Section A-Research paper

Real Time IoT- Based Intelligent Traffic Management Control System

Nadavuluru Prasanna Venkatesh[1], I. Kumaraswamy[2,] K. Bhargavi[3,] Kalaganda Lahari[4,] Jeerla Bhavana[5,] Nandyala Nithin[6]

[123456] Sree Vidyanikethan Engineering College, A. Rangempeta, Tirupati, 517102
nadavuluruprasanna08@gmail.com
kumaraswamy.i@vidyanikethan.edu
bhargavikuruba202@gmail.com
kalagandalahari@gmail.com
bhavanajeerla@gmail.com
nandyalanithin@gmail.com

Abstract. Congestion seems to be trouble in Metro cities such as Delhi, Bangalore, Mumbai, and Hyderabad. This has turned out to be a daily issue at the moment. Road congestion has exacerbated the number of fatal crashes inside the city, making lives lost in accidents even more important. The promotion and use of computer video detection technologies in recent years have made it feasible to detect delays in real-time and given signal ised junctions the chance to switch from open-loop to closed-loop control. The control effect is examined by retrieving the parameters related to traffic control from video traffic detection. The outcomes of the assessment may be used to decide whether a reconfiguration plan is essential. When traffic police surveillance fails, the central control system will take over. To develop the urban roads Using a closed-loop self-tuning system for congestion control, an additional traffic control plan might be created. As a result, according to the system's output, the system. the control methodology may be revised in real-time.

Aside from that, emergency services such as Compulsion vehicles unable to make it on time. This leads to a significant loss of life. In order to satisfy these challenges for long time, we provide a solution in this project. We can tackle these problems by constructing "Green Corridors" for Compulsion vehicles using IoT-enabled technologies. This can reduce their travel time to the desired location and, to a large degree, save human lives lost. The Internet of Things offers a creative and intelligent traffic control solution that tackles these problems. The process may be used by compulsion vehicles to get a green lane and get to their destination promptly. Radio waves are used by the RFID reader to detect. The radio frequency ID tag connected to the compulsion vehicles makes the upcoming traffic signal to turn green in addition to showing a notice to drivers ahead of a compulsion and turning other lanes into a "Green Zone.". The control system now includes a Sensor module and a motion sensor. This system includes the whole traffic system and operates for the following characteristics to be able to get at the swiftly reach the target and to limit the danger of creating accidents.

Keywords: RFID (Radio Frequency Identification), PIR (Passive Infrared sensor), Closed, loop, a Self- tuning system, a Traffic management control system.

1 INTRODUCTION

In the contemporary age, the challenge of traffic congestion is becoming more and more significant. The population increases in synch with the number of automobiles on the road. Various issues are being caused by poor facilities and insufficient development redistribution. Intelligent traffic light signals are necessary to reduce traffic delays and travel times, which is especially crucial in developing nations. Because present traffic systems are either manual or use predetermined time schemes. As a result, we require clever, quick, and resilient traffic management solutions. When a lane at a cross roads has an additional automobiles, the traffic signal becomes green for that lane and red for the other side until the traffic on that lane is cleared. This would improve traffic flow while simultaneously increasing travelers' comfort and driving safety.

The R.Bhargav Devi, E.Sravani, Gaddam Srujan, and others [1] approach use a counter technique to determine the proportion of automobiles to use each lane, which generates computational overhead. The suggested system estimates the total number of automobiles in each lane and alters the ON/OFF state of LEDs correspondingly, simplifying application flow and minimizing processing overhead. The original Zhang Yuye et al. [2] system utilizes an Arduino mega 2560 microcontroller, which has a higher power consumption and no inbuilt ADC, whereas the suggested system employs an Arduino mega 2560 microcontroller, which has a lower power requirement and an inbuilt ADC.

According to the authors Koushik Mandal, Arindam Sen et al. [3], the system uses a crowding detection mechanism by computing transport speed across a segment of road and also the average waiting time of motor vehicles at road crossings. The suggested Method detects rush hour traffic using an infrared sensor, which minimizes complexity. The system's disadvantage is the fractional time delay, which has an influence on emergency services' ability to save lives. Results of research suggest that " Perhaps 65% to 70% of deaths could be averted. if the compulsion crews arrived swiftly.The system designed by I.Jasmine et al. [4-6] performs similarly to the one we suggest, but it also includes evacuation detection, which consists of RFID, an LCD display, and a buzzer. The IoT-enabled STMS allows for the development of an evacuation Green Zone as needed. Affixed to emergency vehicles are Radio Frequency ID tags. Traffic lights are positioned a bit far away from Radio Frequency ID readers.When emergency vehicles are not in the area of traffic lights, traffic signal operation is unaffected. When the The traffic light went green once the radio frequency ID tag is detected. and an alert appears on the Liquid crystal display screen to allow the ambulance to pass. As we all know, traffic harms innocent animals and senior citizens. A PIR sensor identifies humans and animals and stops the cars in the proposed system. The earlier manual techniques of traffic control could not address these challenges. When the vehicle approaches the traffic signal, the suggested technology can turn the signal green. The traditional manual traffic control systems no longer work in today's urban areas

