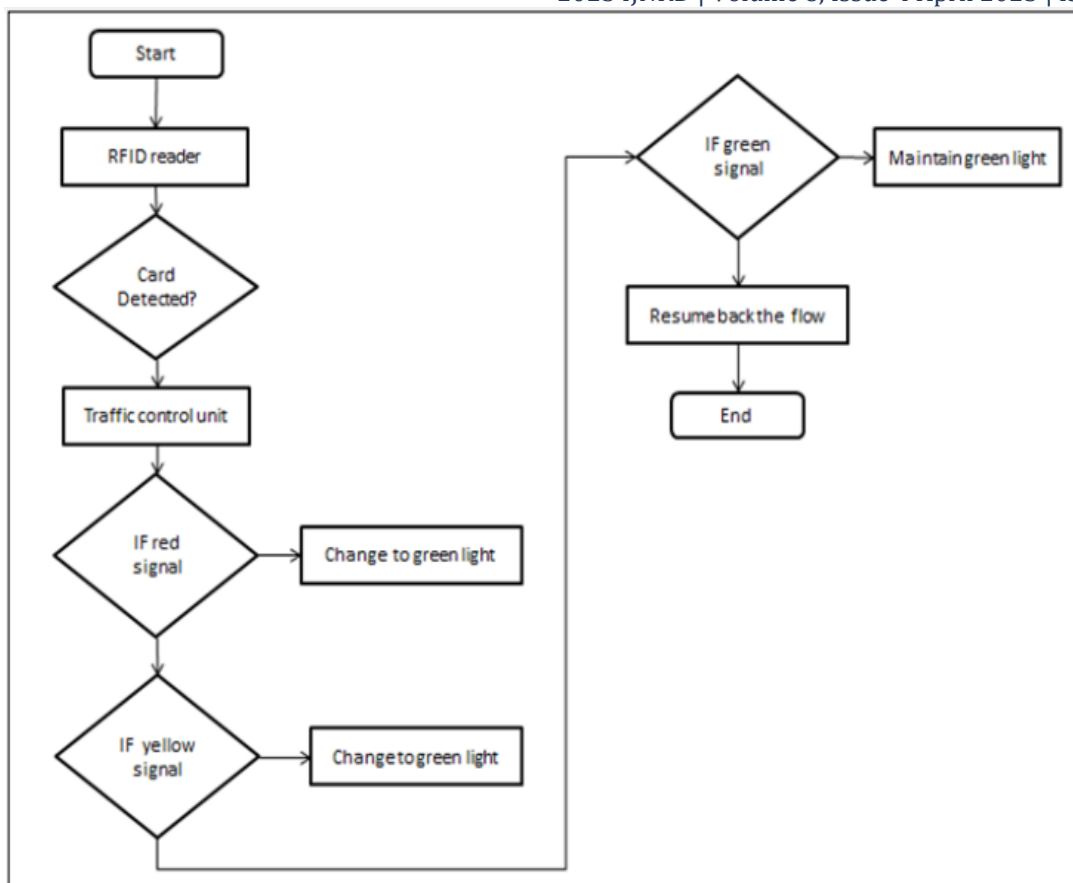


fig: Ambulance and Traffic light



EXPECTED OUTCOMES

The project is ready with all the functionality it is expected from the system that system should,

- The ambulance to reach a specific location without making it stop somewhere before it reaches the destination.
- Monitoring and controlling traffic lights on specified paths to the hospital.
- There is no risk of lives due to this system.

CONCLUSION

The proposed Smart Ambulance Traffic Control System has been designed and successfully tested. The prototype has achieved its functional test. The advantage of the proposed prototype is that it is not solely dependent on internet access but able to work on a standalone basis as well. The system can communicate with the oncoming emergency ambulance and traffic light using available Intel Unsquare and simple RFID technology. However, there is room for improvement. We propose that this work can be extended and tested at in the real-world environment. Since this is a Final Year Project and due to limitations, the authors developed this project as a proof of concept. Active RFID operating range is up to 100 meters or slightly more, and as such future works can focus on using cloud computing to test it in real traffic lights, for different distances between the ambulance and traffic lights, and for different ambulance speeds.

REFERENCES

- [1] Ahir, D., Bharade, S., Botre, P., Nagane, S., & Shah, M. (2018). Intelligent traffic control system for smart ambulance. *International Research Journal of Engineering and Technology*, 5(6), 355-358 Anonymous (2019). The straits times: Patients die as Manila traffic jam block ambulance.
- [2] Chakrabartty, A., & Gupta, S. (2015). Estimation of congestion cost in the city of Kolkata—A case study. *Current Urban Studies*, 3(2), 95-104.
- [3] Davis, N., Joseph, H. R., Raina, G., & Jagannathan, K. (2017). Congestion costs incurred on Indian roads: A case study for New Delhi,” arXiv preprint:1708.08984
- [4] Gupta, P., Pol, S., Rahatekar, D., & Patil, A. (2016). Smart ambulance system. *International Journal of Computer Application*, 6, 23-26..
- [5] Jagadeesan, J., Azhagiri, M., Maheshraj, R. P., Sanjay, B., & Srikanth, T. (2019). Control system for smart traffic signal using LTE, GPS, RFID for ambulance. (2019).

- [6] Kham, N., & New, C (2014). Implementation of modern traffic light control system. International Journal of Scientific and Research Publications, 4(6), 1-6
- [7] Mukkavar, S., Rathod, S., Gawai, S., & Magar, M. (2019). Smart ambulance with traffic control ability. International Research Journal of Engineering and Technology, 6(3), 1868-1869
- [8] Ramani, B. A., & Jeyakumar, A. (2018). Smart ambulance system. International Journal of Advanced Research in Computer Science and Electronics Engineering, 7(7) 36-39.
- [9] Meera K, Mpho K. Madisal. "Android and Cloud based Traffic Control System", ISBN:978-1-5386-3060- 0/18/\$31.00 ©2018 IEEE.

