

TRAFFIC DENSITY CONTROL AND EMERGENCY VEHICLE PATH

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Abstract:

With the increase in human population in cities and therefore number of vehicles, traffic control signals have been playing significant role in managing traffic flow in cities. It provides safety and convenience to both drivers and pedestrians. However, traditional traffic control signals fails in time management, as it allocates equal time slots to each road it is managing. This creates unnecessary waiting for drivers, which could not be endurable in every case, as being in time, is important to everyone. Therefore, here we proposed density based traffic control signal, which allocates different time slots to each road according to vehicle density on it and therefore doing time management function. This system also comes with RF signal override control in case of emergency vehicles such as fire brigade, ambulance, etc. So this is also a priority based system. This system, therefore, offers advantages over ordinary traffic control signal.

Keywords - Density Based Traffic, Traffic Control Signals, Microcontroller, IR Transmitter and Receiver, RF Transmitter and Receiver.

I. INTRODUCTION

Nowadays one of the major problems faced in any metro city is traffic congestion. Getting stranded in between heavy traffic is a headache for each and every person driving the vehicle and even to the traffic police controlling the traffic. It brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals. High volume of vehicles, the inadequate

infrastructure and the irrational distribution of the signaling system are main reasons for these chaotic congestions. One of the oldest ways of handling traffic was having a traffic police deployed at each junction and manually controls the inflow of traffic through hand signaling. However this was quite cumbersome and then came the need for a different type of control - using Traffic Control Signals. Conventional Traffic signal started playing important role in cities, but as time passed, with increase in population in cities, this system became less efficient in traffic management. This called the need of traffic control signal which works more efficiently. So density based traffic control signal is proposed which allocates time for each road depending on the density of traffic on it. And also the project aims to provide signal override for emergency vehicles through RF signal. It happens when there is an emergency situation like ambulance, fire brigade stuck in the traffic. This project therefore happens to be the perfect solution in high population cities. This circuit makes use of IR sensors to measure the density of traffic. These sensors are interfaced with microcontroller of 8051 family which in turn allocates time for each road according to the output of IR sensors through traffic signal. For the emergency override it uses RF transmitter and receiver. Traffic congestion is a severe problem in most cities across the world and therefore it is time to shift more manual mode or fixed timer mode to an automated system with decision making capabilities. Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time. We therefore propose here a mechanism in which the time period of green light and red light is assigned on the basis of the density of the traffic

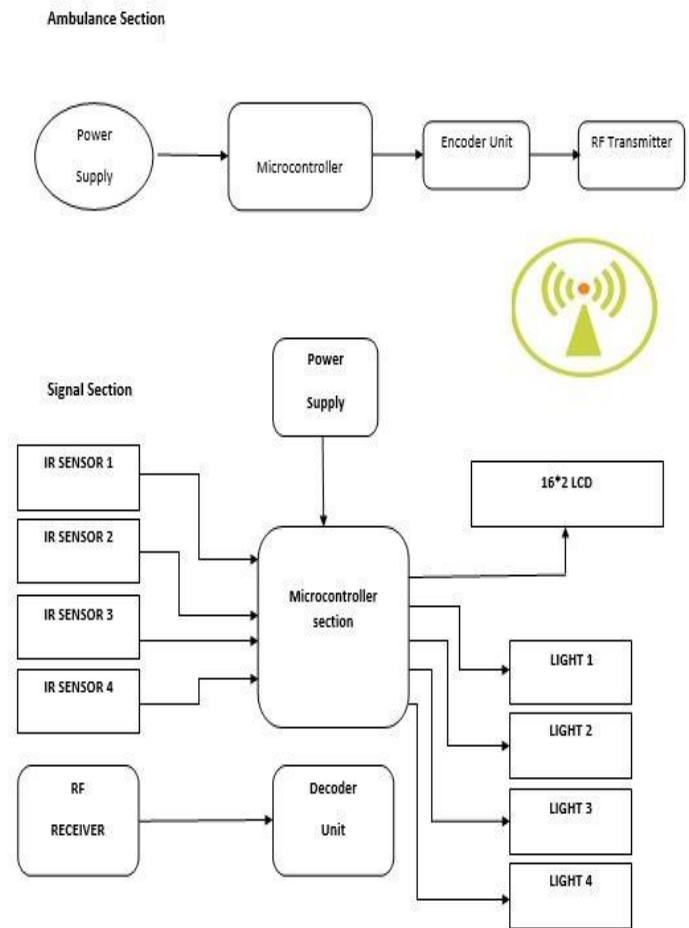
present at that time. This is achieved by using IR sensors. The sensors which are present on sides of the road will detect the presence of the vehicles and send the information to the microcontroller which will then change the appropriate signal to green.

