

# Review Paper on Automation of Traffic Signal Monitoring System using Machine Learning and Internet of Things (IoT)

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## Abstract

*In the new advancing world, traffic rule infringement has become a focal issue for most of the creating nations. The quantity of vehicles is expanding quickly, just as the quantity of traffic rule infringement is expanding exponentially. Overseeing traffic rule infringement has consistently been a dull and bargaining task. Despite the fact that the procedure of traffic the board has gotten computerized, it is a difficult issue because of the fast increment in the populace, thus relate increment of their vehicles, and the assorted variety of the number plates additionally makes the errand progressively troublesome.*

*The chief target of this paper is to control the traffic rule infringement precisely and cost-viably. The proposed model incorporates a computerized framework that utilizes closeness sensors and is camera-dependent on Arduino to catch video. The project presents automatic recognition of number plates of vehicles that mainly cross the pedestrian crossing.*

*This should be possible utilizing artificial intelligence (AI) methods and other image processing systems for plate confinement and character recognition, which makes it quicker and simpler to distinguish the number of plates. In the wake of perceiving the vehicle number from the number plate, the SMS based module is utilized to inform the vehicle proprietors about their traffic rule infringement. Through this paper, we can propose a financially savvy and increasingly effective programmed framework to decrease the number of mishaps that occur close to the pedestrian crossing.*

## 1. INTRODUCTION

Computerization in everyday life has picked up significance as of late. The quantity of mishaps on the streets is because of the standard infringement, for example, breaking traffic signals, over-speeding, driving on wrong sides, and so forth. To stay away from such petty criminal offenses, traffic police must be available out and about and needs to persistently check if some vehicle is damaging the standard. A specific computerized arrangement was created to dispense with the infringement; in any case, every one of them had certain impediments.

Nowadays, rules and regulations are not being followed by some of the people. People are always in a hurry and tend to break signals by crossing over the stop line and stepping over the zebra/pedestrian crossing and leading to no place for pedestrians to cross. Therefore, this is one domain that needs major attention if we look at improving the safety of pedestrians with the objective of forcing motorists to follow all the rules and regulations. Likewise, in previous years, traffic blockages have expanded colossally. Regardless of the way that the quantity of vehicles has extended exponentially, the road system has not been improved proportionately. This thus prompts expanded

traffic blockage and street mishaps. Various advancements are there to distinguish traffic clog and to make congestion management more efficient. However, these technologies have a few disadvantages; for example, establishment issues, intricacy, cost, and so forth. While trying to lessen street mishaps and to guarantee the wellbeing of people on foot, an advanced technological solution has been proposed further.

## 2. LITERATURE REVIEW

Nikita Prabhu et al. [1] portrays a framework that is partitioned into three sections. The initial segment is an independent framework associated with the start component of the vehicle. The subsequent part is another independent framework that is connected to the traffic signal focuses, and the third part will be the regional transport office (RTO) unit. For the vehicle start part, the driver of the vehicle needs to introduce his radio frequency identification (RFID) driving permit card close to the peruse. This interesting RFID card helps in distinguishing the vehicle and its proprietor.

Amey Narkhede et al. [2] proposes a framework that has a guideline target that controls traffic rule infringement precisely and cost-successfully. The paper presents

automatic number plate recognition (ANPR) systems and other picture control procedures utilized for plate confinement and character acknowledgment, which assists with recognizing number plates quicker and simpler.

Aditi Dambe, Upasana Gandhe, Varsha Bendre [3] present a system that is proposed to cause chastising subsequently to the vehicle driver for infringement of traffic rules. The chastising will be normally charged to the vehicle owner if pollution under control (PUC) has ended or if the vehicle is staying on the zebra crossing when the sign is red. Likewise, it centers around welcoming order on streets by halting the vehicle if the vehicle driver does not have a permit or if the driver is drunk. So, this is an endeavor to diminish street mishaps, which is one of the serious issues nowadays.

Suyash Bharamb et al. [4] gives a solution that utilizes dynamic RFID labels that would be mounted on every individual vehicle that screens the vehicle’s development and which will help in diminishing the mishap rates in the nation.

Aditi Yadav et al. [5] proposes a solution for making a traffic framework that is versatile to the present situation in a path. This paper monitors the number of vehicles in a path and, as needed, deals with the traffic signal by modifying the time signal by ascertaining the normal clog on the sign.

Avinash Shinde et al. [6] motivates the task to control the petty criminal offenses by precisely punishing the traffic violators. This will be a limit crafted by the traffic police. This task is valuable for controlling two kinds of petty criminal offenses:

- Traffic signal infringement.
- Toll-assortment path rule infringement

In the primary stage, the vehicles that run a red light will be distinguished utilizing an RFID peruser. The RFID peruser will include the PLC by filtering the label put on the vehicles. The database will be made in the program. At the point when the RFID scanner inputs the vehicle, the programmable logic control (PLC) will quickly contrast the standardized tag distinguished and the sources of info taken care of into the database. In the subsequent stage, the vehicles breaking the cost assortment line rules will be accurately recognized. So also, similar to the primary stage, the examination will be begun with the information inputted in the database. The database will have the subtleties of the vehicle.

