ICEST-2K24 [International Conference on Engineering, Science and Technology]
In Association with
International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN - 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Ambulance Detection and Traffic Flow Control System

Dr. Shrinivas T. Shirkande[1], Mr. Barve Akshay Prakash[2], Mr. Bondar Harshad Nagnath[2], Mr. Gore Sumit Bharat[2], Mr. Rupanawar Saurabh Sarjerao[2]

[1]Associate Professor & Principal, [2]UG Student

Department of Computer Engineering, S. B. Patil College of Engineering, Indapur

ABSTRACT

India is the most populated country in the world. As a result, the traffic problems have become more prevalent and efficient traffic control and the management has become an absolute and urgent requisite. Hence, it is the need of the hour to have a well maintained traffic control system particularly in busy traffic hours. In this Paper, we proposed a traffic control system for the emergency-vehicles like ambulances. The proposed system is clear Traffic flow, for emergency vehicles like ambulances through Radio Frequency Identification (RFID) Sensors and wireless devices. This proposed system aims to reduce and solve most problems related to traffic congestion by using an IoT based setup.

Keywords: Ambulance Detection, Traffic Control, RFID Sensors, IOT System.

I. INTRODUCTION

The vehicle traffic congestion in cities has been exponentially raised due to a large number of vehicles plying on the road. Due to this large traffic, often traffic jams occur on roads because of which the emergency medical vehicles like ambulance and fire engines get stuck in traffic congestion which may be the cause for losing human lives. Current traffic control systems are a static case wherein vehicles have to wait for a predefined amount of time until the microcontroller switches the green light for that lane. If the ambulance is stuck near to the traffic signal, then the traffic police can give priority to the ambulance by giving necessary symbols or signs to the vehicles so that the ambulance can get out of the traffic as quickly as possible. Moreover, if the emergency vehicles are stuck in a lane far from the traffic signal, the siren of the ambulance is unable to reach the traffic police, in which case the emergency vehicles have to wait until the traffic gets cleared or we have to depend on other vehicles to move aside which is not an easy task in traffic situations. We are creating this using IoT technology. In this system we control the traffic lights by connecting them to an Arduino Mega 2560. Similarly, we Install RFID readers at 100 meters Distance on the road starting from every traffic signal and the RFID reader is connected to the Arduino Mega 2560. The RFID tag has been fixed on the ambulance. When the ambulance passes through a pathway where an RFID reader has been installed, the RFID reader detects the ambulance. Once the ambulance is detected by the RFID reader, it forwards the message to Arduino Mega 2560. When the arduino receives a message from nodemcu, then the Arduino adjusts the traffic flow by creating a pathway for the ambulance, allowing it to pass through the road. When an ambulance arrives, then

traffic flow is temporarily adjusted and managed accordingly. IOT is one of the best ways for a smart transportation system.

