Automated Traffic Control System for Ambulance

Submitted by:

Chirag S Bijapur (1BM19IS043)
Madhusudhan M (1BM19IS082)
Samartha S (1BM19IS219)
Sushmitha R (1BM20IS412)

Work done as part of the VII Semester Undergraduate (UG)
Industry Motivated Course (20IS7PCIMC)
during the Academic Year 2022-23

Course Coordinators

Prof. Gururaja H.S.
Assistant Professor, Dept. of ISE
&
Prof. Manjula S
Assistant Professor, Dept. of ISE

Department of Information Science & Engineering

B.M.S. College of Engineering
Bangalore-560019

TABLE OF CONTENTS

Introduction

One of the major problems that the world faces today is traffic management. The problem of the ever-increasing population has led to an increase in worldwide traffic which in turn has resulted in severe traffic congestion issues all over the world. In India, this is serious in overcrowded metropolitan cities such as Bengaluru.

The negative effects of poor traffic management are heavy traffic jams, violation of traffic rules, loss of fuel, money and time etc. This problem of poor traffic management and traffic congestion has a serious impact on emergency service vehicles such as ambulances. A recent study conducted by the Times of India showed that about 30% of deaths are caused due to ambulances not reaching the hospital in time.

Problem Statement

Road traffic congestion is a significant problem faced in densely populated metropolitan cities such as Bengaluru. Due to the traffic congestion, emergency service vehicles such as ambulances are severely impacted.

Therefore there is a need for a solution to tackle the above issue. For our project, we propose a system which will intelligently recognise ambulances and automatically control the traffic lights to ensure the smooth movement of ambulances. This system will help the ambulances reach the hospital in the shortest possible time and hence save more lives.

Literature Survey

[1] Saradha, Vijayshri, Subha, et al. "Intelligent Traffic Signal Control System For Ambulance Using RFID And CLOUD", ICCCT (2017)

- The aim of this paper was to develop an Intelligent Automatic Traffic Control for ambulances. They have proposed designing an android application that will connect the ambulance to the traffic signal station using a cloud network.

- The main idea behind the solution is that if the ambulance stops on the way due to a traffic signal, the RFID installed at the traffic signal tracks the RFID tagged ambulance and sends the data to the cloud. Then the signal will be made green till the ambulance passes the signal.

- They have built an android mobile application using Android Studio, used Java for programming the backend and used a mysql database to store all the information.

[2] Ahire, Bhokare, Mate, Sankpal, et al. "Intelligent Traffic Controller for Ambulance Using RFID", IJASRET (2021)

- In this paper, they have presented the idea for an intelligent traffic control system to pass emergency vehicles smoothly. Their solution combines a smartphone application with a microcontroller.

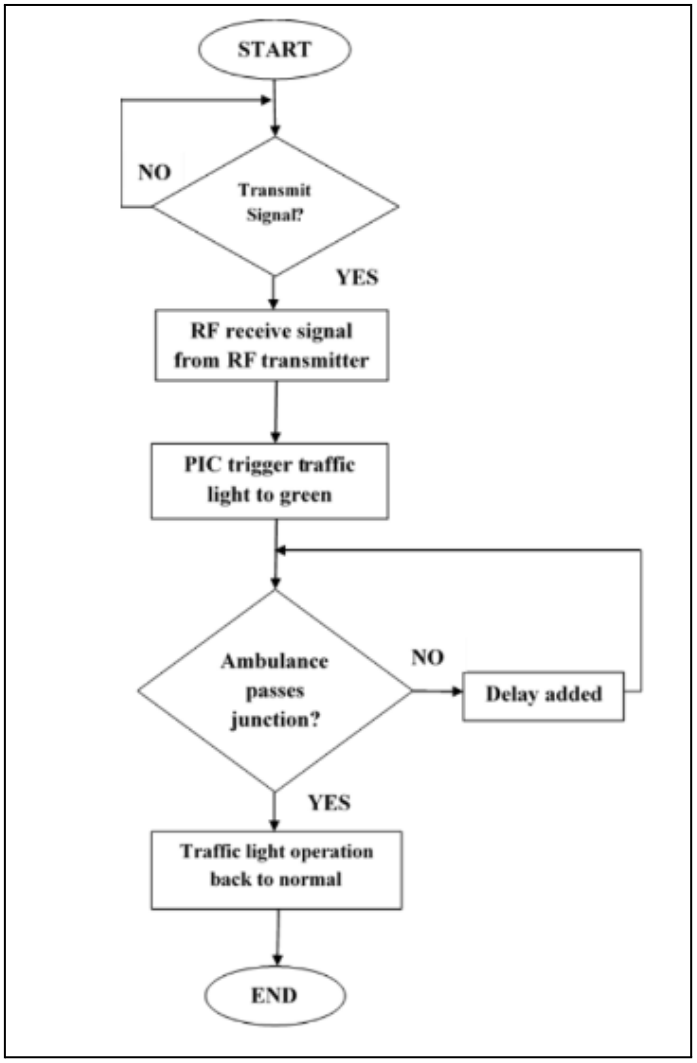
- Each emergency vehicle will be equipped with a special RFID tag, which will be placed at a strategic location that will make it impossible to remove or destroy. When an ambulance is approaching a traffic signal, the RFID tag will communicate with the traffic signal to turn it green so that the ambulance can pass through smoothly.
- They have used Arduino Uno, Arduino MEGA, LEDs,

