AUTOMATIC CONTROL SYSTEM FOR AMBULANCE USING IOT

A MINOR PROJECT - III REPORT

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BONAFIDE CERTIFICATE

Certified that this **18ECP105L-Minor Project III** report "**AUTOMATIC CONTROL SYSTEM FOR AMBULANCE USING IOT"** is the bonafide work of "**DEEPIKA M(927621BEC029), DHARSHANA M (927621BEC041), DHARSHINI T(927621BEC043), INDHUJA V (927621BEC064)"** who carried out the project work under my supervision in the academic year **2023-2024 – ODD SEMESTER**.

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PROJECT COORDINATOR

INSTITUTION VISION AND MISSION

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

M1: Produce smart technocrats with empirical knowledge who can surmount the global challenges.

M2: Create a diverse, fully -engaged, learner -centric campus environment to provide quality education to the students.

M3: Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

DEPARTMENT VISION, MISSION, PEO, PO AND PSO

Vision

   To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research and social responsibility.

Mission

M1: Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives

PEO1: Core Competence: Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering.

PEO2: Professionalism: Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: Lifelong Learning: Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality.

Program Outcomes

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfill the industrial expectations.

Abstract	Matching with POs, PSOs
Power supply, RFID module, Arduino NANO, Buzzer, IOT module	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2**

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We would like to thank our **Minor Project Co-ordinator**, **Dr.K.Karthikeyan, B.E., M.Tech., Ph.D., Associate Professor**, Department of Electronics and Communication Engineering for his kind cooperation and culminating in the successful completion of this project work. We are glad to thank all the Faculty Members of the Department of Electronics and Communication Engineering for extending a warm helping hand and valuable suggestions throughout the project. Words are boundless to thank our Parents and Friends for their motivation to complete this project successfully.

ABSTRACT

Road block due to heavy traffic is one of the crucial issues in India due to which ambulance services get affected on large amount, due to delay in ambulance service, patient may lose their life and number of these scenarios are getting increased day by day. In this project, proposed a smart ambulance service with more added technologies like RFID module, IOT module and etc.. This will be monitoring the ambulance path and clear the traffic jams in signals helpful for along with sensor nodes. The main objective behind in this project is to provide a smart way of controlling traffic light timing during a peak hour and also to provide smooth flow for the ambulance to reach the hospital in time. We are going to implement a new mode called "ambulance mode" which would control the traffic lights in the path of the ambulance. This scheme is fully automated thus it controls the traffic lights, helping to reach the hospital in time. This is not preferred only for ambulance. It is preferable for other emergency vehicles such as fire engine.

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LIST OF ABBREVIATIONS

ACRONYM		ABBREVIATION
RFID	-	Radio Frequency-Identification
GSM	-	Global System for Mobile Communication
IoT	-	Internet of Things
GPS	-	Global Positioning System

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

India is the second most population country in the world and is a fast-growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non lane based and chaotic. It needs a traffic control solution, which are different from the developed countries. Intelligent a management of traffic flow can reduce the negative impact of congestion. In recent years, wireless network is widely used in the road transport as they provide more cost-effective options Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions.

RFID is wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. Some RFID systems will only work within the range inches or centimeters, while others may work for 100 meters (300 feet) or more. The main concept behind this project is to provide a smooth flow for the ambulance to reach the hospitals in time and thereby minimizing the delay caused by traffic congestion. In future may get even worse. In this cause Recovery action need to be taken immediately. So, for our over populated environment, there is a real need of this for the society to make easier day to day transportations. This will help to reduce blockage of emergency vehicles in traffic and helps to provide immediate recovery with the turn of the century, there occurred an explosion of population across the globe. According to the United Nation's Department of Economic and Social Affairs, Population Division of the world was 1.3 billion as of October 14, 2017. This directly led to more number of peoples living in cities. In this 21st century day by day more and

more people are dwelling in cities and towns. This has resulted in outburst of traffic in cities.

However, not much attention has been paid towards reduction of the traffic congestion. Hence, we came up with a proposed model which can minimize the traffic congestion for normal traffic flow. Keeping in mind the modern Indian road, our proposed model would be able to solve the problem of traffic congestion on the junction much more efficiently than conventional traffic system. The whole system is efficient as well as cost effective, and can easily be installed in Indian roadways.

