

# Intelligent Traffic Control System using Raspberry pi

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**Abstract-** The traffic control system is the serious hazards in almost every country this is due to rapid increases in number of vehicle. In order to reduces the complexity and reduces the time, the existing traffic system has to be combined with an existing technology. Emergency services are organization which ensure public safety by addressing different emergencies. They are allowed to do drive through the intersecting when traffic signal light is red, because the vehicles are not reach the destination on particular time. Crisis vehicle like rescue vehicle an ambulance and fire trucks need to achieve their goals at the most punctual. An intelligent traffic control system has been developed to overcome the traffic problem using Raspberry pi. This method helps to give quick way to the traffic system and ambulance clearance. In this system RFID and IR sensor are placed on the traffic signal used to detects the vehicle and also store the data of vehicle for future use. Based on the number of vehicles count, the information is captured by sensor and store the details. During the traffic congestion time, any emergency vehicle detects the signal that automatically change GREEN to RED and also if there is heavy number of vehicle standing on the signal and it changes the signal accordingly. Once the signal has been changed, without the knowledge of traffic police. Using Flask Web Application Technology helps to check the details of traffic changes through internet with. Creating an application using local IP address, by using this address the traffic police can able to check the changes of signal in everywhere. It helps to reduces the manpower and cost effective.

**Index Terms-** Traffic Congestion Control, RFID Module, GSM Module.

## INTRODUCTION

Traffic congestion is serious problem in many modern cities around the world. The travelling of different places within the city is becoming more difficult for the travelers in traffic. Because of the congestion problems, people lose time, miss opportunities, and get frustrated. Due to traffic congestions their loss in productivity from workers, trade opportunities are lost, delivery gets delayed,

and thereby the cost goes on increasing. Traffic control system is major issue in the world. The emergency vehicles are permitted to break the rules, in order to reach the destination on time. The emergency vehicles do not get the information immediately after the accident has occurred. It needs a traffic control solution, which are different from the developed Countries. The intelligent management of traffic can reduce the negative impact of congestion. In recent years, wireless networks are mainly used in the road transport as they provide more cost effective. Most of the current day systems use predetermined timing circuits to operate traffic signals, which are not efficient because they do not operate according to the current volume of traffic at the crossing [1]. It is often seen in today's automated traffic control systems because those vehicles have to wait at a road crossing even though there is little or no traffic in the other direction. To manage traffic congestion, sensor-based systems were suggested for improvement over fixed timing controlled ones. Sometimes multiple detections were also difficult to handle with a sensor based system. These techniques are deals with multivehicle, multilane, multi road junction areas. It provides an efficient time management scheme, in which, time schedule is worked out in real time for the passage of each traffic column. The real-time operation of the system matches the judgment of a traffic policeman on duty. Priority based traffic lights controller using wireless sensor networks was discussed which was used to provide clearance to any emergency vehicle by turning all the red lights to green in the path of the emergency vehicle depending on the priority assigned to them. Efficient management of traffic is achieved by instructing this system to make decisions based on traffic density occurring in its environment. The advantage lies in the fact that these automated systems in [3], being free of manual intervention, can be employed to monitor traffic in areas where it may not be feasible to post people or which are prone to accidents

ranging from Hilly areas to narrow tunnels. This paper organized as follows, Section 2 discussed about the related works. Section 3 briefly discussed about the proposed system framework and also architecture of the system. Section 4 deals with the discussion of experimental results and analysis. Section 5 concludes the work with the proposal of a future work.

## II. LITERATURE SURVEY

The work proposed in [1] presents an intelligent traffic control system to pass the emergency vehicle in a smoothly way. It contains of ZigBee, PIC16F887A, RFID Reader and GSM can be used in traffic control to provide cost effective solution. RFID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader.

The framework done in [2] of using RFID and IR sensor. It consists three parts: First it consists of RFID to receive the number of vehicle crossed using RFID tag and send signal to RFID reader. According to the RFID signal make the path on GREEN. The second part is stolen vehicle, when the RFID reader receives the vehicle list the vehicle number if the number matches it sends the SMS to the police station and enable RED light on traffic signal.

The system explained in [3] about the raspberry pi controller using the traffic control system. Raspberry pi is the minicomputer it is credit card size, used for multifunction based on the application. Here the traffic is continuously monitored and recorded. It is used for monitoring the traffic density and gives the report to the traveler.

The proposed design and implementation of an intelligent and automated traffic control system in [4] which takes advantages of computer vision and image processing technique. Along with conventional computer vision techniques, this paper introduces two new methods which has low processing cost. One of the methods has been constructed with the help of hardware and the other one is designed without hardware support.

