IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105059 |

Automated Traffic Control System with Emergency Vehicle Priority

Dr. Ramananda Mallya, Ruchi Kumari, Suraj Shetty, Vimal Shetty, Melroy Vernon Menezes

Asst. Professor, Dept. of Information Sc. &Engg, MITE, Moodbidri, Karnataka, India

Student, Dept. of Information Sc. &Engg, MITE, Moodbidri, Karnataka, India

Student, Dept. of Information Sc. &Engg, MITE, Moodbidri, Karnataka, India

Student, Dept. of Information Sc. &Engg, MITE, Moodbidri, Karnataka, India

Student, Dept. of Information Sc. &Engg, MITE, Moodbidri, Karnataka, India

ABSTRACT: This is a system designed to manage and regulate the flow of traffic on roads. The system utilizes advanced technologies to provide efficient and effective traffic control, especially during emergency situations. The system is consisting of a network of sensors, cameras, and some other monitoring devices to collect real-time data on traffic conditions. This data is then analyzed and processed by an artificial intelligence system, which generates optimal traffic management strategies. The key features of this system is its ability to prioritize emergency vehicles such as police cars, fire trucks and ambulances. When an emergency vehicle approaches a congested area, the system will automatically adjust traffic signals to give emergency vehicle a clear path through the traffic. The system also includes the communication platform that allows emergency services to interact with the traffic control center. This enables the center to receive real-time updates on the location and status of emergency vehicles, allowing them to adjust traffic signals and routes accordingly.

In addition to improving emergency response times, the system also enhances traffic flow during normal operations, reducing congestion and minimizing travel times for commuters. Overall,This is an important step towards creating safer, more efficient, and more reliable transportation systems.

KEYWORDS: Dynamic Traffic control system, Emergency vehicles priority, Vehicular density, Audio-visual sensing, Internet of things.

I. INTRODUCTION

Traffic congestion has become a major issue in urban areas around the world, leading to increased travel times, fuel consumption, and environmental pollution. Moreover, in emergency situations, traffic congestion can severely impede the response time of emergency vehicles such as police cars, fire trucks and ambulances. This can lead to delays in the delivery of critical services, which can result in loss of life and property damage.

This is a solution that aims to address these challenges by utilizing advanced technologies to regulate the flow of traffic on roads. The system integrates sensors, cameras, and other monitoring devices to collect real-time data on traffic conditions. This data is then processed by an artificialintelligence system to generate optimal traffic management strategies. One of the key features of this system is its ability to prioritize emergency vehicles, giving them a clear path through the traffic. This is achieved through the automatic adjustment of traffic signals when an emergency vehicle approaches a congested area. The system also includes a communication platform that allows emergency services to interact with the traffic control centre, providing real-time updates on the location and status of vehicles.

By improving emergency response times and reducing congestion during normal operations, thiswill have the potential to make transportation systems safer, more efficient, and more reliable. Another challenge is need for ongoing maintenance and support to ensure that system remains operational and effective over time. This can include regular maintenance of the sensors and cameras, as well as updates to the software and algorithms used by the artificial intelligence system.

In conclusion, this is an important step towards creating safer, more efficient, and more reliable transportation systems. The integration of sensors, cameras, and other advanced technologies, along with an artificial intelligence

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105059 |

system, can provide efficient and effective traffic management strategies, particularly in emergency situations. There are more challenges associated with implementing and maintaining such a system, the potential benefits in terms of improved emergency response times and reduced congestion make it a promising solution for the future.

II. RELATED WORK

Several studies and projects had been introduced related to Traffic control systems with emergency vehicle priority. These are a few examples of related work:

1. An ATCSEVP system was developed and deployed in the city of Atlanta, Georgia in 2017. The system used real-time data from vehicles to give them with priority at traffic signals, reducing emergency response times by an average of 26%.
2. A research study conducted in Beijing, China in 2019 developed an ATCSEVP system using a GPS and cellular network technologies. The system was able to detect emergency vehicles and give them with highest priority at traffic signals, reducing emergency response times by an average of 33%.
3. A project conducted in Barcelona, Spain in 2020 developed an ATCSEVP system used ML algorithms to detect emergency vehicles and predict their routes through traffic. The system was able to reduce emergency response times by up to 50%.
4. A research study conducted in 2018 developed an ATCSEVP system using a combination of sensor technologies and data fusion algorithms. The system was able to detect emergency vehicles and provide them with priority at traffic signals, reducing emergency response times by an average of 20%.

