

# Density based Traffic Control System

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**Abstract:** Traffic light control systems are widely used to control and to monitor the transport system. They are mainly used to maintain a smooth traffic system on the busiest roads of the city. However, the synchronization of multiple traffic light systems at adjacent intersections is a complicated problem. We are approaching with the concept of the volume control traffic system. Here the traffic system is maintained based on the count of the cars. The number of cars is to be counted by using the sensors. The two type of the sensor – the touch line sensors and the laser sensor. The touch line sensors are sensitive enough to count the number of cars but get easily damaged by heavy vehicles. The laser sensors are used to detect the number of cars. They are preferred due to their directivity property.

**Keywords:** Traffic Control System, IR Sensors, LED Lights, 8051 Microcontroller

## I. INTRODUCTION:

We are quite familiar with the manual based traffic control system which involved deployment of a traffic police at every junction who used to do the signaling sitting in a small hut. Traffic systems are of three types- Manually controlled Volume based Time based traffic control system: Since it was a hectic job, so we have upgraded ourselves and we have switched to time based traffic control system. But the problem is ,since it is based upon pre-determined timing control sequence it fails to handle the dynamic nature of traffic. So many times it happens that even if there is no traffic still everyone has to wait. They are not flexible according to the traffic intensity. Due to this a lot of time is wasted and traffic congestion becomes a major issue.

So, the answer of this problem is *volume/density* based traffic control system with IR sensors.

In this very model, the system adjusts itself based on the amount of traffic on road. IR transmitter and receivers are used for the detection of any vehicle on road.

## II. A) IR SENSORS

Whenever the IR receiver gets an obstruction in the path between IR transmitter and receiver the resistance of the photo diode in the IR sensor changes and this change in resistance is converted to an electric signal and passed to

the microcontroller. To analyze the volume of traffic a counter is used along with IR sensors which keep a count on the number of times the IR ray is obstructed. This count determines the frequency of the traffic on that particular lane.

The various units of the system are- I) A Display: An Arrangement of 3 LEDs are used. RED, AMBER and GREEN are used for STOP, READY and GO. II) IR Sensors: The IR sensors detect the presence of vehicles on road. Whenever a car passes the IR ray gets blocked. This causes the resistance of the photo diode in the IR sensors to increase which is then converted to an electric signal and passed to the microcontroller. When there is traffic the IR sensors sends a low voltage to the microcontroller and when there is no traffic it sends a high voltage.

## B) MICROCONTROLLER

Microcontroller 8051 is used. It is a 8 bit microcontroller with 4kb of ROM and 128 bytes of RAM. It has a crystal oscillator integrated having a crystal frequency of 12MHz. The microcontroller is used to assign timing to the traffic lights on the different lanes based on traffic density. If the traffic density is high it gives green light on that lane for more duration. The microprocessor is programed in such a way that when it receives a logic low signal from a lane the microcontroller gives green signal to that particular lane.

