Server Based Automated Smart Traffic Clearing System During Emergency Using Parallel Plates

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ABSTRACT— Traffic congestion has become a major problem nowadays. At present, adaptive traffic control system clears the traffic based on allocated time. There are various reasons for this traffic congestion. As a result of it, emergency conditions faces heavy difficulties. We overcome these problems by introducing a concept of automated traffic clearing system. This automation is the process of making the electronic device to communicate between them to serve the purpose of the human. This project is to establish the communication between the traffic signals and the emergency vehicle so that the traffic signal can respond to the arrival of the emergency vehicle and respond according to that. When the traffic signal changes its states according to the position of the emergency vehicle, emergency vehicle can pass without any delay so that the emergency purpose will be first fulfilled. Thus this project will act as a life saver.

Keywords— Traffic control, emergency, parallel plate capacitor, data processing, web server

1, INTRODUCTION

Emergency vehicles such as ambulances, fire fighting vehicles and police force vehicles are required to reach their destination as quickly as possible. One of the most important delays is the time that is consumed in intersections with these traffic lights, especially when their intersections are highly congested. In this paper we discuss the design and implementation of an automatic pre-emption traffic control system that ensures to give preferences to all the emergency vehicles. Traffic congestion has become a major problem in this. One of these is the rapid growth of the population. As a result of this, the number of cars is increasing annually The increase in the number of trucks and commercial vehicles also causes traffic congestion. This causes problems for the ambulance to reach the hospital on the right time. As the result of the rapid growth of technology and engineering field the life of the mankind has got automated. This automation is the process of making the electronic device to communicate between them to serve the purpose of the human. The one of the major field that concentrate on the automation is Internet of Things creatively called as IOT. This project is based on the IOT and cloud to save the human life at critical situation. This project is to establish the communication between the traffic signals andthe ambulance so that the traffic signal can respond to the arrival of the ambulance and respond according to that. When the traffic signals are changes its

according to the position of the ambulance it can able to make a free way for the ambulance. Thus this project will act as a life saver.

2, SMART TRAFFIC CLEARING SYSTEM

This system is used to clear the traffic in the intersection of roads based on the traffic congestion. During emergency situations, the ambulance driver or authorised personal sends the signals to server by using an mobile application. The server after receiving the signal, it gives the shortest route coordinates to the embedded client. At the same time,it takes the control of all traffic signals in the route which is sent to client. Now the emergency vehicle can easily reach the destination without any delay. While comparing to the present traffic system, this system is not only better and efficient but also will be a life saver.

3, SYSTEM ANALYSIS

3.1 Existing System

The Existing system is a signal control in which the cycle length, phase plan and phase times are predetermined and fixed. Pre-timed control consists of a series of intervals that are fixed in   duration. Collectively, the preset green, yellow, and red intervals result in a deterministic sequence and fixed cycle length for the intersection. Pre-timed control cannot compensate for unplanned fluctuations in traffic flows, and it tends to be inefficient at isolated intersections were traffic arrivals are random. The traffic lights are used mainly for pedestrians to be protected when they cross the roads. The normal function of traffic system is to control the coordination to ensure that traffic moves as smoothly and safely as possible. It helps in reducing collisions, both vehicular and pedestrians. It encourages travel within the speed limit to meet the green lights. Emergency will occur any way, any time and on any location. In that case the speedily response is required. The number of vehicles using the limited road networks infrastructure which was slowly increased. I feel that the major consequence of this increase is the traffic management problem. One of the most critical consequences of traffic problem is the delay of emergency vehicles such as, ambulance during accidents to reach hospitals on time, Fire brigade vehicles, police van to catch the thief, and VIP (minister or president) vehicles. There are traffic jams occur on main way in special seasons and rush hours. That was lead to a long waiting time of peoples and high cost of fuel consumption on the road. And in that delay the Emergency vehicles are stuck in traffic jams. Sometimes even if there is no traffic then also people have to wait because there is a certain time limit of traffic signal. So road users have to wait till the traffic signal returned to green light stuck in traffic jams. Sometimes even if there is no traffic then also people have to wait because there is a certain time limit of traffic signal. So road users have to wait till the traffic signal returned to green light. Traffic signals have strengths and weaknesses that must be considered when deciding whether to install them. Signaled intersections can reduce delay for side road traffic and reduce the occurrence of collisions by turning traffic and cross traffic. But they may also cause delay for traffic on the main road, and often increase rear-end collisions. Since right-

angled and turn-against-traffic collisions are more likely to result in injuries, this is often an acceptable trade-off .Therefore we have to find new methods which solve this problem.

