

# CCTV based Traffic Control System

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**Abstract**— Traffic Lights were first placed at intersection of George and Bridge Street in year 1868. This system is then developed by American Traffic Signal Company in year 1914.

Since there traffic light is used at every junction all over the world for controlling the traffic congestion. Now a day's Traffic lights work on fixed timer, which will repeat itself after completion of one cycle. Traffic lights are basically used to control the flow of traffic at the junctions of roads. But due to increasing number of vehicles traffic congestion and road accidents are the major issues occurring at traffic junctions, especially in metropolitan cities. In India there is a death of one person in every four minute due to road accident.

This paper identifies various problems faced on the Indian roads like congestion and accidents at junctions and gives some statistics related to number of accidents and deaths occurring at traffic junctions. Also proposes a Traffic Control System model to overcome these problems. This model is capable of detecting vehicles that are not following traffic rules and providing information to the owner of vehicle through SMS. Also with the help of CCTV cameras 24X7 surveillance is also possible. This system will interrupted when emergency vehicle comes in any of the lane. After giving path for emergency vehicle, process will be continued.

**Keywords**—Traffic congestion, Road Accidents, CCTV surveillance, emergency vehicles

## I. INTRODUCTION

As due to increasing population and increasing demand, there is need for transportation. Due to which vehicles on road increases rapidly, typically in metropolitan cities like Mumbai, Delhi, Chennai etc. According to the article of Times of India, the six top cities in terms of vehicle population are Delhi, Chennai, Hyderabad, Pune, Mumbai and Kolkata. In this Delhi tops with its 7.3 million unit vehicle population, the second biggest vehicle pool belongs to Chennai at 3.7 million units closely followed by Hyderabad at 3.38 million units. Mumbai, considered a much bigger automobile market, has a vehicle pool smaller than Pune. Mumbai's tally is 2 million units compared to Pune 2.26 million. If we take city with least vehicular population amongst top six city i.e. Mumbai, statistic shows that Mumbai increased its vehicular population by 1.7 lack in 2013-14, which is 44,000 vehicles more than what was added in the year 2012-13.

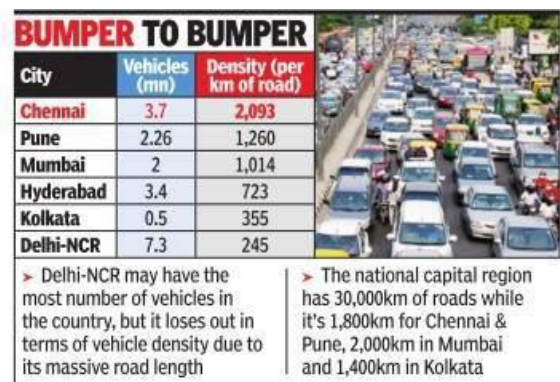


Fig.1. Times of India article showing the number of vehicles

This population is increasing the traffic congestion, accidents and deaths.

Another problem is violation of traffic laws. There are changes occurring in penalties, but it is not possible to monitor every vehicle whole day. These are some problems due to which India's Traffic junction becoming most dangerous spots. According to article of TOI India's traffic junction is accounting for large number of fatalities. The data shows at least 75,200 people lost their lives in crashes at traffic crossing in 2013, which is over 50% of the total death on Indian roads. While more than 60,000 such deaths were reported at road crossings.

According to figures, 56,868 deaths were recorded at uncontrolled junctions having no traffic light or traffic police. The report shows about 25,800 people died at T-junction while 13,500 fatalities took place at Y-junctions. Four arm junctions registered nearly 10,800 fatalities and about 7,800 people lost lives at staggered junction.



Fig.2. Statistics showing causes of fatalities

## II. OBJECTIVE

Surveys show that India's traffic junctions as the most dangerous spots, accounting for a large number of fatalities. The annual accident report also highlights the need for better designing of such junctions and proper monitoring of traffic flow. To solve this problem, a smart traffic control system that will make use of four subsystems using IR sensors, cameras, microcontrollers, transceivers etc. will be implemented, which are:

- Density based control system
- IR sensors based system for prevention of rule violation
- Control system for emergency vehicles
- 24x7 CCTV surveillance system

Using these systems, the mentioned problems will be solved to some extent.

## III. METHODOLOGY

The IR sensors will be used for two purposes: at the junctions for IR based Prevention of rule violation and at some distance from the junctions for density based control system. The sensors used at the junction will be wireless sensors and will send the data wirelessly to the nodal microcontroller. Using the data from the sensors placed at junctions, the nodal microcontroller will send signals which will trigger the nodal camera to capture an image. This image is transferred to the main microcontroller which then sends it to the RTO's server using Ethernet. The data from the density control system IR sensors will also be fed into the nodal microcontroller which will transfer it to the main controller. Depending on this data, the timings of the traffic signal will be varied to allow greater passage time for lanes with higher density of traffic.