2. TRADITIONAL TRAFFIC HANDLING SYSTEM

A. Roads heavily packed with vehicles

Heavy traffic congestion is now becoming incredibly popular in major cities as the number and variety of automobiles on the road increases. This typically occurs at the busiest intersections during office hours and in the evenings, when office workers travel home. The most obvious effect of this situation is an increase in the amount of time people spend onthe road. The solution to this problem is to create a completely new program with different delay settings for different junctions [7-10].

B . Automatic traffic light system/ image processing methods[10-12].

The set temporal structure of smart lighting might cause time delays. They operate in a certain cycle, switching from one signal to the next, producing unwelcome single channel is filled with traffic while the other lanes are vacant. In general, prolonged green light intervals correspond to enhanced network capacity on one side of the interchange compared to the other sides. As a consequence, we suggest a technique for adjusting red and green lights based on traffic density. Long traffic jams may be psychologically taxing when vehicles are entirely halted.

3. CIRCUIT DESIGN AND PROPOSED METHOD

The traffic signal control system is designed to regulate traffic lights based on the lane's traffic count. It is crafted to detect traffic and regulate it depending on density by activating traffic lights properly. To detect traffic, digital infrared sensors are used. The Ultrasonic sensors detect cars by detecting the radiation they generate. They are proportionate to the road and face the lane to detect vehicles. We'll place them far enough away from the roundabout so they detect traffic jams only once a certain threshold is met. RFID sensors are also utilized to control traffic lights. Aids in the creation of a "Green Corridor" for emergency vehicles. Allows an emergency vehicle to easily pass through Figure 1 depicts a basic block diagram. The system also includes a PIR sensor, which detects people and animals and prevents vehicles from crossing. Figure 2 depicts a basic block diagram.

4.EXERTION

The exertion of our project is carried out utilising followinghardware:

1) Arduino Mega 2560 Micro-Controller
2) LED Lights (Red, Yellow & Green)
3) Radio Frequency ID Tag
4) Radio Frequency ID Scanner
5) Patch cards
5) Model ambulances and vehicles
6) LCD Display with Arduino
7) SR-04 ultrasonic sensors
8) Infrared sensors

The Arduino Mega 2560, which serves as the system's. The amygdala interprets data from the SR-04 sensors indefinitely. Figure 2 depicts a comprehensive

flowchart of the different procedures required. According on the information collected by the sensors, it will estimate traffic density and govern traffic lights based on the traffic density of each lane, which will then employ traffic stagnation. The system's traffic signals are made from LEDs. Each signal is made up of two red and green LEDs. Crafted a four-lane crosswalk traffic control system.
every alley will include four electronic SR-04 camera sensors and eight LEDs that will operate as traffic signals.