The system discussed in [5] about the depend upon the mercy of others. The delay of emergency vehicle reaching the accident spot and the traffic in between accident spot and hospital has increased the chances of death of the victim. Tracing the accident spot is the major issue faced by emergency unit.

The proposed technologies in [6] integrated into modern vehicles offer an opportunity for better assistance to people injured in traffic accidents. To improve the overall rescue process, a fast and accurate estimation of the severity of the accident represent a key point to help the emergency services to better estimate the required resources. This paper proposes a novel intelligent system which is able to automatically detect road accidents.

The System developed in [7] the traffic congestion and tidal flow are major facts that cause delay to ambulance. In order to save human life from accidents we introduce a scheme called ITLS (Intelligent Traffic Light system). The main concept behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion. The idea behind this scheme is to implement ITLS which would control automatically the traffic lights in the path of the ambulance.

The system discussed in [8] the preemptive traffic light control in an effort to reduce in [4] travel times of emergency vehicles in urban areas and negative effects on the total travel times of all vehicles in the traffic network. In this paper, a new algorithm for preemptive traffic light control is proposed. It is based on emergency vehicle location and intersection queue length data. Using these data, the algorithm dynamically adapts the signal program of a signalized intersection. Proposed algorithm is tested in four different scenarios using a realistically simulated isolated intersection as a use case.

In the existing traffic control system which is used through Microcontroller, ARM etc., to control the traffic, clear the ambulance and find the stolen vehicle. It can be seen that, existing technologies are insufficient to handle the problems of congestion control, emergency vehicle clearance, and stolen vehicle detection. In the traffic control system has developed using various technologies like ARM, Microcontroller, Raspberry pi etc., Using this technology to find the number of vehicles waiting for the signal clearance and ambulance crossing and stolen vehicle using IR sensor, RFID and ZigBee etc. ZigBee is used to detects the shortest distance only, the traffic congestion is heavy it cannot able to control the vehicle congestion accurately.

### III. PROPOSED INTELLIGENT TRAFFIC CONTROL SYSTEM

In the proposed intelligent traffic control system to pass emergency vehicles smoothly. Each individual vehicle is equipped with special radio frequency identification. Also there are no priority service provided for any priority vehicles like ambulance, fire brigades etc. Thus some services other than the normal services must be introduced to priority vehicles for more efficiency in traffic system. There is a drastic need to solve the problems faced by the citizens for efficient management of traffic.

The most of the people overcome the traffic pressure, road traffic congestion is becoming more and more serious, research and implementation of the intelligent traffic control to improve the traffic environment, characteristic of urban road traffic, energy conservation and environmental protection is of great significance. Development and application of Internet of things technology for the realization of the intelligent traffic control provides a good technical support.

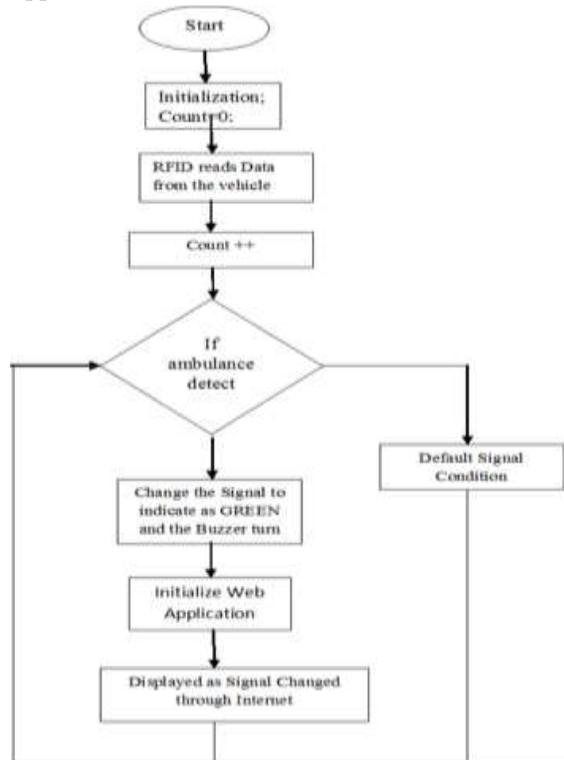


Fig.1 Flowchart of implementing traffic control  
The intelligent traffic control system is developed to overcome the drawback of traffic control system to reduce the traffic congestion using Raspberry pi. It

can also detect number of vehicle on road due to the heaviness on road it can auto-adjust the system according to the road conditions which makes the system intelligent. The raspberry pi it works as a mini computer. It has many advantages of using raspberry pi it has multiple components to various application. Here the RFID is used to detect the number of vehicle in traffic and also the ambulance in traffic signal, the data are stored in the memory for future use. It detects the heavy number of vehicle standing on the traffic signal detect using RFID and changes the signal to GREEN, other side it makes it as red. Once the ambulance is detecting, it follows the same procedure to fall the signal GREEN and also indicating using BUZZER, signal changes the buzzer automatically ON and indicating the signal changed. The one more advantage of the proposed system is the traffic man checks the signal changes at anyplace through internet. Here creates a local IP address code with flask web application it helps to reduce the work of traffic police and monitor the traffic changes.

