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Traffic Congestion Monitoring Using Smart Traffic Control Approach for Emergency Vehicle

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Abstract: ***The efficiency and robustness increased after using embedded technology for monitoring and control applications. Due to traffic load, intensity can get stuck or they are delayed in reaching their destination. The system describes an intelligent and complex application that helps to clear traffic and to improve security while having fast response of the emergency services. By making use of embedded and wireless communication we can develop an application to clear the traffic while coming in the path. There is a system called as "Intelligent traffic light controller". Where traffic light intelligently decides based on the total traffic on all adjacent roads. This paper presents the current framework of decision support systems for traffic management based on short and medium term predictions and includes some reflections on their likely evolution, based on current scientific research and the evolution of the availability of new types of data and their associated methodologies. When unexpected and unplanned events such as natural disasters, traffic accidents or even terrorist attacks happen, it is necessary to prepare a quick evacuation process and the provisioning of the quickest access routes for emergency services units.***

- ***Accidental situations, emergency situations with related to the health or life of any person is considered as the most important thing to deal with.***
- ***But the problem that is faced is at the early stage that is taking the patient to the hospitals.***
- ***Especially during this pandemic time, where the time factor is very important, here if the patient is not taken to hospital within the time then there is chances of life risk.***
- ***So in this project we aim to solve this problem by installing a sensor on each road near the traffic signal so if the ambulance is coming, then that path will have green signal and other all turns out to be red.***

Keywords: Traffic congestion, Ambulance, Arduino, IR Sensor

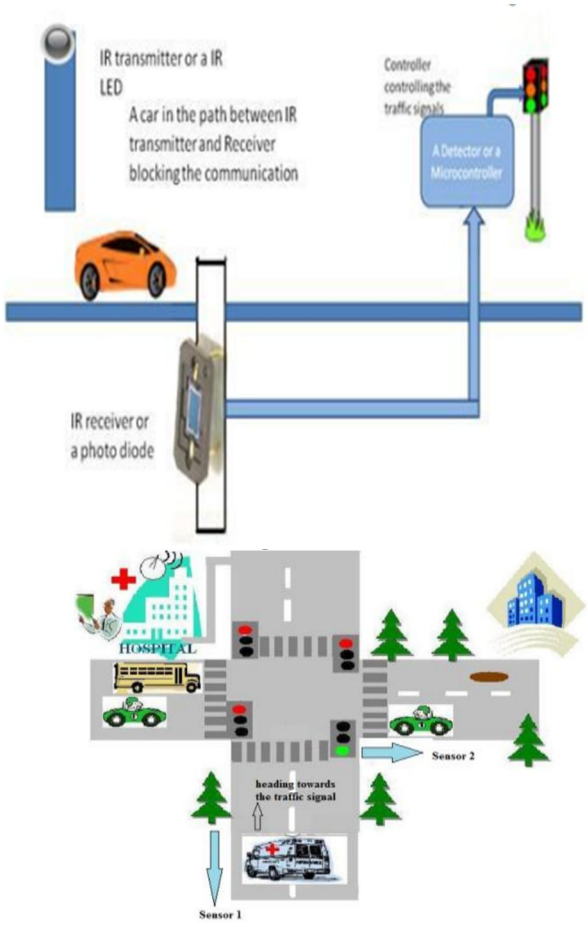
I. INTRODUCTION

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With increasing industrialization, urbanization and population, there has been a tremendous growth in traffic. With growing traffic there is rise in problems which include traffic jams, accidents, etc. One of the major effects of these traffic jams are faced by ambulances, fire-brigades and other emergency vehicles. Ambulance service is greatly affected because of traffic jams. Delays in reaching the hospital may lead to the loss of life of a patient. These things need a speedy response. Thus it is crucial and necessary to determine direct, fast and efficient response technique. Although each and every vehicle passing through the traffic has its own purpose, importance should be given to ambulance and other emergency vehicles because if they have to wait longer time on the traffic there is increase in the risk.

Majority of the traffic signals work on simple timers. Based on the traffic density at a particular intersection, the traffic light will cycle through red, yellow, and green at regular intervals to ensure a uniform traffic flow in all directions through the intersection. Timer-based signals are excellent for busy areas that have a uniform and heavy volume of traffic. Whereas in areas. having sporadic and unpredictable traffic, timer-based systems don't prove to be beneficial.

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II. PROBLEM STATEMENT

In today's real world even in increase of vehicles growth, traffic signals are programmed and still running on fixed timers which will does not vary based on the volume of vehicle accumulation at junction. Due to this scenario there will be a chance of increased waiting time. As no provisions are available with present traffic monitoring system forgetting any information about vehicles. Because of this it will become very difficult to track vehicle and to control signals. So, it creates complexities in emergency situations to minimize delay time of emergency vehicle and may put life' s at risk.