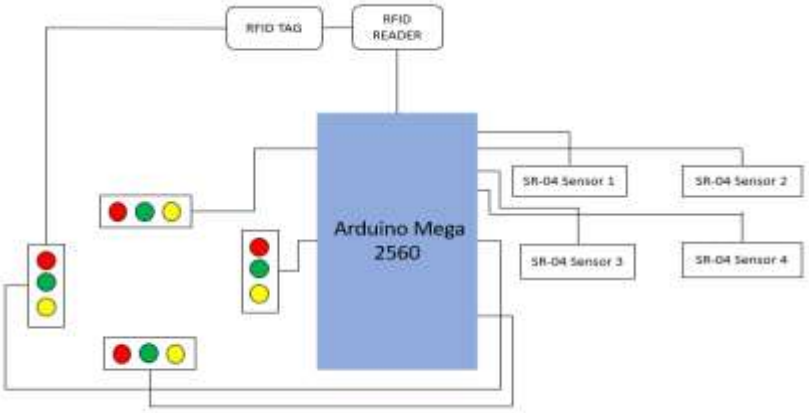

FIG.1. Block Design

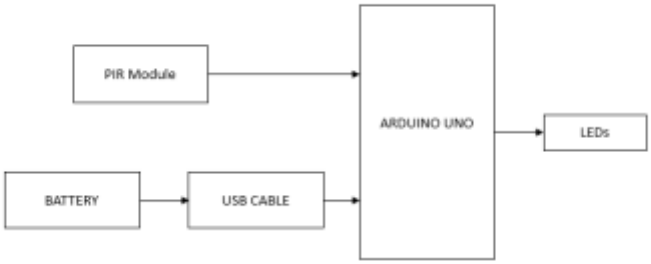

Fig.2. Block diagram 2

Each ambulance is outfitted with just an Radio Frequency ID tag. This usually leads to our first portion, the ambulance segment. It comprises an ambulance with an Radio Frequency ID tag attached to it. The second section discusses traffic lights. It is made up of an Radio Frequency ID reader that scans Radio Frequency ID tags. Following the scanning of the tag, the Radio Frequency ID reader retains the data and transfers it to a server through cloud computing. The initiative, which is powered by the Internet of Things, aims to establish a "Green zone" for compulsion vehicles. The internet of

things is transformed into a smart project, which acts as the cornerstone for any Sustainable urban. By combining cloud computing and delving more into the notion of Sustainable commuting, the project may be improved. [13] [14] [15].

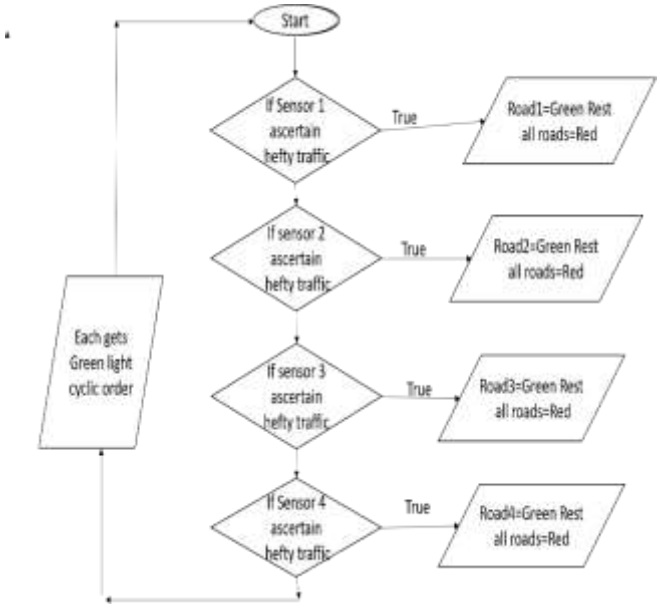

Fig.3. Flow chart to control Traffic density system

This technique may be used to continually update updates on traffic and keep them safe in the cloud. An Android smartphone application might be used to command this [16]. This technology enables traffic lights to be regulated electronically by logging the time and dimensions of the compulsion vehicle and more effectively.

A PIR Sensing element is also part of this setup. It's on all four sides of the traffic signals. When a human or animal crosses the road, the PIR sensor detects infrared rays released by all heat-emitting barriers and stops the cars by flashing red until the person or animal passes the road.

5. Result

A PIR Sensor technology is also included in this setup. It's on all four sides of the traffic signals. When a human or animal crosses the road, the PIR sensor detects infrared rays released by all heat-emitting barriers and stops the cars by flashing red until the person or animal passes the road. cases I The typical condition, in which all lanes have nearly equal traffic. (ii) one of the aisles when is denser than the others. The model's computing logic is as follows: There seem to be four roads, labelled 1, 2, 3, and 4.

Typically, our system will continue to remove traffic from all arteries. should first alleviate the traffic and turned off every other green light. This indicates that the red light is activated on all other routes, but not on Road 1. We needed should first alleviate the traffic. We have the green Light Emitting Diode for road 2 switched on after 2 seconds.

As a result, in order to better comprehend this model, we additionally included excessive traffic on any of the roadways. So, if Road 1 is busy, the system will prioritize it. We did this by turning the green Light Emitting Diode on road 1 to HIGH. When the green Light Emitting Diode turns on, the red LED on road 1 turns off. To prevent crashes, we turned the green LEDs on adjacent roadways to LOW and the red Light Emitting Diodes to HIGH. This will continue until the traffic on Road 1 is decreased from heavy to normal. To regulate traffic, we must control each of the Light Emitting Diodes simultaneously.

We've also proposed a project to address these issues. Our project, an Intelligent traffic management control system, is based on Internet of Things (IoT) technology. It employs a Radio Frequency ID Tag and Radio Frequency ID Scanner to notify the traffic signal of thearrival of an emergency vehicle. This command turns the traffic lights green and also creates a "Green Zone" for theemergency vehicle. People's time and lives are thus saved [17].

PIR sensor, which identifies humans and animals by sensing motion and pauses cars until they cross the road, is also included in this system. This technique offers various benefits. This lays the path for the golden assistance traffic administration system [20-23]**.**

6. CONCLUSION

Our country demands a very cost-effective and efficient traffic management system because traffic is now handled manually. We must decrease traffic delays and congestion as the population grows in order to reduce road accidents. As a consequence, we developed an intelligent traffic management control system that controls traffic efficiently to alleviate congestion by minimizing delay and integrating RFID and PIR sensors. We were successful in reducing the risk of traffic congestion by adopting this strategy.

