# Traffic Light Priority Control For Emergency Vehicle

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ABSTRACT

Traffic congestion and transportation delay on urban requirements are increasing worldwide. Traffic signal is the significant issue to control traffic lights in vehicle systems. To improve the safety for both pedestrians and the vehicles Traffic signal is must.

Emergency vehicles, like Ambulence have responsibility to reach patients or those who are met with accidents have to quickly transfer them to hospital. Due to traffic signals they may be delayed for rescue operations. Our paper define how traffic signal lights will detect emergency vehicles, how to manipulate the traffic light and how to provide free way to emergency vehicle.

Keywords : Emergency vehicles, Traffic congestion, RFID, LED

## 1. INTRODUCTION

The rapid growth in the vehicle ownership is one of the measures for economic growth of country. However indirect effect of vehicle ownership is acute traffic congestion. The exploitation of new trends and technologies requires fast transportation of goods, machinery and manpower for various reasons.

The goal of each one is to reach at destination without wasting time and money. But resources provided by current infrastructures are limited. So the Traffic management at road is crucial to reduce waiting and traveling times, save fuel and money. Even though present traffic light controlling system handles the traffic at intersections, many times congestion, accidents happened due to its poor performance.

Suppose a vehicle has to travel a hundred miles to reach its destination via some city and on its way it has to pass through numerous intersections of city. If the traffic system at those intersections is controlled by preset timers then the vehicle will waste precious time at most intersections.

The expansion of road infrastructure is not ultimate solution to the traffic congestion. It requires some smart mechanism that deals with the problems in the present traffic controlling system. The proposed system also provides the map feature, which shows the traffic situation of requested traffic signal.

The problems of typical conventional traffic light Controller are mentioned below:

### A. Fixed-time interval:

Nowadays, most of the industrialized countries are using fixed-time strategies for urban traffic control. Vehicles at the traffic lane wait until the green light on. Due to the fixed time interval of red & green light, suppose a road is always crowded with vehicles and go-ahead time is short. So, vehicles can't pass through the road in the time allowed. But sub lane has few vehicles and go-ahead time is relatively long. The proposed system provides dynamic time interval for traffic lights according to length of vehicles present at each lane.

### B. Traffic-response strategies:

Present traffic systems fail to provide traffic information including congested roads and alternate routes available in case of congestion. The proposed system provides GSM phone interface to the user, with SMS facility to those who wish to obtain the latest traffic information on congested roads. The map of the traffic signal will be provided to the users on their request. The proposed system has been developed using the sensor assembly along with embedded technology.

### C. Emergency Vehicle Stuck in Traffic Jam:

Usually, during traffic jam, the emergency vehicle, such as ambulance, fire brigade and police will be stuck especially at the traffic light junction. This is because the road users waiting for the traffic light turn to green. This is very critical problem because it can cause the emergency case become complicated and involving life.

## 2. LITERATURE SURVEY

In this section, the various solutions to the traffic congestion problems suggested in the literature are presented as below:

**A.** Expert System:

Expert System based Traffic Light Controller described by Findler and Stapp (1992). An expert system uses the set of rules to decide the next action. In traffic Light control such an action can change some of control parameters that means the totally new system implementation required.

**B.** Fuzzy Logic:

Fuzzy Logic Traffic Light Controller described by Tan (1995). The fuzzy logic controller determines the time that the traffic light should stay in a certain state, before switching to the next state. This system has the disadvantage of the controller since it depends on the preset quantification values for fuzzy variables.

C. Reinforcement Learning:

Reinforcement learning based Traffic Light Controller described by Thorpe(1997). In this system, neural network is used for the traffic-light based value function which predicts the waiting time for all cars standing at the junction. This means that traffic light controller have to deal with a huge number of states, where learning time and variance may be quite large.

**C.** Prediction based optimization:

Prediction based optimization based Traffic Light Controller described by Tavladakis and Voulgaris(1999). In this system, Measurements taken during the current cycle are used to test several possible settings for the next cycle. Since it only uses the data of one cycle, it could not handle strong fluctuations in traffic flow well. Hence it gives poor performance.

**D.** Using Magneto-Resistive Sensors:

The author Cai Bai-gen(2009) design a vehicle detection system based on magneto-resistive sensor is composed by wireless traffic information collection nodes which are set on two sides of road to detect vehicle signal . The magneto-resistive sensor is costly and maintenance cost of the system will be more if the system fails. This system has lacks of emergence measures.