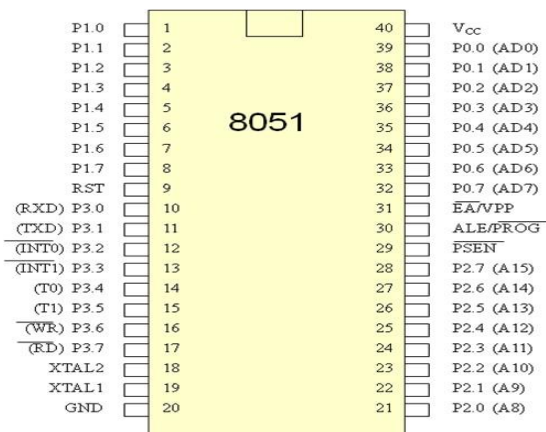


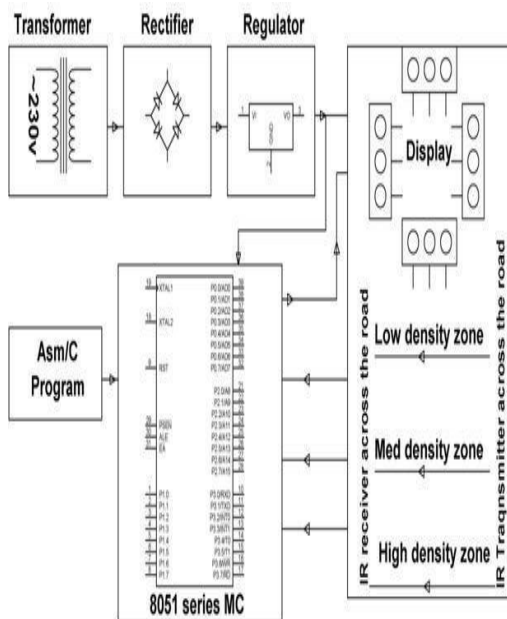
Fig: 8051 micro-controller

**C)Explanation of Working of this System:** When there is no vehicle the IR ray is not obstructed and the photodiode receives the IR light and starts conducting. The photodiode is coupled with transistors. Due to conduction the corresponding transistor also starts conducting and thus the output is high which send to the microcontroller is. The microcontroller is programmed such that when it receives a logic high signal from any lane it gives Red signal to that lane. Whenever the IR ray is obstructed by any vehicle the photodiode doesn't receive the IR light and thus the corresponding transistor couldn't conduct and cuts off giving a voltage low as output. The microcontroller is programmed such that when it receives a low signal it from a lane it will give Green signal to that particular lane. Thus the traffic system becomes flexible with traffic and controls the traffic on different lanes based on the density.

**CIRCUIT COMPONENTS:**

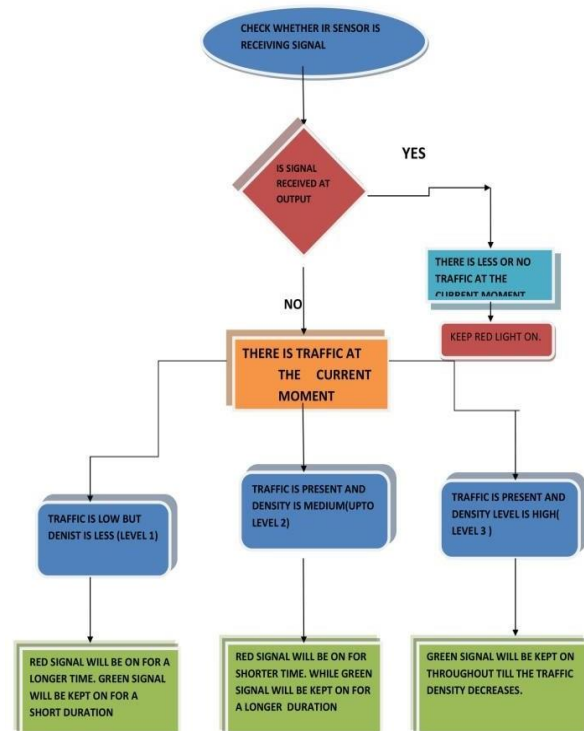
1. 8051 Microcontroller
2. Voltage Regulator
3. IR sensors
4. LEDs-12(4- Green, 4-Red, 4- Amber)
5. Resistors
6. Capacitors
7. Transistors
8. PCB Board
9. Connecting wires.

**CIRCUIT DIAGRAM:**



Flow Chart Describing Density Based Traffic Control:

**FLOWCHART TO SHOW THE WORKING OF DENISY BASED TRAFFIC CONTROL SYSTEM**



**FUTURE SCOPE:**

Due to continuous growth of population in the world, it is a great challenge for the upcoming generation to manage the traffic system. Much improvement will come in the future. To manage the conventional transport system we should think of the intelligent and automatic way of controlling the system. As the population increases, it increases the number of vehicles also. To control the huge number of vehicles the intelligent methods should be adopted. In future purpose we can use the image sensor or imager. It does it work by producing the image of the roads. It creates the image by converting the variable attenuation of light into signal that conveys the picture. Imagers used the both digital and analog electronics devices.

**CONCLUSION:**

The study is aimed that the control of the traffic jams in the roads. As the number of cars is increasing day by day so our traffic control system should change. No. of passing vehicle in the fixed time slot on the road decide the density range of traffic and on the basis of vehicle count microcontroller decide the traffic light delays for next recording interval.

**ACKNOWLEDGMENT**

The authors would like to thank Dr. Abir Chatterjee and their respective parents.

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