Traditional traffic control approaches are far outperformed by the suggested technology. The research also opens the path for future improvements to present technologies.

REFERENCES

[1] R.Bhargav Devi, E.Sravani,Gaddam Srujan, Shiv Shankar “Density Based Traffic Signal System using Arduino Uno” International Conference on Inventive Computing and Informatics (ICICI) 2017.

[2] Zhang Yuye & Yan Weisheng, (2009) “Research ofTraffic Signal Light Intelligent Control System Based on Microcontroller”, First International Workshop on EducationTechnology and Computer Science, pp301- 303.

[3] Kaushik Mandal, Arindam Sen, Abhijnan Chakraborty and Siuli Roy “Road Traffic Congestion Monitoring & measurement using RFID & GSM Technology”, IEEE/Annual Conference on Intelligent Transportation System, 2011.

[4] J. Jasmine, Deva Priya, G. Ram Swathi, P. Nathiyar "Intelligent Traffic Control System Using Arduino Uno"
IJEAIS Vol. 3 Issue 3, March – 2019, pp. 51-56

[5] B. J. Saradha, G. Vijayshri and T. Subha, "Intelligent traffic signal control system for ambulance using RFID and cloud," 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, 2017, pp. 90-96. doi: 10.1109/ICCCT2.2017.

[6] Wen, W., 2010. An intelligent traffic management expert system with RFID technology. Expert Systems with Applications, 37(4), pp.3024- 3035.

[7] V.Jain,A.Sharma, and L.Subramanian. "Road traffic congestion in the developing world".In ACM DEV, 2011.

[8] Bhavya A, et al, "Application of Artificial Neural Network in Cryptography", IEEE International Conference on " Power Energy, Environment and Intelligent Control,
October 18-19, 2019

[9] Pullan, P. et al, "Intelligent Clogged Sewer Control System" IEEE International WIE Conference Electrical and Electronic Engineering , India, 15-16 Nov 2019.

[10] Bilal Ghazal Khales Elkhatib, Khales chahine ,Mohammad Kherfan, "Smart Traffic Light Control System"IEEE 2016.

[11] Agrawal, N. D., & Sahu, A. (2015). Intelligent Real Time Traffic Controller Using Image Processing–A Survey. International Journal of Science and Research (IJSR) ISSN (Online), 4(4), 2319-7064.

[12] Khushi, "Smart control of Traffic Light System using Image Processing", International Conference on Current Trends in Computer, Electrical, Electronics and Communication (ICCTCEEC- 2017).

[13] Janahan, S.K., Veeramanickam, M.R.M., Arun, S., Narayanan, K., Anandan, R. and Parvez, S.J., 2018. IoT based smart traffic signal monitoring system using vehicles counts. International Journal of Engineering & Technology, 7(2.21), pp.309-312.

[14] D.K.Gupta, A. Srinivasulu, et al.,"Hybrid Gravitational-Firefly Algorithm based Load Frequency Control for Hydrothermal Two-area System", Mathematics, 2021, 9(7), 712; doi:10.3390/math9070712.

[15] S. Hebbar, P. Pattar, and V. Golla, "A mobile zigbee module in a traffic control system," Potentials, IEEE, vol. 35, no. 1, pp. 19–23, 2016.

[16] P. G. Kaushik, V. D. Dahake, and P. V. Mahalle, "Design of intelligent traffic light controller using fpga," International Journal of Electronics, Communication and Soft Computing Science & Engineering (IJECSCSE), vol. 4, p. 194, 2015.

[17] Bode, M., Jha, S. S., & Nair, S. B. (2014, October). A mobile agent based autonomous partial green corridor discovery and maintenance mechanism for emergency services amidst urban traffic. In Proceedings of the First International Conference on IoT in Urban Space (pp. 13-18).

[18] R. Mundra, A. Srinivasulu, C. Ravariu, A. Bhargav, M.Sarada, "Real Time Driver Alertness System Based on Eye Aspect Ratio and Head Pose Estimation", in proc. of the International Conference on Smart Technologies in Urban Engineering, 29 Nov.2022,vol. 536, pp. 707-716. doi:10.1007/978-3-031-20141-7_63

[19] George, A.A., Krishna, A., Dias, T., Vargheese, A.S. and Divya, R.S., 2017, July. Golden aid an emergency ambulance system. In 2017 International Conference on Networks & Advances in Computational Technologies (NetACT) (pp. 473-476). IEEE.