## 3. ARCHITECTURE

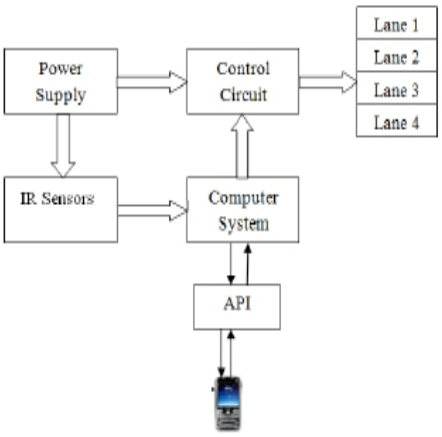


Fig.1.Block Diagram of STC System

Fig1 Shows block diagram of Smart Traffic Light Controller which consists of API, STC circuit, computer system, IR Sensors. The sensors detect traffic present at signal, and provide it as input to the computer system and then time period is decided through programming and this time is given to signal through control circuit. So finally depending on current traffic present at signal, time period is assign to it and the red, green, orange light signal glows accordingly.

The Infrared Sensors mounted on road to detect the vehicle on the road. The presence or absence of a vehicle is sensed by a sensor assembly mounted on each road. This acts as an input to the STC unit. The STC unit generates an output signals for Red, Green and Yellow Signal and monitor their timings taking into consideration the number of vehicles on each road. The same information is transmitted to the mobile user which will request for congestion status. If vehicle driver at junction send SMS on GSM mobile phone to STC unit, the driver will get message indicating congestion status of road. STC system will also give information about alternate route to the user, if present traffic is heavy.

In the emergency mode, vehicle like ambulance, fire fighter or police vehicle, the signals are altered for the fast and easy movement of these vehicles. If an emergency vehicle is passing by the route, the signals on the roads which are crossing this route will be immediately made red to stop vehicles on these routes. This is a very important feature which is very useful in case of emergency.

## 4. RESULT ANALYSIS

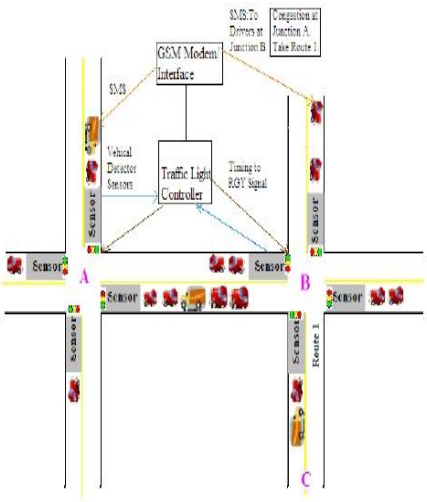


Fig.2. Basic concept of Smart Traffic Light Controller

The Basic Model of Smart Traffic Light Controller System is shown in Fig.2. In proposed model the junctions are shown by letter A, B and C. To detect traffic length the Infra-Red sensors are mounted on road side at each junction. Sensors detect the traffic level and provide this as input to computer system where it decides time period for each red, green and orange light for which it remains in glowing state.

As shown in figure, if there is heavy traffic congestion at junction A then through SMS, car driver will be informed about congestion so that he can decide to take another route i.e. route 1 passing by C on their mobile phone. if an emergency vehicle is passing by the route A-B, the signals on the roads which are crossing this route will be immediately made red to stop vehicles on these routes. This is a very important feature which is very useful in case of emergency.

Main Components used in this system are:

1) AT89S52 /P89V51RD2 microcontroller. (for software storage and logic)
2) LM358 (Dual Opamp to control logic of IR sensors).
3) Appropriate LED's, diodes, resistors etc.
4) Power supply for the unit.
5) LCD display / 7 Segment for Display.
6) Virtual logic for controllers.
7) IR Reader

## 5. CONCLUSION

The smartness of traffic signal controller is introduced in this project with specific operations and hardware interfaces. The software API provides easy interface to the administrator. Proposed system works efficiently over the present traffic controlling system with respect to less waiting time, efficient operation during emergency mode and suggesting alternate route to emergency vehicle.

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