III. METHODOLOGY

This system primarily consists of Arduino Uno (AT mega 328p) microcontroller, Encoder(HT12E), Decoder(HT12D), RF transmitter and RF receiver is mainly designed to work under two modes are normal mode and emergency mode.

A. Normal Mode

In normal mode whole working of system is based on operation of on-chip microcontroller which is programmed to control traffic signals with fixed predefined time intervals. So, based on predefined time intervals signals in different ways are getting altered at different interval of time. Similarly, every central traffic control system is programmed with different functions and methods according to the traffic congestion in particular way.

B. Emergency Mode

In this system, emergency mode is activated by changing switch state to high on transmitter side. When a particular switch gets activated then a signal along with encoded data is transmitted through RF transmitter to the RF receiver installed at central traffic control system nearer to every traffic junctions. After data reception the microcontroller will control signal states for smooth flow of emergency vehicle. So in emergency mode traffic lights will be controlled by received data.

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IV. SYSTEM OVERVIEW

The fig.1 shows block diagram which gives you the overview of the proposed system.

A. Block Diagram Description

Traffic Signal Junction

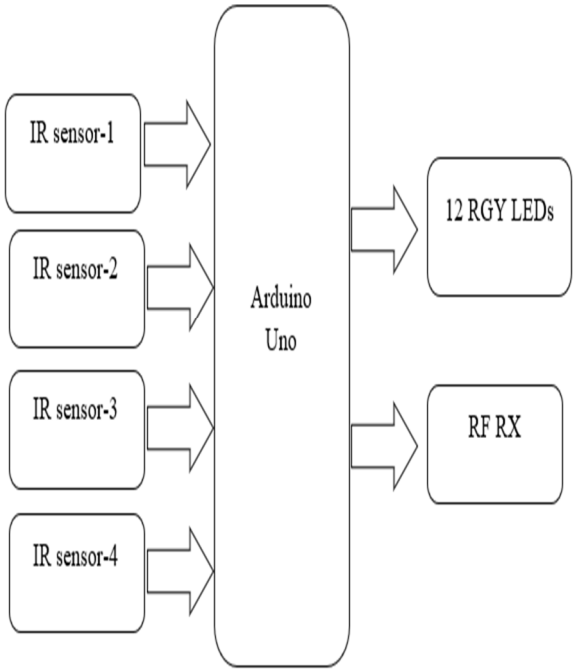


Fig 1.1 Block diagram for traffic signal junction

B. Ambulance Part

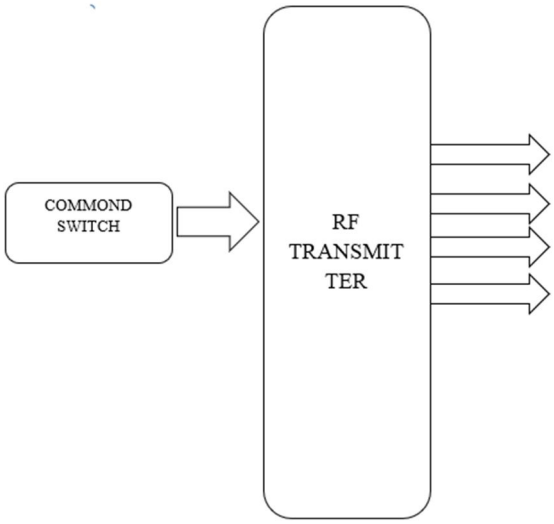


Fig 1.2 Block diagram for ambulance part

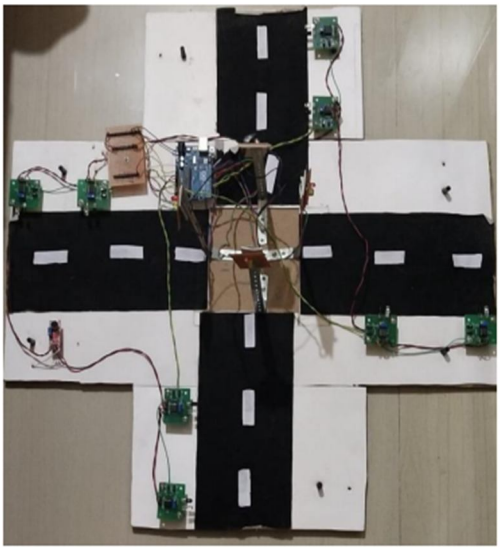
V. IMPLEMENTATION

The model works on the principle of changing of Traffic signals based on the density through an assigned section of the road. There are four sensors placed at four sides of a four way road which checks the density of the area covered by the sensors. Here we are using IR sensors to design an intelligent traffic control system.

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In order to make a way for emergency vehicle (ambulance) IR sensors will be kept on either sides of the road at a specific distance. Each of the IR and an IR receiver. Just as the name suggests, the IR transmitter transmits the IR rays and the receiver is responsible to receive the rays.