### IV. IMPLEMENTATION OF INTELLIGENT TRAFFIC CONTROL SYSTEM

The proposed intelligent traffic control system is developed using Raspberry pi 3 B+ model. It has 1.4GHz 64-bit quad core ARM cortex-A53 CPU, dual-band 802.11ac. It provides faster Ethernet and also improved thermal management and give improved PXE network and USB mass-storage booting. RFID it helps to detects the vehicle in the traffic signal and gives the information to raspberry pi as shown in fig 4.1. It allows the reach higher clock frequencies (or to run at lower voltages to reduce power consumption), and to more accurately monitor and control the temperature of the chip. Below 70C use to improves the increases of the core frequencies to 1.4GHz it reaches above 70 it drops to 1.2GHz it gives the improvement to decreases the core voltage, increasing with the period of time.

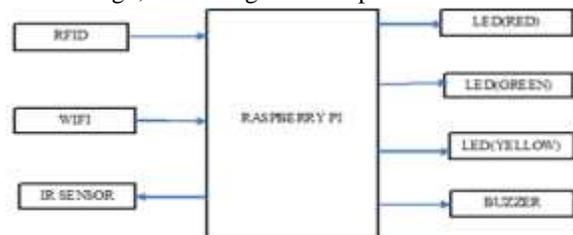


Fig.2 Block Diagram of Traffic Control System

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals and cases. However, some accessories have been included in several official and unofficial bundles. The organization behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing the technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and in developing countries.

#### V. EXPERIMENT RESULT AND ANALYSIS

Intelligent traffic control system developed using raspberry pi and coded with python to implement the RFID code to detect the vehicle. Information collected from the tags is then transferred through a communication interface to a host computer host system, where the data can be stored in a database and analyzed at a later use. In the intelligent traffic control system is designed to help the traffic congestion in habitual life. The traffic is the major issue, this technology has been developed to reduce the traffic control and also it helps to detect the ambulance and emergency vehicle in traffic. Here using Raspberry pi and coded with python software were used for the technologies. The RFID is placed in the four signal which is used to detects the vehicle and store data for future usage. Once the Ambulance is detected the signal automatically changes to RED to GREEN, and also buzzer will turn ON. The traffic police also check the details of traffic changes through internet with the help of local ip address.



Fig.3 Software implementation of Traffic control



Fig.4 Hardware development

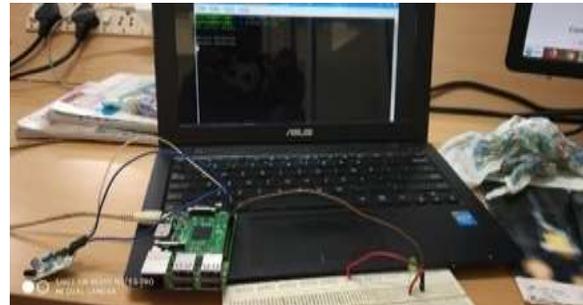


Fig.5 Hardware development and implementation



Fig.6 Output of web Application

#### VI.CONCLUSION AND FUTURE ENCHNACEMENTS

The implementation of raspberry pi based traffic control system gives more advantages. Traffic controls system helps to give the way for ambulance and also it helps to reach the destination at correct time. In the traffic system, the congestion occurs or it detects the heavy traffic on the road the signal changes RED to GREEN and also the BUZZER will turn ON to shows the ambulance detected the signal changes for few minutes. The use of RFID to count the number if vehicle in the signal and store it the memory for future works. Introducing an application called flask web Technology, it will help to monitor the ambulances changes in any places through internet. Create a local IP address it connected to the

traffic control to monitor the changes. It reduces the work of traffic police.

The existing method of intelligent traffic control system can be further enhanced by using longer range RFID readers, longer range IR and web development. The IR sensors can be replaced by magnetic sensors, so that the density of vehicles can be calculated without any disturbances and noise. It helps the traffic police to check the traffic changes through internet. It can be improved by extending to all the roads in a multi road junction.

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