International Journal of Emerging Science and Engineering (IJESE)
ISSN: 2319–6378 (Online), Volume-13 Issue-10, September 2025

Intelligent Traffic Signalling Priority System for Ambulance and VIP Vehicles

Aamir Mushtaque Khan, P. S. Choudhary

Abstract: ***The accretion of traffic has led to the use of a more sophisticated Traffic management system in today's society. Traffic Congestion is a significant factor which forestalls the smooth flow of Ambulance and VIP vehicles. To alleviate the inconvenience caused by traffic, the Traffic Light Controller (TLC) is used, which minimises the waiting time of cars and also manages the traffic load. RFID-based systems play a crucial role in solving the problems caused by traffic. The project is a replica of a four-way lane crossing in a real-time scenario. In the first part, which concentrated on issues faced by Ambulances, the RFID concept is used to make the ambulance's lane green, thus providing a free way without interrupting the Ambulance. In the second part, which concentrated on problems faced by Priority vehicles, IR sensors are used to actuate the timers accordingly and thus prevent traffic congestion. In the third part, focused on Traffic density control, an IR transmitter and receiver are used to provide dynamic traffic control, thereby increasing the duration of the green light in lanes with high traffic density and regulating traffic.***

Keywords: Embedded System, Arduino-Nano, Traffic Lights, RF Module.

Abbreviations:
V2V: Vehicle-To-Vehicle
Traffic Light Controller (TLC)

I. INTRODUCTION

Due to the thriving urbanisation, industrialisation, and population growth, traffic management has become a challenging task. With traffic growth, there is an occurrence of a bundle of problems too; these problems include traffic jams, accidents and traffic rule violations. This, in turn, hurts the economy of the country as well as the lives of many. Traffic lights play an essential role in traffic management. Traffic lights are the signalling devices that are placed at intersection points and used to control the flow of traffic on the road. Most projects use the sensor to calculate the current volume of traffic.

Manuscript received on 09 August 2025 | First Revised Manuscript received on 02 September 2025 | Second Revised Manuscript received on 08 September 2025 | Manuscript Accepted on 15 September 2025 | Manuscript published on 30 September 2025.
*Correspondence Author(s)
Aamir Mushtaque Khan*, PG Scholar, Department of Electronics and Telecommunication, Prof Ram Meghe College of Engineering and Management, Badnera, Amravati, Mumbai (Maharashtra), India. Email ID: aamirmkhan55@gmail.com
Dr. P. S. Choudhary, Associate Professor, Post Graduate Department of Digital Electronics, Prof. Ram Meghe College of Engineering and Management, Badnera, Amravati, Mumbai (Maharashtra), India. Email ID: pschoudhari@gmail.com

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open-access article under the CC-BY-NC-ND license http://creativecommons.org/licenses/by-nc-nd/4.0/

Still, this approach has the limitation that this technique is based on counting the vehicles and treats emergency vehicles as ordinary vehicles, which means no priority to ambulance, fire brigade or VIP vehicles. As a result, emergency vehicles are stuck at traffic signals and waste their valuable time. In today's world, health hazards are a significant concern. Especially, people in the older age group are the victims, due to the worsening traffic conditions, which lead to miasma and pollution of different types. RF-based systems can solve the problem of traffic light control. This system prioritises different types of vehicles and considers traffic density on the roads by installing RF readers at road intersections. Radio frequency identification is a technique that uses radio waves to uniquely identify objects.