These projects and studies demonstrate the potential benefits of ATCSEVP systems in improving emergency response times and reducing traffic congestion. Ongoing research and development in this area are likely to lead to further improvements in the effectiveness and efficiency of those systems.

III. PROPOSED ALGORITHM

System Design:

The first step in designing an ATCS with emergency vehicle priority is to define the system requirements. The system must be able to monitor traffic conditions in real-time and dynamically adjust traffic signals to optimize traffic flow. The system should also must detect emergency vehicles and give them priority over regular traffic.

Sensor Integration:

The next step is to integrate various sensors, as cameras, radar, and GPS, into the system. These sensors will be used to trace traffic conditions and detect emergency vehicles. Cameras could use to capture images of the traffic, while radar could use to trace the presence of vehicles.

Data Processing:

The data collected from sensors need to be processed and analysed to give the current traffic conditions.

The ATCS have to identify congestion areas and adjust the traffic signals accordingly. The system should able to recognize emergency vehicles and prioritize their passage through the traffic signals.

Emergency Vehicle Detection:

Emergency vehicles could be traced using various methods, Like GPS tracking, acoustic sensors, or radio frequency identification (RFID). GPS tracking used to track the location of emergency vehicles and notify the ATCS in real-time. Acoustic sensors can detect the sirens of emergency vehicles, while RFID used to identify the vehicles using special tags.

Priority Assignment:

Once a desired vehicles is detected, the ATCS should assign it a priority status. The priority status will depend on the urgency of the situation and the distance to the destination. The system should also consider the traffic conditions and adjust the priority accordingly.

Traffic Signal Adjustment:

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105059 |

The Signals should be adjusted to prioritize the passage of vehicles. The ATCS should use a dynamic traffic signal plan that can be updated in real-time based on conditions and emergency vehicle priorities. The system should also provide a green wave for emergency vehicles to minimize the time of red lights.

Communication with Emergency Vehicles:

The ATCS should talk with vehicles to give them the data about traffic conditions and the expected time of arrival at their destination. The system shall able to provide route recommendations to emergency vehicles to avoid congestion areas.

Testing and Evaluation:

The final step is to test and study the performance of ATCS with emergency vehicle priority. The system should be tested under different traffic conditions, including high congestion and low congestion.

IV. SIMULATION RESULTS

This is a computerized system designed to regulate traffic flow and reduce congestion on roadways. It is an essential component of modern transportation infrastructure and has become increasingly important as cities continue to grow and traffic volumes increase. An ATCS can use a variety of devices and data sources to watch traffic situation and make real-time adjustments to traffic signal timings, lane closures, and other factors to improve the flow of traffic.One important feature of an ATCS is to prioritize emergency vehicles such as police cars, fire trucks, and ambulances. In emergency situation, time is essence, and every second counts. An ATCS with emergency vehicle priority can help ensures that responders can reach their destination quickly and safely.