Fig 3.1   Present Traffic System

4, PROPOSED SYSTEM

In order to overcome the problems faced by pretimed traffic control system. This automated smart traffic clearing system can be used. This project is to establish the communication between the traffic signals and the ambulance so that the traffic signal can respond to the arrival of the ambulance and respond according to that. When the traffic signals are changes its states according to the position of the ambulance it can able to make a free way for the ambulance. Thus this project will act as a life saver. The automatic traffic light system is that, in case of emergency vehicles like ambulances and fire engines that want to pass by when the signal is red.

The most prevalent traffic signaling system in developing countries is the timer based system. This system involves a predefined time setting for each road at an intersection. While this might prove effective for light traffic, heavy traffic requires an adaptive system that will work based on the density of traffic on each road.In this paper, we propose an adaptive traffic intersection system where the traffic monitoring is done with the help of a parallel plate capacitor and traffic clearance at intersections will be carried out based on the density of traffic at that particular intersection.

In a country like India, where the economic condition is in development stage and the existing traffic signal infrastructure is non-automated and making the whole traffic signal system automated is not possible. So, the proposed idea takes this problem into account and with a partial change uses the existing infrastructure to fulfill the criteria. The adaptive traffic signal system can do the following: traffic signal system based on the volume of traffic on each side of the signal.

Optimize the following:

- Minimize the average waiting time.
- Maximize the average number of vehicles passing through the intersection.
- Minimizing the number of accidents that occur due to red light violation.

A basic component of electrical circuits – a parallel plate capacitor which is placed under a speed breaker is used for traffic monitoring in this method. One of the basic parameters of electrical circuits is capacitance also called as condenser. This capacitance is a function of area between two plates, the separation between them and the dielectric medium in between them and the distance between the plates. In this method the distance between the plates is the variable parameter.

$$C = A(\varepsilon o\ \varepsilon r)\ /\ d$$

A= common area between plates
$\varepsilon 0$= permittivity of free space
εr= relative permittivity (dielectric constant of the medium)
d= distance between plates

The parallel plate capacitor acts as a sensor in this case. Its output is given to a signal conditioning unit namely a ballast circuit in this case to convert the displacement into a corresponding voltage pulse. This voltage pulse is given toa counter to visualize the number of vehicles numerically. This counter value is transmitted to the raspberry pi controlling the traffic lights which modifies the signal timings depending on this count value.
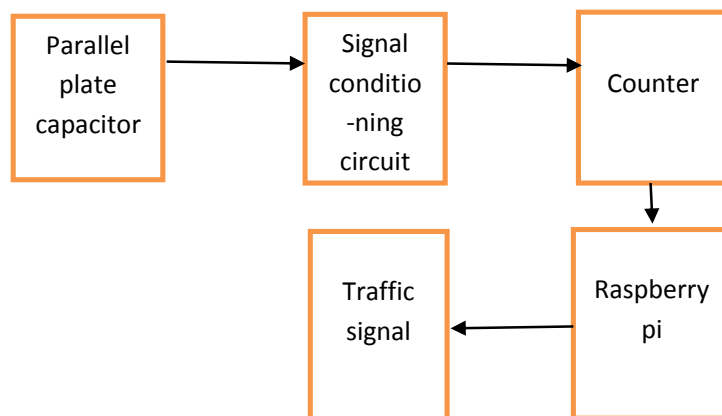

Fig 4.1   Block diagram of proposed system

5, CONCLUSION AND FUTURE SCOPE

In this paper we have mainly focused on replacing the existing pretimed traffic control system using parallel plates with raspberry pi in order to overcome the drawbacks of pretimed traffic control system. Primary objective of this project is to reduce the traffic congestion and to clear way for emergency vehicle to reach its destination. This paper touched on a key point to clear the traffic smoothly based on adaptive technology depending on the density of traffic so that people can reach their destination in least time by not stopping for a long time at the traffic intersections unnecessarily. Traffic intersections will be smart enough to take care for the flow of traffic if there is a emergency purpose vehicle need to pass on and in normal condition traffic intersection will work normally. In future, a separate frequency can be used as of now used in walkie-talkie so that authorized personnel can only access the server and control the traffic signals when there is need irrespective of connecting to a same Wi-fi.

6.APPLICATIONS

- Effective congestion clearing system

- During emergency situations, the vehicle can reach the destination without any stuck in Traffic.

7, REFERENCES

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