The method is quite simple; it senses the vehicle on the road for certain minute at predefined distance and takes the best fitted decision automatically by the vehicle on the road. The next step of the implementation is that a system to handle and changing the traffic signal to green when the emergency vehicle reaches the signal. Different hardware components were used, such as RFID in each emergency vehicle like ambulance. When emergency vehicle was being at the traffic junction the RFID tag transmitter module in vehicle sends a signal to the RFID receiver in traffic to change the traffic light to green.

1.2 OBJECTIVES

The main motto behind our project is to provide a smart way of controlling traffic light timing during a peak hour and also to provide smooth flow for the ambulance to reach the hospital in time. We are going to implement a new mode called "ambulance mode" which would control the traffic lights in the path of the ambulance. This scheme is fully automated thus it controls the traffic lights, helping to reach the hospital in time. This is not preferred only for ambulance. It is preferrable for other emergency vehicles such as fire engine.

This project would be helpful to make free flow of ambulance without being stuck into the traffic. In the current situation itself, transportation of a patient to hospital in emergency conditions seems quite simple but in actual it is very difficult during peak hours. Moreover, the situation gets worse when emergency vehicles have to wait for other vehicles to give way at intersections with traffic signals. In this case recovery action need to be taken immediately. So, for our over populated environment, there is a real need of this project for the society to make easier day to day transportations. Our project will help to reduce blockage of system to meet the above need.

CHAPTER 2
LITERATURE SURVEY

From the literature survey it is observed that researchers have widely used of RFID and IOT module. Most of the research is about the plate recognition of ambulance. The Ambulance Reference Number matching was implemented on traffic signal obtained from RFID and an average accuracy of 90% was obtained. Sensor based method were used by few researchers. When background is complex, it might contain more false license plate detection in Sensor based method. Sensor based method is used which requires much processing power and might result in slower processing time. Proposed work aims at increasing time of processing on identification of the nearby hospital with all requirements of patients. Topologies for various blocks have been finalized from the above literature.

S.No	Title	Author	Year of Publication
1.	Golden AID-an emergency ambulance system	Arun Krishna, Toney Dies and Divya R.S	2017
2.	An rescue system of an advanced ambulance using prioritized traffic system	Smrti singh	2016
3.	A survey an IOT based road traffic survillience and accident detention system	Vipul k Dhabhi	2017
4.	Intelligent traffic control signal system for ambulance using cloud and RFID	B.Janishrdha J vijayshri T.Subha	2017
5.	Advance automation control an ambulance under emergency	Leela sai Krishna Chaudhary m	2017