### A. Density Based Control System

For smart density control system IR sensors will be placed at some estimated distance from junction in every lane. So if that IR sensor will be blocked for some predefined period of time, then heavy traffic density in that lane will be detected. Hence this system will provide more time for clearance of traffic lane with heavy traffic compared to lane with minimal traffic density. If density in more than one lane will be above the limit then lane will be served on first come first serve basis.

### B. IR sensor based control system for prevention of rule violation

IR sensors will be installed at the junction, it will make sure that vehicles will stop before zebra crossing hence provide safety to pedestrians. In the case of wider roads having a number of lanes, a number of IR sensors will be placed i.e. one on each lane. This will lead to accurate detection. With the help of CCTV installed at junction one can keep watch on traffic rule violator from control room. If any person violates the traffic rule and tries to jump the signal, the IR sensors at the junction will be blocked. This will send a trigger signal to the CCTV camera and image of that vehicle will be captured and sent to nearest RTO (regional transport office), then after image processing in control room, plate number will be obtained. Software will be designed to be installed in the RTO's server, which will search for the details in the database of registered vehicles in RTO using the number scanned. This

software will then send a SMS to the concerned violator. This will reduce the traffic violation at junction.

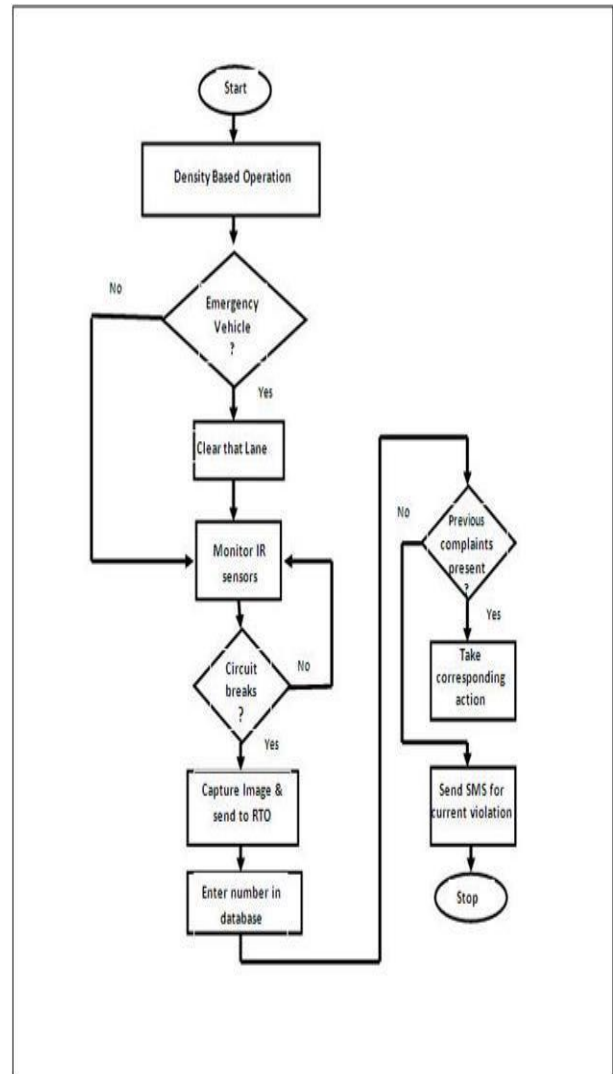


Fig.3. Flowchart depicting the flow of process

### C. Control for Emergency vehicles

For emergency vehicles, RF transmitter will be installed on ambulance, fire brigade etc, so if they come in predefined area then signal will be received by receiver at the junction then that lane will be cleared first so as to provide negligible waiting time for that vehicle. After clearing that lane junction will work normally. Overall waiting time will be reduced at junction with this system. If emergency vehicles are coming in two different lane then first come first serve basis.

### D. 24x7 CCTV surveillance system

The CCTV cameras will be constantly monitoring the lanes. The live feed will be sent to the RTO's control room. This will help the RTO officers to keep a track of the events taking place on the roads.

## IV. CONCLUSION

This proposed system can be used to have a greater degree of automation. There is no need for the Traffic Police officers to monitor roads for traffic rule violation. Also since we are integrating software that searches for the contact

details of the violating vehicle's owner in the RTO's database using the extracted registration number from the CCTV image, there is no requirement of any human intervention. This system will reduce the heavy traffic jams occurring at junctions and decrease the overall waiting time for the vehicles for lane clearance. It helps emergency vehicles reach the destination faster, thus saving a lot of lives. Also it is compatible with the existing Area Traffic Control System. And hence can be easily installed.

Thus this is a robust system that atomizes the traffic control system and ensures that the traffic rule violators are penalized. Also since the system is fully automated, it will help in curbing the corruption as well.

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