[Fig.1: Traffic Jam at Signals]

II. LITERATURE SURVEY

Automation of traffic lights through IoT, written by Sudhamani Chilakala. The paper proposed controlling air pollution using traffic signals. Air pollution contains gases such as carbon dioxide, smoke, ammonia and humidity. The information is constantly forwarded to the microcontroller, and it is then reported to the online server through the Wi-Fi module [1]—a proposed IoT-based innovative traffic light control system within a V2X framework, written by Hanna Abohashima. The paper proposes applying the framework of vehicle-to-vehicle communication (V2V) to vehicles. The paper also integrated mathematical methods with a Neuro-Fuzzy approach based on a traffic control system [2], an innovative traffic light controller system developed by L.P.F. Oliveira. The paper proposes controlling traffic lights using topology communication with other wireless network traffic lights. The Xmesh network proved to be feasible for managing data packets through the N4IoT layer [3]—an IoT-based intelligent traffic signal system for emergency vehicles, written by Shubhankar Vishwas Bhate. The paper proposes a method that is primarily based on IoT and

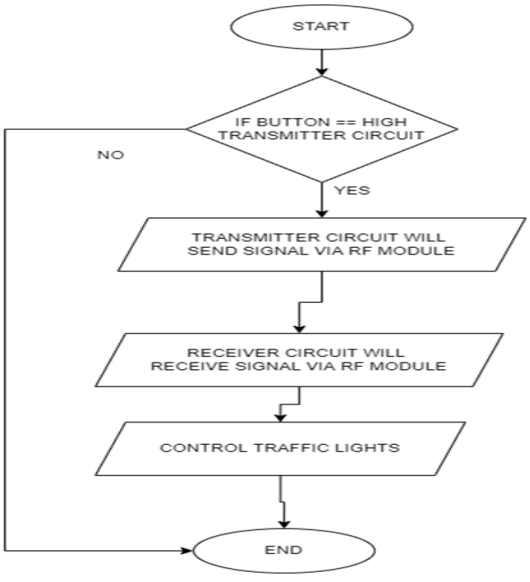
© Copyright: All rights reserved.

controls traffic signals using a device such as Raspberry Pi [4]—an IoT-based dynamic traffic signal control, developed by Anitha. The paper proposes a method based on IoT, utilising the kernel method [5]—an innovative traffic light control system developed by Jorge Guerra. The paper proposed controlling the traffic signals using IoT. An IoT system based on the Raspberry Pi platform and PIR sensors will be designed and implemented. The design is for the implementation of camera-related functions [6]. Intelligent traffic light control system based on real-time traffic flows, written by Zhijun Li. The paper proposed a traffic system based on Ultrasonic technology. The ultrasonic sensor achieves real-time monitoring by using ultrasonic sensors for road vehicles [7]. Intelligent control of the traffic light system using Image processing, written by Khushi. This paper proposed controlling the traffic signals based on Image processing using MATLAB code [8]—an intelligent traffic control system written by Aneesa Saleh. The paper proposed that the infrared sensors and cameras combined with an image processing algorithm were used to detect traffic density [9]—an adaptive traffic lights control system written by Swapnil Manohar Shinde. The paper proposes that the adaptive cell phone interface for traffic light control provides traffic information to drivers on demand, helping to efficiently regulate traffic and make alternative route decisions [10]—an intelligent traffic lights control system written by Bilal Ghazal. The paper proposes a system based on a PIC microcontroller that evaluates traffic density using IR sensors [11]. A dynamic fuzzy logic traffic light integrated system with an accident detection system using traffic simulation, written by Mohammed Ali Yousef. The proposed system was divided into three main parts: the dynamic Webster, the dynamic cycle time, and the accident detection system using fuzzy logic theory, along with an action system dependent on the detection system [12]—cyber-physical bright traffic lights, as written by Hamid Vakilzadian. The paper proposed that the smart traffic focuses on the requirement for using sensors, actuators and communication technologies to calculate the arrival time of vehicles at a traffic light at a road intersection by monitoring the actual speed of cars [13]. Design of a traffic light control system based on DSP written by Jaun He. This paper designed an intelligent traffic light control system with a DSP chip as the core controller and performed a simulation experiment using CCS simulation software [14]—"Design of Traffic Lights Controlling System Based on PLC and Configuration Technology," written by Liu Yang. The paper proposed that traffic signals can be controlled by using PLC and software MCGS [15].

