

Ambulance Detection and Traffic Flow Control System

Dr. S. T. Shirkande¹, Akshay P. Barve², Harshad N. Bondar², Sumit B. Gore², Saurabh S. Rupanawar²

¹Assistant Professor, ²Student

Department of B.E. Computer, SBPCOE, Indapur, Maharashtra, India

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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 project, 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 project 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 Project using IoT technology. In this system we control the traffic lights by connecting them to an Arduino uno. 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 NodeMCU. 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, then NodeMCU forwards the message to Arduino. 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 way for smart transportation system[1].

II. LITERATURE SURVEY

Sr. No	Paper Title	Author	Year	Problem solved in paper: Existing Problem Statements	Technique used to solve problem: Existing Problem Solution	What will be future work: future Scope
1	Ambulance Detection and Traffic Control System [2]	Rohit R Kowshik and AkashAithal	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 The 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.
2	Emergency Vehicle Priority and Self-Organising Traffic Control at Intersections Using Internet-of-Things Platform [3]	Zeeshan Kaleem and Shams Ur Rahman	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 minimum time possible.
3	Intelligent Traffic Control System: Towards Smart City [4]	Arjun Datta and Amit Kumar	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	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	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

				hardware. With this proposal, we present techniques to control traffic and prevent accidents in un-laned traffic systems as prevalent in most developing countries.	or red traffic signals. This traffic light control system is more flexible and efficient than the ones in existence previously.	to get a much more efficient and generalized system of traffic control
4	Smart Ambulance System using IoT [5]	Omkar Udawan t and Nikhil Thomba re,	2017	we have different problems in ambulance services in case of emergency. Different types of MAC protocols are studies for data dissemination for 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 compare 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 on 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 [6]	Bharad waj.R and Deepak. J	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 travel. It gives a special priority to ambulance 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	Smart Traffic Control Ambulance System [7]	Swapnal iVikhe	2020	This work is developed with a main intention of saving the life of a person. Whenever an accident occurs and any serious condition take from home that time, the ambulance take that person to	This system consists of 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 traffic signal for	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

				traveling to admit in hospital during that the traffic is cleared for the smooth and fast running of the ambulance.	clear the signal to fast reach the hospital.	according to the shortest path to the hospital. This saves more time and the patient is taken to the hospital.
7	Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection [8]	Nimmala Uma And Shashavali	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 system by considering one road of the traffic junction.	the emergency vehicle clearance. Here each vehicles contain Zigbee transmitter and Zigbee receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle 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.
8	Adaptive ambulance monitoring system using IOT[9]	S. Mahalakshmi and T. Ragunthar	2022	The proposed project aims to reduce the traffic congestion and provide an elegant and quicker routing for ambulances to reach the destination. The proposed work can be implemented in a smart city project as a module to solve the existing problem of delayed arrival of ambulances to the destination.	the focus is on the dynamic nature of traffic and focuses on finding the ideal time for vehicles to pass the junction. Method used is Greenshields's algorithm where traffic was considered as a fluid. Traffic cameras are used at the junction for finding the traffic density. These cameras are used to detect traffic density using computer vision techniques like YOLO	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.
9	Traffic light control system for emergency vehicles [10]	Nalina v and Dr P Jayarekha	2023	The proposed solution as an intellectual auto traffic control solution that makes easy for emergency response operations (that is	Our approach to the solution is based on a RFID tagging of traffic signals to communicate their information to the car. The proposed	This system could be made completely automated as it could find the shortest path to the nearest hospital and if the ambulance

				<p>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.</p>	<p>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.</p>	<p>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 minimum time possible.</p>
10	<p>Density based Traffic Control System with Ambulance Detection [11]</p>	<p>Pooja K and Pranith a P Reddy</p>	2019	<p>This interface is synchronized with the whole process of the traffic system. Automatically, this project could be programmed in any way to control the traffic light model and will be useful for planning proper road system</p>	<p>In this paper we have studied the optimization of traffic light controller 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.</p>	<p>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.</p>

III. LIMITATIONS OF EXISTING SYSTEM

1. The time it takes for the system to detect an ambulance and adjust traffic lights may not always be fast enough to provide immediate assistance, especially in densely populated areas.
2. IoT devices and RFID sensors require regular maintenance to ensure they function correctly. Malfunctions or sensor failures can disrupt the system.
3. While the system prioritizes ambulances, it may disrupt regular traffic flow, causing congestion and delays for non-emergency vehicles.
4. The system relies on network connectivity for communication between IoT devices and the central server. Network outages can hinder its functionality.
5. 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.
6. IoT devices and traffic light modifications are susceptible to vandalism and theft, which can disrupt the system's operation.

7. Implementing such a system may require adherence to various regulations and standards, which can add complexity and cost to the project.
8. The system may trigger emergency responses based on RFID data, leading to false alarms if a non-emergency vehicle with an RFID tag passes by.
9. Real-time ambulance detection often requires significant computational resources, which can be a challenge in resource-constrained settings.
10. Implementing RFID sensors, IoT devices, and traffic light modifications can be expensive, making it challenging for widespread adoption, especially in less developed regions.

IV. 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 project 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.

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