II. LITERATURE SURVEY

1. "Ambulance Detection and Traffic Control System" 2019, The proposed system can be used by the Adaptive Traffic Control System to effectively manage the motion of Emergency Medical Services such as ambulances during high traffic congestion. GPS, IoT and Raspberry Pi technologies are used so that the traffic controller system can take immediate action ensuring the reduction in time delay between the emergency destination. The system proposed merely focuses on developing a way to let the ambulances pass traffic signals with minimum delay. As a result, many more areas can be explored to provide patients with high-quality ambulance service. The IoT is one of the best ways for smart transportation system [1].
2. "Emergency Vehicle Priority and Self-Organising Traffic Control at Intersections Using Internet-of-Things Platform" 2018, EVP-STC was proposed to maximize traffic throughput and minimize average vehicle waiting times at intersections. This scheme accelerates emergency response operations, by facilitating the transit of emergency vehicles through intersections in urban areas. In the proposed priority management scheme, an intersection controller communicates with force-resistive sensors and emergency vehicles via ZigBee communication, to resolve potential conflicts at intersections in order to assign higher priorities to specific roads or approaches. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital in the minimum time possible.
3. "Intelligent Traffic Control System: Towards Smart City" 2019, Traffic problems have increased in the last few years and along with that, the present traffic light controllers have limitations because they use the same old traditional hardware. With this proposal, we present techniques to control traffic and prevent accidents in unplanned traffic systems as prevalent in most developing countries. We have proposed the use of sensors along with embedded technologies mainly focusing on the IoT aspect of it. The traffic on the road will decide the timings of the green or red traffic signals. This traffic light control system is more flexible and efficient than the ones in existence previously. Our proposed algorithm was tested real time in a single location and during similar times of day. Further it is to be tested in other circumstances as well to get a much more efficient and generalized system of traffic control.
4. "Smart Ambulance System using IoT" 2017, we have different problems in ambulance services in case of emergency. Different types of MAC protocols are studied for data dissemination for the SMART ambulance system. Performance of the CSMA MAC protocol is drastically better for PDR, PLR, End to End delay and throughput in the network. It gives 30 to 60% better results for PDR, 40 to 60% better result for average PLR, 15 to 35% better result for average throughout, 20 to 50% better results for average end to end delay as compared to TDMA, SMAC and 802.15.4 MAC Protocols. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.
5. "Efficient Dynamic Traffic Control System using Wireless Sensor Networks" 2014, The proposed system solves many problems faced in the real time situations. It reduces the traffic delays and saves a lot of time

during the trip. It gives a special priority to ambulances to reduce the time that gets wasted at the signal and thus it could even save a life in danger. Capacitive proximity sensors and IR based sensor tags Capacitive Proximity sensors can be used to get more accurate normal vehicle count when compared to Inductive Proximity sensors but are comparatively costly.IR sensors could be used to get the count of emergency vehicles instead of RFID tags. The system proposed merely focuses on developing a way to let the ambulances pass traffic signals with minimum delay. As a result, many more areas can be explored to provide patients with high-quality ambulance service.

6. "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection" 2020, 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 by considering one road of the traffic junction. the emergency vehicle clearance. Here each vehicle containing a Zigbee transmitter and Zigbee receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purposes. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.
7. "Smart Traffic Control Ambulance System" 2020, This work is developed with a main intention of saving the life of a person. Whenever an accident occurs and any serious condition takes place from home that time, the ambulance takes that person to travel to admit in hospital during that the traffic is cleared for the smooth and fast running of the ambulance. This system consists of a health analysis and traffic control system in an ambulance, signal, and a network (Fig.1). We designed the RFID based technology to detect the ambulance before a traffic signal to clear the signal to fast reach at the hospital. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital.
8. "Adaptive ambulance monitoring system using IOT '' 2022, Since the last years and until now, technology has made fast progress for many industries, in particular, the garment industry which aims to follow consumer desires and demands. One of these demands is to fit clothes before purchasing them on-line. Therefore, many research works have been focused on how to develop an intelligent apparel industry to ensure the online shopping experience. Most of these works focus on the virtual try-on task to develop Image-based virtual fitting systems which present various challenging issues since persons can appear in different poses and views. In recent years, many studies have developed by using deep learning methods to face the challenges of pose variation, occlusion and illumination changes. Thus, we reviewed, in this paper, a large range of research works focused on using deep learning methods in image-based virtual fitting solutions by summarizing their challenges, their main frameworks and the popular benchmark datasets used for training. Hence, an overview of different evaluation metrics is presented with some examples of performance comparison, and lastly, some promising future research directions are discussed.
9. "Traffic light control system for emergency vehicles" 2023, The proposed solution as an intellective auto traffic control solution that makes easy for emergency response operations (that is facilitating quicker movement of emergency vehicles through traffic in urban areas). In the proposed solution the vehicles

can resolve the emerging conflicts at road junctions by themselves and implement a priority based solution that can prioritize emergency vehicles at road junctions. Our approach to the solution is based on a RFID tagging of traffic signals to communicate their information to the car. The proposed system showcases promising results as the active RFID technology enables to detect the existence and distinction of the traffic signals reliably and adequately in advance. It helps to facilitate emergency response operations. This is done with the help of RFID tagging. This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance halts at the signal, then the signal changes automatically according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital in the minimum time possible.