The whole system is controlled by the microcontroller which is the Arduino. Arduino is interfaced with Serial to parallel IC(74HC595) and IR sensors .As the vehicle passes through these IR sensors, the IR sensor will detect the vehicle & will send the information to the Arduino. The total no of IR sensors required are 4 and Led's 12. Three sets of LEDs via Green, Yellow and Red are used to indicate the GO state, Ready to Go state and WAIT state.The traffic signal will be tuned with a default timing of 10 seconds of green light and all other signal will be red. After 10 seconds two signals will be yellow for 4 seconds and another two will be red. This condition will be followed till all the IR sensors receiving the signals or all the IR sensors are not getting signals.



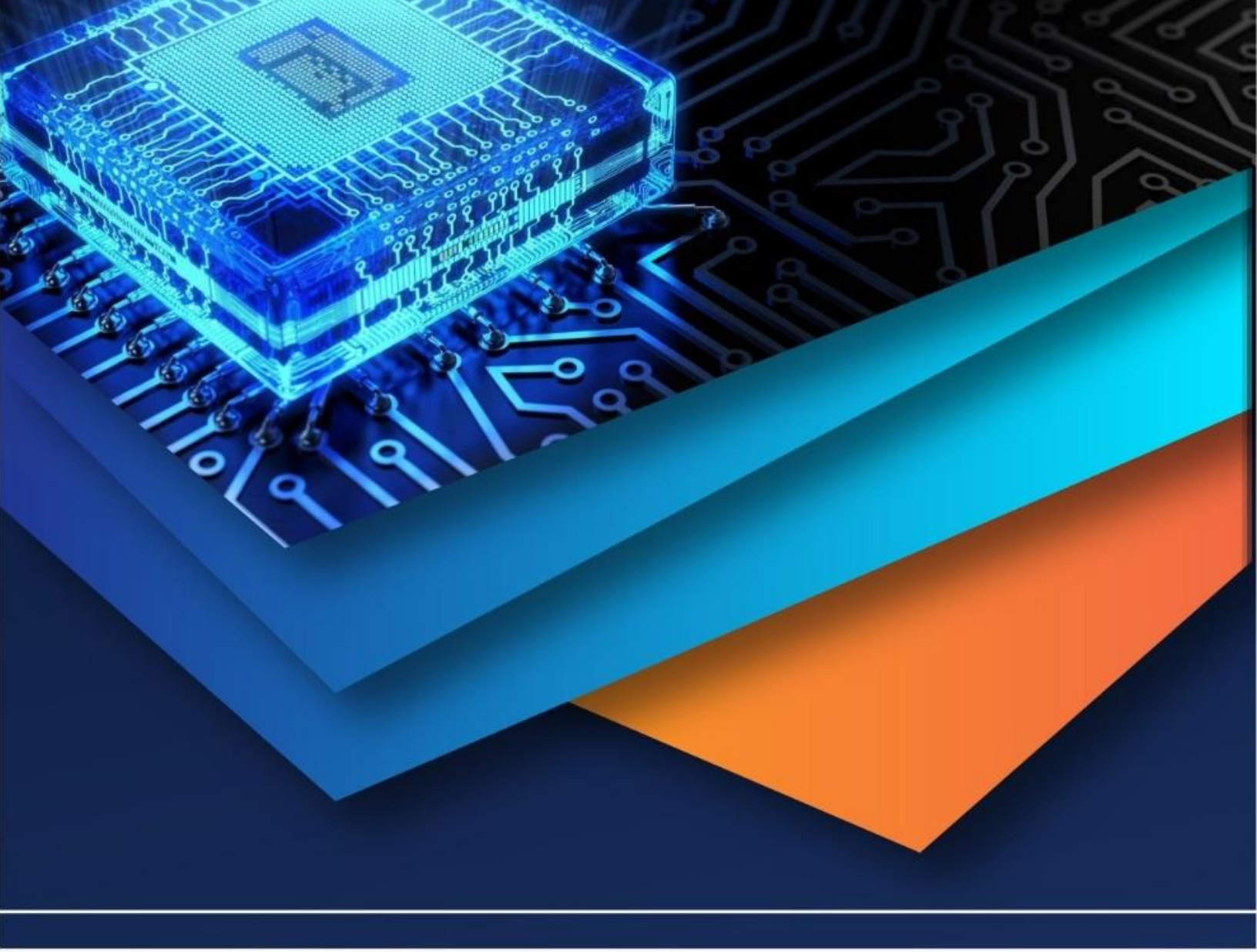
VI. CONCLUSION

The observing the purposed system results are provides the time management in traffic signal is possible which is reducing the traffic. The purposed model can be tray to giving the solution of Density based and clear way of Emergency vehicles. The work of density based system provide the flexibly change the signals. It provides the clearance way of lane to Emergency vehicles hence many precious lives would be saved. The purposed system has worked in automatically without any disturbance of public. This can be elongated to more number of junctions. An 'app' can be designed which uses traffic status at different location from the control station database to exhibit so that it avails mundane people.

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