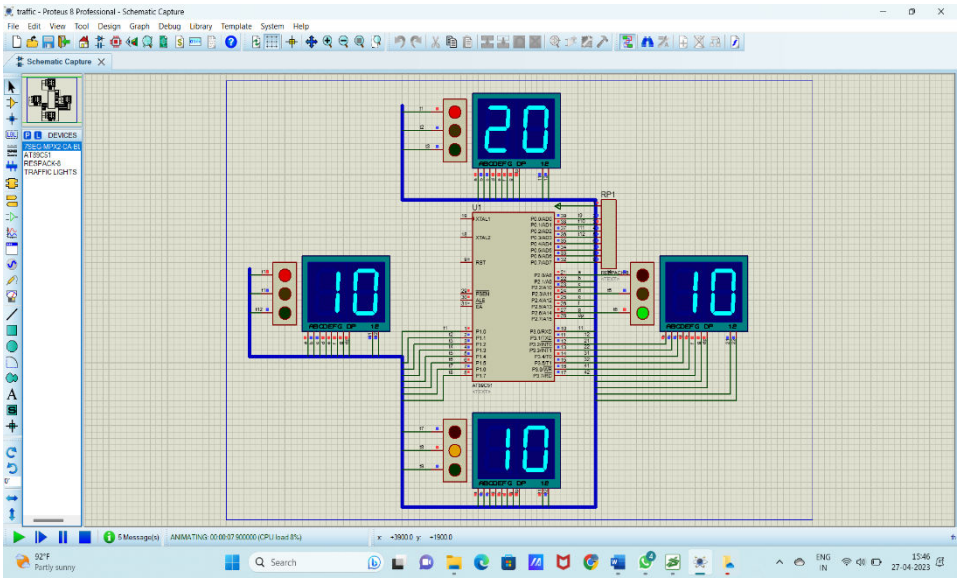

Fig.1.Circuit diagram

There are many ways that an ATCS can prioritize emergency vehicles. One approach is to use GPS tracking and radio communication and to trace the location of emergency vehicles and adjust traffic signals to provide a clear path. Another approach is to use sensors embedded in the roadway to detect the presence of emergency vehicles and automatically adjust traffic signals to give them priority. A third approach is to use a combination of both technologies to provide the most accurate and reliable emergency vehicle priority.

Implementing an ATCS with emergency vehicle priority can have several benefits. For example, it can help lower response time for emergency vehicles, will improve the outcomes for patients and reduce property damage in the case

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105059 |

of fires or other disasters. It can also improve the safety of emergency responders by reducing the risk of accidents or delays caused by traffic congestion.