CHAPTER 3
EXISTING SYSTEM

In modern life we have to face with many problems one of which is traffic congestion becoming more serious in day by day. It is said that the high tome of vehicles, the scanty infrastructure and the irrational distribution of the development are main reasons for augmented traffic jam. The major cause leading to traffic jam is the high number of vehicles which was caused by the population and the development of economy. To unravel this problem, the government should encourage people to use public transport or vehicles with small size such as bicycles or make tax on personal vehicles. Particularly, in some Asian countries such as Viet Nam, the local authorities passed law limiting to the number of vehicles for each family. The methods mentioned above are really efficient in fact. That the inadequate infrastructure cannot handle the issue of traffic is also a Decisive reason. The public conveyance is available and its quality is very bad, mostly in the establishing countries. Besides, the highway and roads are incapable of meeting the requirement of increasing number of vehicles.
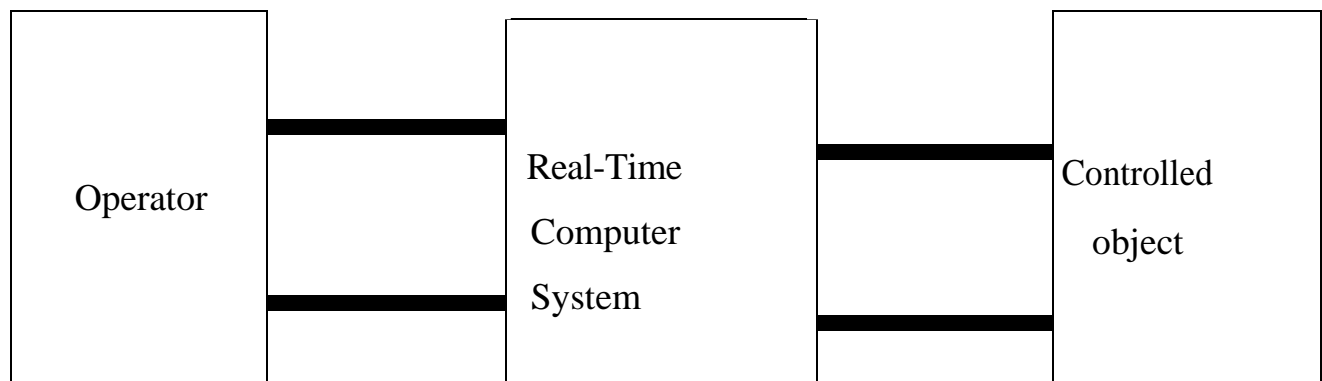
Figure3.1: Real-Time System
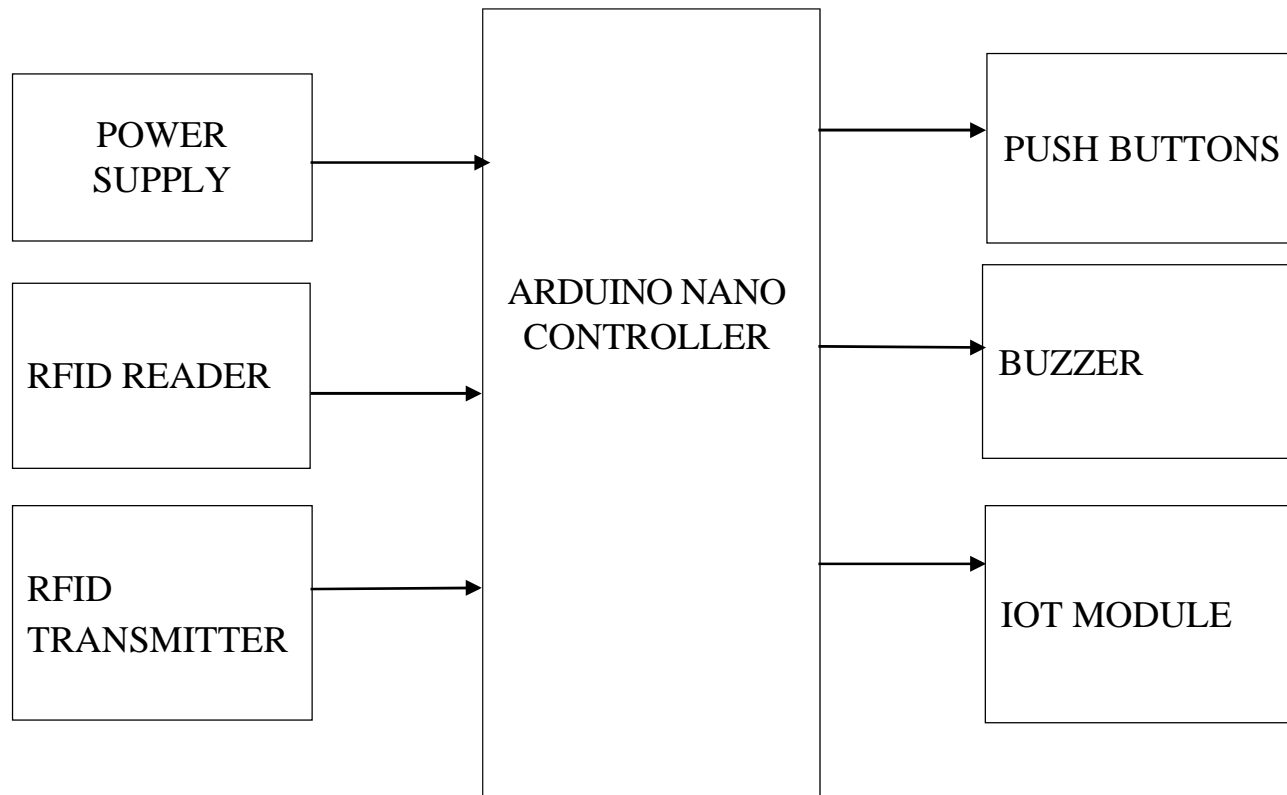
CHAPTER 4