A. Summary:

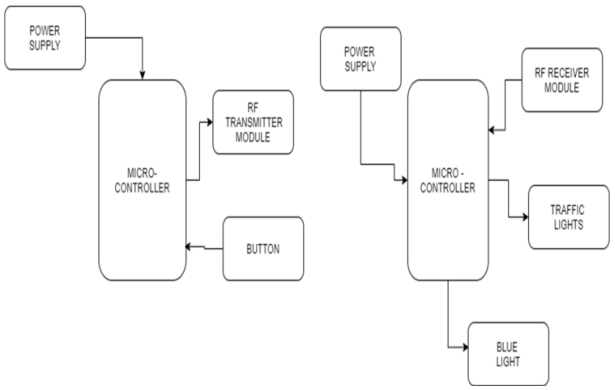
Sr.No.	Research Paper Name	Authors	Year	Technology used	Scope to Work
1	Automation of Traffic Lights through IoT	Sudhamani Chilakala, N.Renuka, Suraya Mubeen	2020	IoT	controlled air pollution, including harmful gases such as carbon monoxide, carbon dioxide, smoke, and ammonia, as well as humidity in the atmosphere.
2	A proposed IoT-based bright traffic lights control system within a V2X framework	Hanaa Abohashima, Mohamed Gheith, Amr Eltawil	2020	IoT	Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) related technologies are used.
3	Intelligent traffic light controller system	L. F. P. Oliveira, L. T. Manera,P.D.G. Luz	2019	IoT	A traffic light controller electronic circuit with a centralised control topology.
4	An IoT-based intelligent traffic signal system for emergency vehicles	Shubhankar Vishwas Bhate, Prasad Vilas Kulkarni, Shubham Dhanaji Lagad, Mahesh Dnyaneshwar Shinde	2018	Raspberry Pi	The model includes managing traffic signals using devices such as Raspberry Pi, NodeMCU, and RFID Tags.
5	An IoT for ITS: An IoT-based dynamic traffic signal control	Anitha, K.N. Rama Mohan Babu	2018	IoT	The Arduino controller and IR sensors regulate the traffic system to work efficiently.

B. Related Algorithm



[Fig.2: Shows the Flowchart of Our System Module]

III. BLOCK DIAGRAM



[Fig.3: Block Diagram of Our System]

I am using two microcontrollers, specifically the Arduino Uno and Arduino Nano. One of the microcontrollers will be connected to an ambulance or VIP vehicle, and the other

© Copyright: All rights reserved.

will be connected to traffic lights. The Arduino Nano will be connected to an ambulance or a VIP vehicle, which will be equipped with a button used to notify the driver to clear the way. The Arduino Uno will be connected to traffic lights with a blue light, serving a special purpose to inform everyone about the presence of an ambulance and VIP vehicles. Whenever the ambulance starts from the origin, the driver will press the button to notify the traffic signals to clear the way.

IV. OBJECTIVES

I am aiming to create a system where emergency vehicles or VIP vehicles can pass through traffic without any interruption. As emergency vehicles need to be at the target location as soon as possible, our dissertation is designed to clear all traffic signals to green without human interference automatically.

V. CONCLUSION

I designed the project concept based on a literature study regarding this project. Block diagram, concept of the project and components got finalised using this literature study. As emergency vehicles need to be at the target location as soon as possible, our dissertation is designed to clear all traffic signals to green without human interference automatically.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