Proposed Solution

We propose to build an automated and intelligent traffic control system which will help in the smooth movement of emergency vehicles, especially ambulances. The primary technologies that will be used are RFID (Radio Frequency Identification) and Cloud. Using RFID, we can identify the ambulance and then we can use cloud computing to communicate with the traffic signal systems along the path of the ambulance to turn green and make way for the ambulance. As a result, the traffic will be cleared and priority will be given for the ambulance to move. Further, we can identify when the ambulance clears a particular junction and then we can communicate with the traffic signal at that particular junction to resume normal behavior.

The system would also use real-time traffic data to optimize traffic flow and reduce delays for emergency vehicles. This would help to improve response times for emergency service vehicles and potentially save lives.

Low Level Design



Market Scope

- Ambulance detection at intersections by RFID
- Cloud-based communication with traffic signals
- Real-time traffic data analysis
- Traffic flow optimization
- Prioritizing ambulances over other vehicles
- Support for emergency services
- Remote monitoring and control of the system.

Advantages

Improved response times for emergency medical services: By giving priority to ambulances at traffic intersections, the system can help to reduce the time it takes for an ambulance to reach its destination, potentially saving lives.

Reduced traffic delays: By using real-time traffic data to optimize traffic flow, the system can help to reduce delays for other vehicles, improving overall traffic flow and reducing congestion.

Increased safety: By clearing a path for ambulances to pass through, the system can help to reduce the risk of accidents involving emergency vehicles.

Cost-effective: RFID technology is relatively inexpensive and easy to implement, and cloud computing allows for scalable and flexible solutions that can be easily updated and maintained

Technology Stack Used

- Mobile app with cloud access and GPS provided
- RFID technology
- Cloud storage
- Database
- Micro-controller unit

- RFID readers: These would be placed at intersections to detect the presence of an ambulance equipped with an RFID tag.
- Cloud platform: This would be used to store and analyze real-time traffic data, as well as to communicate with traffic signals at intersections to give priority to ambulances. Some popular cloud platform are AWS, Azure, and Google Cloud Platform.
- Traffic signal control system: This would be responsible for controlling the traffic lights at intersections, and would be connected to the cloud platform to receive instructions on how to prioritize ambulances.
- Data visualization and analysis tools: These would be used to analyze real-time traffic data and optimize traffic flow.
- Application programming interfaces (APIs): These would be used to connect the various components of the system, such as the RFID readers, cloud platform, and traffic signal control system.
- Software development: A software development kit (SDK) could be used to develop the application that runs on the RFID readers, traffic signal control system, and cloud platform.
- Database: A database like MySQL, MongoDB, or Cassandra could be used to store the real-time traffic data, and the historical data for future analysis.

- Security: A security layer could be added to the system to protect against unauthorized access and ensure the privacy of data.

Additional Enhancements

- Suggesting the best route for the ambulance between the location and hospital
- Alerting the doctors in the hospital about the status/condition of the patient
- Feature to store the patient's medical history in a database on the server
- Option to issue alert to nearest traffic police station incase the congestion is very high and police intervention is needed

Conclusion

In today's world, with an ever-increasing population, the problem of traffic congestion will only get worse. The issues faced by emergency vehicles like ambulances will become more severe and due to the traffic jams, there will be great delay in the ambulance reaching the hospital in time.
This urges the need to implement a solution such as ours which will intelligently recognise ambulances and automatically control the traffic signal to ensure smooth and rapid movement of the ambulance. As the entire system is automated, no human intervention is needed.
If our proposed idea is successfully implemented, many lives will be saved and the society will be benefitted. Such a system will be of great benefit in overcrowded metropolitan cities such as Bangalore.

References

[1] Saradha, Vijayshri, Subha, et al. “Intelligent Traffic Signal Control System For Ambulance Using RFID And CLOUD”, ICCCT (2017)

[2] Ahire, Bhokare, Mate, Sankpal, et al. “Intelligent Traffic Controller for Ambulance Using RFID”, IJASRET (2021)

[3] Kokate, Dabade, Shete, Shitre, Singh, et al. “Intelligent Traffic Signal Control System For Ambulance”, IJRAR (2018)