10. "Density based Traffic Control System with Ambulance Detection" 2019, This interface is synchronized with the whole process of the traffic system. Automatically, this could be programmed in any way to control the traffic light model and will be useful for planning proper road systems. In this paper we have studied the optimization of traffic light controllers in a city using Arduino and IR sensors. A traffic light system has been designed and developed with proper integration of both the hardware and the software. This system can be further extended to send the present status of the patient to the hospital once the patient is in the ambulance for the aid. This process would surely need various sensors and wireless networking, sending all the details to the hospital where the patient is to be admitted.Real-time face detection and recognition achieved through Viola-Jones method. Software captures images, stores in database. Automated system detects person using three-phase methodology. [18]

III.LIMITATIONS OF EXISTING WORK

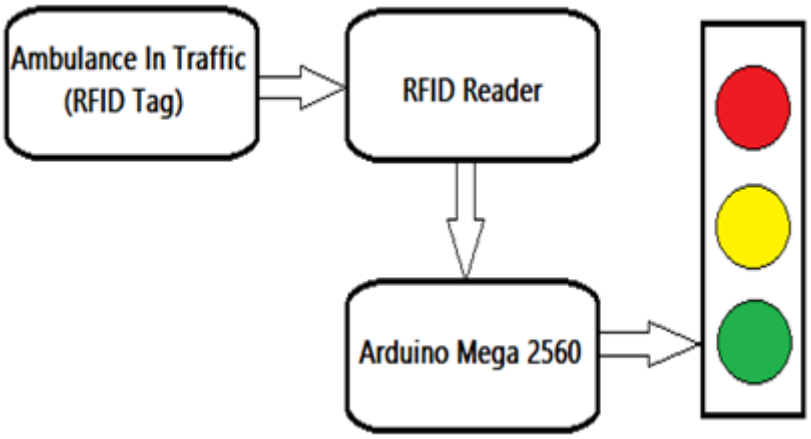
- Setting up the system, including purchasing and installing the necessary hardware and software, can be expensive, especially for municipalities or regions with limited budgets.
- Like any technology, the system requires regular maintenance and updates to ensure it functions correctly. This maintenance can be time-consuming and costly.
- RFID detection can sometimes yield false positives (detecting non-emergency vehicles as ambulances) or false negatives (failing to detect ambulances). These errors can disrupt traffic flow or compromise safety.
- The system is primarily designed for ambulances with RFID tags. Other emergency vehicles like fire trucks and police cars may not be accommodated unless they also have RFID tags.Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress.

IV.PROBLEM STATEMENT

Develop a system that detects ambulances in real-time, prioritizes their route through traffic, and optimizes traffic flow to expedite emergency response. This system aims to minimize response times, ensure safety, and comply with privacy regulations while enhancing urban traffic management.

V. PROPOSED SYSTEM

1. ARCHITECTURE



VI. RESULT DISCUSSION

We designed a "Ambulance Detection and Traffic Flow Control System" using IOT devices which works in Real-Time. Such IOT devices are Arduino Mega 2560 for Control Traffic Lights, RFID Sensor for Detecting Ambulance in traffic jams. We are connecting traffic lights and RFID readers to an Arduino Mega 2560.This system developed for work in real-time.

When the system is ready then we take some tests. In that test, we observed that the traffic lights were functioning properly, and we also noticed the effective range of the RFID reader. This system works in real time using an RFID reader to actively function, identifying ambulances in traffic. When an ambulance is detected, the traffic light immediately changes into yellow for a few seconds, and then switches to green. After the ambulance passes, the traffic light changes to yellow for a few seconds and turns into red. Then traffic lights work normally. In this way this Ambulance Detection and Traffic Flow Control System successfully works in Real-Time.