REFERENCES

1. Sudhamani Chilakala, N Renuka, Suraya Mubeen, "Automation of Traffic Lights through IoT", IEEE 7th International Conference on Smart Structures and Systems ICSSS 2020. DOI: https://doi.org/10.1109/ICSSS49621.2020.9202275
2. Hanaa Abohashima, Mohamed Gheith, Amr Eltawil, "A Proposed IoT-Based Smart Traffic Lights Controls System Within a V2X Framework", 978-1-7281-8226-1/20/31.00,2020 IEEE. DOI: https://doi.org/10.1109/NILES50944.2020.9257874
3. L. F. P. Oliveira, L. T. Manera, P. D. G. Luz, "Smart Traffic Light Controller System". 978-1-7281-2949-5/19/31.00,2019 IEEE. DOI: https://doi.org/10.1109/IOTSMS48152.2019.8939239
4. Shubhankar Vishwas Bhate, Prasad Vilas Kulkarni, Shubham Dhanaji Lagad, Mahesh Dnyaneshwar Shinde, "IoT-based Intelligent Traffic Signal System for Emergency vehicles", 978-1-5386-1974-2/18/31.00,2018 IEEE. DOI: https://doi.org/10.1109/ICICCT.2018.8473210
5. Anitha, K.N. Rama Mohan Babu, "IOT for ITS: An IoT-based dynamic traffic signal control", 978-1-5386-2456-2/18/31.00,2018 IEEE. DOI: https://doi.org/10.1109/ICIRCA.2018.8597392
6. Nicole Dliaz, Jorge Guerra, Juan Nicola "Smart Traffic Light Control System", 978-1-5386-6657-9/18/31.00,2018 IEEE. DOI: http://dx.doi.org/10.1109/ETCM.2018.8580282
7. Zhijun Li, Chunxiao Li, Yanan Zhang, and Xuelong Hu, "Intelligent Traffic Light Control System Based on Real Time Traffic Flows," 978-1-5090-6196-9/17/31.00, 2017 IEEE. DOI: https://doi.org/10.1109/CCNC.2017.7983196
8. Khushi, "Smart Control of Traffic Light System using Image Processing", 978-1-5386-3243-7/17/31.00,2017 IEEE. DOI: https://doi.org/10.1109/CTCEEC.2017.8454966
9. Aneesa Saleh, Steve A. Adeshina, Ahmad Galadima and Okechukwu Ugweje, " An Intelligent Traffic Control System", 978-1-5386-2501-9/17/31.00,2017 IEEE. DOI: https://doi.org/10.1109/ICECCO.2017.8333313
10. Swapnil Manohar Shinde, "Adaptive Traffic Lights Control System", 978-1-5090-4264-7/17/31.00,2017 IEEE. DOI: https://doi.org/10.1109/ICISIM.2017.8122189
11. Bilal Ghazal, Khaled Eikhatib, Khaled Chahine, Mohamad Kherfan, "Smart Traffic Light Control System", ISBN: 978-1-4673-6942-8/16/31.00,2016 IEEE. DOI: http://dx.doi.org/10.1109/EECEA.2016.7470780
12. Faisal AlAwadhi, Mohammed Ali Yousef, Abdulrahman Al-Kandari, "Dynamic fuzzy logic traffic light integrated system with Accident Detection System using iTraffic Simulation", 978-1-5090-0424-9/16 31.00,2016 IEEE. DOI: https://doi.org/10.1109/ACSAT.2015.38
13. Arwa Ibrahim Ahmed and Ashraf Gasm El Seed, "Intelligent Traffic Light Based On Multi Agent System," 978-1-4799-2758-6/13 $31.00, 2013 IEEE. DOI: https://doi.org/10.1109/ACSAT.2013.25
14. Juan He, Song-Yue Yuan, Fei-Qiao Xiong, "Design of Traffic Lights Control System Based on DSP", 978-1-4673-0875-5/12/31.00,2012 IEEE. DOI: https://doi.org/10.1109/RSETE.2012.6260527
15. Liu YangChen XianFeng, "Design of Traffic Lights Controlling System Based on PLC and Configuration Technology," 978-0-7695-3843-3/09 26.00, 2009 IEEE. DOI: https://doi.org/10.1109/MINES.2009.176

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)/ journal and/or the editor(s). The Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP) and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

© Copyright: All rights reserved.