II. PRESENT TRAFFIC SIGNALING SYSTEM

Under present scenario, traffic control is achieved by use of a system of hand signs by traffic police personnel, traffic signals, and markings. Each traffic control device is governed by standards of designs and usage; for example, stop signs always have a red background and are octagonal in shape. Design standards allows the motorists to quickly and consistently perceive the sign in the visual field along the road. Standard use of colors and shape aids in the identification and in deciding on the appropriate course of action.

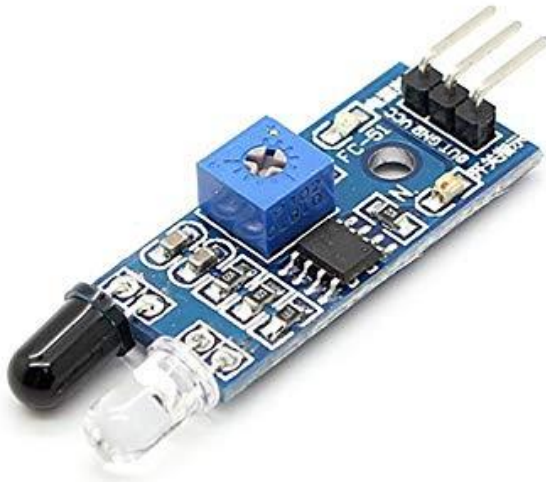
Under current circumstances, traffic lights are set in the different directions with fixed time delay, following a particular cycle while switching from one signal to another creating unwanted and wasteful congestion on one lane while the other lanes remain vacant.

Block Diagram



IR SENSORS

Sensors are very important part of electronics, especially in robotics and automation. An infrared sensor is an electronic device that emits infrared rays in order to sense the aspects of the surrounding, rather sense the presence of vehicles (related to the system proposed). IR sensor basically consists of an IR LED and IR photodiode. IR sensor work on the principle in which IR LED emits IR radiation and photodiode sense that IR radiation. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors radiate some form of thermal radiations and are invisible to our eyes, which can be detected by IR sensors only.



RF MODULE

Generally an RF module is a small size electronic device that is used to transmit or receive radio signals between two devices. Here we have placed the RF transmitter in emergency vehicle (ambulance, Fire Brigade, etc.) and RF receiver in the signal block. Whenever the vehicle comes in the range of the RF, the RF transmitter will transmit RF signals to the receiver in the signal block which will change that particular signal to green. RF modules may comply with a defined protocol for RF communications such as Zigbee, Bluetooth, or Wi-Fi, or they may implement a proprietary protocol.

Thus system tries to reduce possibilities of traffic jams, caused by traffic lights, to an extent as well as provide path to emergency vehicles, which is today's current need.



OPERATIONAL MODEL

The model works on the principle of giving priority to emergency vehicles for avoiding any unwanted delay to accomplish that emergency task by making the appropriate signal green while remaining signals red in a junction. Also to avoid wastage of time, IR sensors are used to sense the density of vehicles in a particular road of a junction and provide path for traffic/congestion by making that signal green and all red.

A RF transmitter module is placed in emergency vehicle like ambulance, fire brigade, etc. and RF receiver is placed in signal block in the junction. When the emergency vehicle approaches the junction and comes in the range of receiver, then RF signal will be transmitted from vehicle to signal i.e. to the microcontroller which will then automatically change the appropriate signal to green while all other signal to red in that junction and stop the normal functioning of the signal for some time until the emergency vehicle (ambulance, fire brigade, etc.) crosses the junction and move away from the RF range of transmitter and receiver.

There are four sensors placed at four sides of a four way road i.e. a junction, which sense the density of vehicles to develop an intelligent traffic control system along with emergency vehicle path. These IR transmitter and receiver will be mounted on same sides of road at a particular distance from the junction and which continuously transmit and receive IR rays. When density of vehicles increase at the specific road and reach the IR sensor point rather cross the IR point, the IR rays will get blocked by the vehicles which in turn will send the signal to microcontroller to change the signal to green. This signal from IR to microcontroller will indicate that the density of vehicles at that road is increasing and hence it should be cleared which is achieve in our model.



Fig. Display on LCD.

CONCLUSION

We have successfully implemented this system with a remarkable output to manage the density of traffic. With field application of this project the congestion of traffic can be effectively managed by distributing the time slots based on the Density of vehicles in certain lanes of multi-junction crossing. Also, we have proposed a solution to reduce the time required to provide the Emergency services.

ADVANTAGES

- It will reduce traffic congestion and hence save time.
- Time required for Emergency services will reduce.

DISADVANTAGES

- Proper maintenance is required by government on time to time basis.

APPLICATIONS

- It is useful in reducing travel time for transporting organs or patients.
- Manage traffic in a better way in emergency situations.

FUTURE SCOPE

- Synchronization with 'Google Maps' will help in improving efficiency of system.

RESULT

Whenever the emergency vehicle comes in the range of RF, the appropriate signal turns to green to provide path for the vehicle to save time.

Also the IR sensors detect the density of vehicle on each road of 4 way junction and send appropriate signal to microcontroller to change the signal to green.

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