PROPOSED SYSTEM

Figure 4.1: Block Diagram

The proposed a system using Radio frequency identification which is a tiny electronic gadget that comprise of a small chip and an antenna. The chip is embedded with information's about patient's status and the ambulance current lane. The RFID reader located at the traffic signal reads this information from the RFID locator installed at ambulance. To avoid unnecessary traffic signal changes the ambulance current location and patient's condition using mobile app registered by the ambulance driver is referred. In case of network failure RFID takes the whole control.

The 2 major technologies on which it works are

- Mobile app
- RFID

RFID tracks the arrival of ambulance at the traffic signal at a certain distance, a mobile app is used for authentication whether the condition is emergency or non- emergency of the ambulance. GPS is used to track the nearest traffic signal and in turn to send the same data to the particular signal, this data from the RFID and app is given to the microcontroller to process the results and changes the signal accordingly. Both the RFID and mobile app integrate to serve the system without failure at any manner by alternatively working when other fails in its action.

The system involves 4 scenarios;

1.   If the ambulance is in emergency condition is halted in traffic, then the RFID gives the data of the ambulance and the app gives the value 'emergency' the user and the signal changes to green.

2. If the ambulance is not in emergency situation, then the user gives the value 'non-emergency' to the cloud network and the signal is not necessarily made green.

3.   If the ambulance is in emergency and the RFID fails to work then the user gives the value 'blocked' to the cloud through app which makes the system work without failure.

4.   If the ambulance in emergency is stopped due to network failure, then the mobile app can't be accessed here the RFID takes the whole control by sending continuous data to the controller over a long time and further the signal changes.

CHAPTER 5

WORKING PRINCIPLE

The main purpose of this unit is to detect the ambulance which is 1km away from the traffic junction during its way to hospital. A RFID module fitted at the 1km marking will continuously monitor at an interval of 1 second. In ambulance vehicle we place TWO PUSH BUTTONS for alarm purpose. NORMAL and EMERGENCY.

For emergency situation we need to activate the RFID Module through push button. Once the RFID module receive the signal from ambulance mean, then it will pass the signal to controller as per the instruction we feed to controller. And clear the signal through IOT module to traffic control unit. RFID tracks the arrival of ambulance at the traffic signal at a certain distance, a mobile app is used for authentication whether the condition is emergency or non-emergency of the ambulance. GPS is used to track the nearest traffic signal and in turn to send the same data to the particular signal, this data from the RFID & app is given to the microcontroller to process the results & changes the signal accordingly. Both the RFID & mobile app integrate to serve the system without failure at any manner by alternatively working when other fails in its action.

CHAPTER 6
METHODOLOGY

COMPONENTS REQUIRED

HARDWARE DISCRIPTION

POWER SUPPLY

The potential transformer will step down the power supply voltage (0-230V) to (0- 6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

Figure 6.1: Power Supply

RFID MODULE

   Radio frequency Identification (RFID) is a wireless identification technology that uses radio waves to identify the presence of RFID tags. Just like Bar code reader, RFID technology is used for identification of people, object etc. presence.

In barcode technology, we need to optically scan the barcode by keeping it in front of reader, whereas in RFID technology we just need to bring RFID tags in range of readers. Also, barcodes can get damaged or unreadable, which is not in the case for most of the RFID.

RFID is used in many applications like attendance system in which every person will have their separate RFID tag which will help identify person and their attendance. RFID is used in many companies to provide access to their authorized employees. It is also helpful to keep track of goods and in automated toll collection system on highway by embedding Tag (having unique ID) on them.

Figure 6.2:RFID Module

ARDUINO NANO

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board

Figure 6.3: Arduino nano

IOT MODULE

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

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BUZZER

An Arduino buzzer is also called a piezo buzzer. It is basically a tiny speaker that you can connect directly to an Arduino. You can make it sound a tone at a frequency you set. The buzzer produces sound based on reverse of the piezoelectric effect.