VII. RESULTS / OUTPUTS

Fig. Traffic Light Normal Flow

Fig. Ambulance Stuck in Traffic

Fig. Ambulance Detect in Traffic

Fig. Ambulance Goes Successfully

Fig. Again Traffic Light Normal Flow

VIII. CONCLUSION

Implemented system works in real-time with successfully Ambulance detection and traffic flow control without disturbing another traffic flow. The main attempt of this our proposed system is to minimize the deaths of critical patients by making sure that the ambulance reaches the emergency location and the hospital in time for treatment. RFID Sensors, IoT technologies are used so that the traffic controller system can take immediate action ensuring the reduction in time delay between the traffic jams.

IX. REFERENCES

[1]. Jadhav, Ajit, et al. "RFID based secure smart school bus system." Department of CSE, IAETSD J, March(2018).
[2]. Rohit R Kowshik, AkashAithal, Ambulance Detection and Traffic Control System 2019.
[3]. ZeeshanKaleem, Shams Ur Rahman, Emergency Vehicle Priority and Self-Organising Traffic Control at Intersections Using Internet-of-Things Platform 2018.
[4]. Arjun Datta, Amit Kumar, Intelligent Traffic Control System: Towards Smart City 2019.
[5]. OmkarUdawant, Nikhil Thombare, Smart Ambulance System using IoT 2017
[6]. Bharadwaj.R, Deepak.J, Efficient Dynamic Traffic Control System using Wireless Sensor Networks 2014.
[7]. SwapnaliVikhe, Smart Traffic Control Ambulance System 2020.
[8]. Nimmala Uma, Ahashavali, Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection 2020.
[9]. S. Mahalakshmi, T.Ragnthar, Adaptive ambulance monitoring system using IOT 2022.
[10].Nalina v, Dr P Jayarekha, Traffic light control system for emergency vehicles 2023.
[11].Vyawahare, J. S., Bankar, M. A., Banker, S., Gavi, S. B., &Nalawade, V. S. A SCHEME OF WATERMARKING FOR IMAGE COPYRIGHT PROTECTION BY USING NEW DCT ALGORITHM
[12].Jadhav, A., Shinde, A., Nanavare, N., Ranmode, G., &Gavali, A. B. (2018). RFID based secure smart school bus system. IAETSD Journal for Advanced Research in Applied Sciences, 5(3), 127-134.

[13].Patil, D. S., Gavali, A. B., &Gavali, S. B. (2014, February). Review on indexing methods in location based services. In 2014 IEEE International Advance Computing Conference (IACC) (pp. 930-936). IEEE.

[14].Kale, R. ., Shirkande, S. T. ., Pawar, R. ., Chitre, A. ., Deokate, S. T. ., Rajput, S. D. ., & Kumar, J. R. R. . (2023). CR System with Efficient Spectrum Sensing and Optimized Handoff Latency to Get Best Quality of Service. International Journal of Intelligent Systems and Applications in Engineering, 11(10s), 829–839.

[15].Parlewar, P. ., Jagtap, V. ., Pujeri, U. ., Kulkarni, M. M. S. ., Shirkande, S. T. ., &Tripathi, A. . (2023). An Efficient Low-Loss Data Transmission Model for Noisy Networks. International Journal of Intelligent Systems and Applications in Engineering, 11(9s), 267–276.

[16].Upadhye, P. A., Ghule, G., Tatiya, M., Shirkande, S. T., Kashid, S. M., &Bhamare, D. Optimizing Communication Systems with Applied Nonlinear Analysis Techniques, Communications on Applied Nonlinear Analysis, https://doi.org/10.52783/cana.v30.277. 1

[17].Ekatpure, J. N., Jadhav, P., Gavali, R., Kale, P., &Padasalkar, S. (2023). Pharmaceutical Data Optimisation Using Quantum Machine Learning.

[18].Ekatpure, J., Nair, D., Deshpande, M., Sagare, S., &Jadhav, P. (2021). ATM Security Using Image Processing in Machine Learning. International Research Journal of Innovations in Engineering and Technology, 5(6), 29.