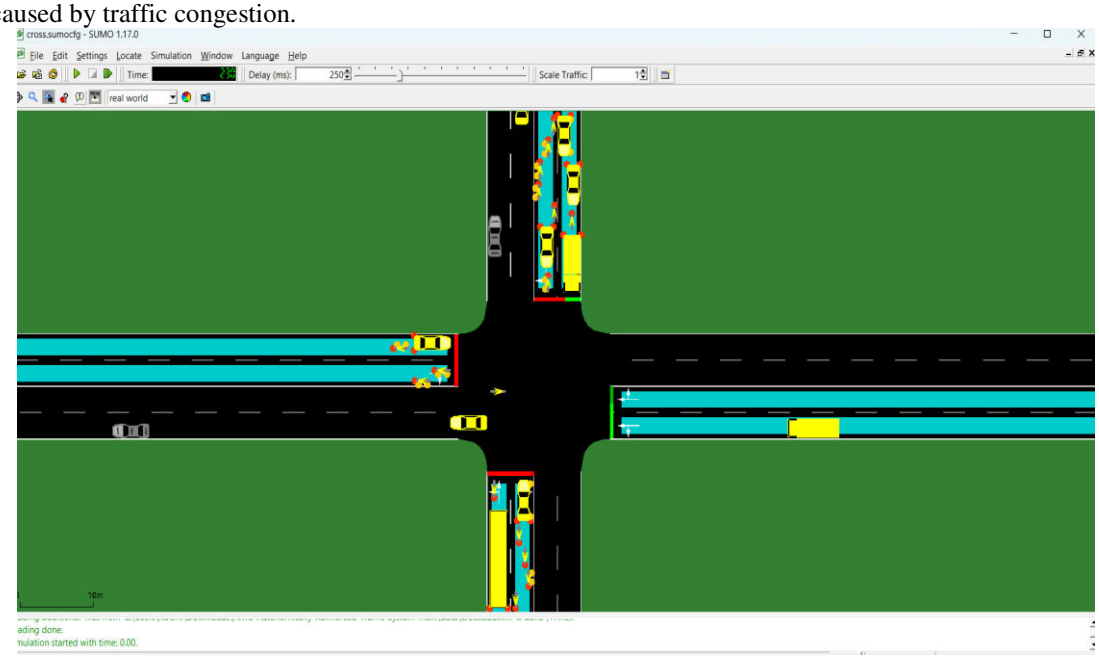

Fig.2. Traffic Simulator

The ATCS can also installed other feature to improve traffic flow and reduce congestion. For example, it can use data from traffic cameras and sensors to identify areas of congestion and adjust traffic signal timings to reduce wait times for drivers. It can also use real-time weather data to adjust traffic signal timings to account for rain, snow, or other adverse weather conditions.

V. CONCLUSION AND FUTURE WORK

In conclusion, this is a highly beneficial solution for managing traffic and reducing response times for emergency vehicles. The system works by using sensors and algorithms to detect emergency vehicles and provide them with priority access to the road. This technology can help emergency responders reach their destinations faster and potentially save lives. Furthermore, the system can enhance total traffic flow by reducing congestion and optimizing traffic patterns. The integration of machine learning and artificial intelligence can enhance the system's performance by continuously learning and adapting to changing traffic conditions. However, the successful implementation of this system requires significant investment in infrastructure and technology. There may also be concerns regarding the privacy and security of the data collected by the system. Therefore, it is essential to carefully evaluate the potential benefits and drawbacks of such a system before implementing it on a larger scale.

REFERENCES

1. Rupesh Tayde, Krushna Jadhav, Raj Shirbhate, Ritesh Gade, Ajay Lohate, “micrologix controller based intelligent traffic-congestion control system”, 2022.
2. Ezeugonna Franklyn Ifeanyi , Okoro Ugochukwu Samuel , Okere Promise, “Design of a micro controller based traffic light controller system for congestion and emergency situation” 2022.
3. Gurpreet Kaur and Sumit Sharma, “Intelligent traffic light system”, 2022.
4. Monalisa Samal, Jyostnamayee Behera “Iot based traffic congestion control management system for ambulances” 2020
5. Rupesh Tayde, Krushna Jadhav, Raj Shirbhate, Ritesh Gade, Ajay Lohate, “micrologix controller based intelligent traffic-congestion control system”, 2022.
6. Umar Mahmud,Shariq Hussain, Amber Serwar, Ibrahim kalil toure, “A Distributed Emergency Vehicle Transit System Using Artificial Intelligence of Things”, 2022.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105059 |

7. Monalisa Samal, Jyostnamayee Behera "Iot based traffic congestion control management system for ambulances" 2020
8. Mohammed, Medha Awadalla, "Development of an IoT based Traffic monitoring system for city governance", 2020.
9. Rupesh Tayde, Krushna Jadhav, Raj Shirbhate, Ritesh Gade, Ajay Lohate, "micrologix controller based intelligent traffic-congestion control system", 2022
10. "IoT Based Traffic Management System Prioritizing Emergency Vehicles" by Kumar Anurag, Santanu Agarwal, Ramansh Taluja, Prashant Kumar Dewangan, and Dr. Manoj H M, International research of engineering research & technology, 2022.
11. "A Smart Priority-Based Traffic Control System for Emergency Vehicles", Gour Karmakar, Abdullahi Chowdhury, Joarder Kamruzzaman and Iqbal Gondal, Published in: IEEE Sensors Journal (Volume: 21, Issue: 14, 15 July 2021).
12. "Algorithm for Creating Optimized Green Corridor for Emergency Vehicles with Minimum Possible Disturbance in Traffic", Shalini Yadav and Rahul Rishi, LOGI – Scientific Journal on Transport and Logistics, 2022.
13. "Algorithm for Creating Optimized Green Corridor for Emergency Vehicles with Minimum Possible Disturbance in Traffic", Shalini Yadav and Rahul Rishi, LOGI – Scientific Journal on Transport and Logistics, 2022.
14. "A Survey of Smart Cities", Daniel G. Costa , JoãoPpaulo J. Peixoto , Elivelton Rangel, and Maycon Peixoto, IEEE Access 2022.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details