SOFTWARE REQUIRED
ARDUINO IDE

IDE stands for Integrated Development Environment. It is a text editor that lets you upload code on to Arduino. Every program file is called a sketch and contains all the code that you write for your projects. Every file has an extension of .ino which used to be a .pde! Verify Button. The first button is the verify button. The verify button is used for compiling your code and checking for errors. It highlights all the errors that you have in the sketch. If there are no errors there won't be any highlights and you are good to go. The shortcut key for the verify button is 'ctrl + r'.

Figure 6.4 : Arduino IDE

PROTEUS TESTING TOOL

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

WHAT IS PROTEUS?

It is a software suite containing schematic, simulation as well as PCB designing. ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation.

CHAPTER 7
RESULT AND DISCUSSION

The system consists of three major parts: Arduino UNO, an RFID system in an emergency vehicle, and an RFID system at an intersection. The RFID system either in an emergency vehicle or at an intersection contains a controller, an ultrahigh-frequency RFID reader module, a Wi-Fi module, and a 2.4-GHz antenna. In addition, a UHF ID antenna is especially designed for the RFID system in an emergency vehicle. The IoT system provides real-time visual warning at an intersection and siren warning from an emergency vehicle in order to effectively inform road users about an emergency vehicle approaching.
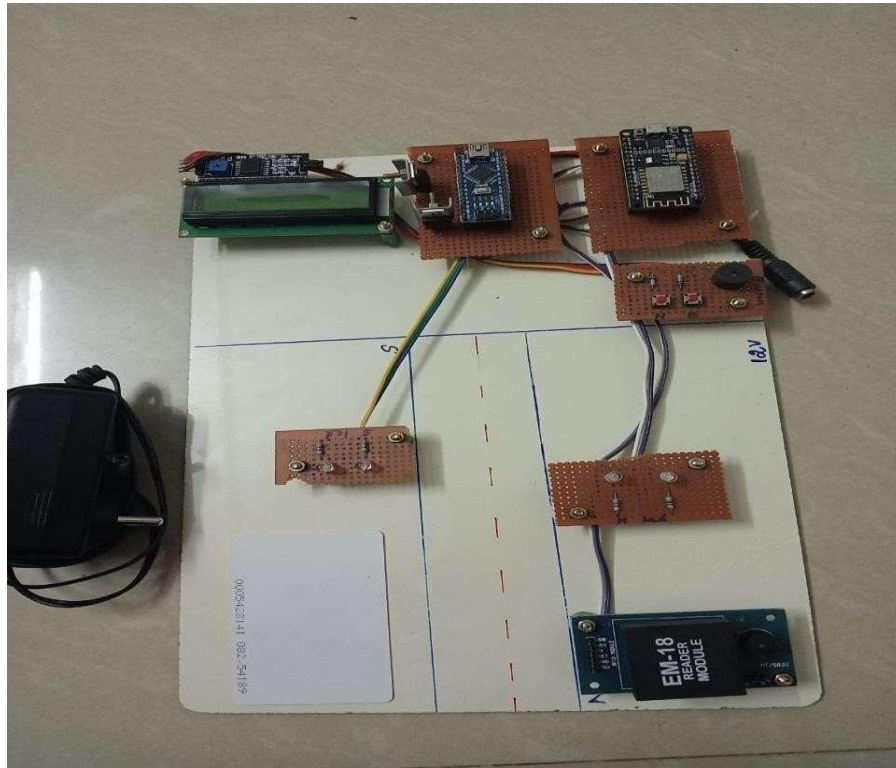

Figure 7. 1 Automatic control system for ambulance using IOT

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CHAPTER 8
CONCLUSION AND FUTURE WORK

Human life is precious and must follow safety measures very conscious in all aspects this of course includes ambulances services too. In this, by using intelligent ambulance system we can achieve the uninterrupted service of the traffic control system by implementing the alternate methods for signal change to allow flow control. As the accuracy of the RFID is more than Cameras, therefore our proposed paper also improves the performance of traffic light Violation Detection System. This system is cost effective, multiple usage and deployed using trending IOT, which is more efficient. 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. Further enhancements can be done to the prototype by testing it with longer range RFID readers. Also, GPS can be placed to track the ambulance.

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