### 3. EXISTING SYSTEM AND PROPOSED SYSTEM

#### 3.1. Existing System

In the current system, if any vehicle crosses the stop line and stands over the zebra crossing, then the traffic officer monitoring the signal captures the vehicle’s image so as to recognize the number plate. Suppose if the officer is not monitoring a particular signal and if any vehicle violates the traffic rules over that particular signal, it may not be recognized, and the person may not be punished for performing the violation. Also, those vehicles are not captured into the system, which makes them lenient of violating the rules again.

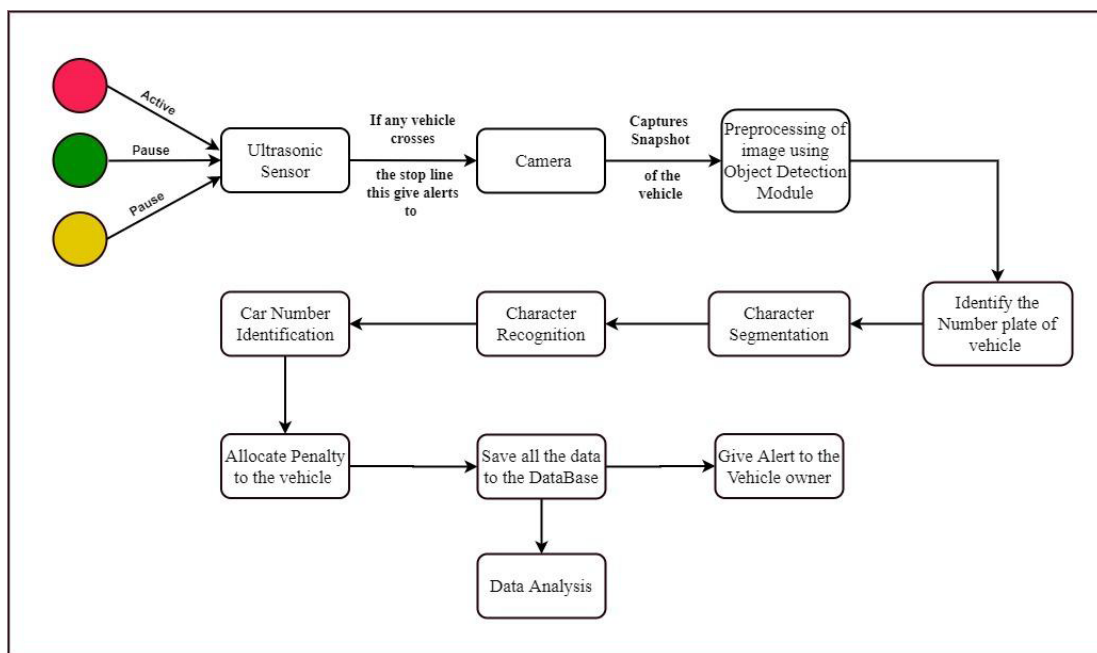


Fig.1: Block diagram of automation of traffic signal monitoring

Since a traffic police officer in office has many signals to monitor due to which there might be a possibility of recognizing all the violations performed at the same time. The proposed solution will help to overcome these issues by making one part of the violation automatic.

The current system penalizes the violators manually. It means that the penalty is assigned to the violators through human effort. Also, if any car isn't observed by traffic police officers, they may not be punished or penalized. Thus, we are proposing a system to automate this whole process. Also, maintain the safety of the pedestrian and create discipline into the citizens who might progress the city into a smart city.

Complications in the existing system:

If the officer is not monitoring a particular signal, and if any vehicle violates the rule over there, it may not be recognized.

Applications RFID to each and every car is expensive, and updating each and every card to the RFID will take a much longer time (Fig. 1).

### 3.2. Proposed System

Our proposed structure uses an ultrasonic sensor to be associated with traffic signals, which will recognize vehicles crossing the stop line when the traffic signal light indicates red. At the point when the sensor recognizes the vehicle, it will give an alert to the camera, and the camera will take the snap of the image and send the snap to the application for further assessment. The application will get the picture, convert it to grayscale, and afterward remove the number plate from the picture. At that point, the character acknowledgment calculation will be utilized to get the number of the vehicle from the number plate. From that point onward, the vehicle will be punished for the infringement that it has done against the principles and guidelines.

Afterward, all the information will be spared to the suitable archives, with the goal that further examination should be possible on the information. Likewise, the violator will get an alarm message on their telephone number/mail (whatever I connected to the vehicle) with respect to the infringement they have done and the punishment they have been charged.

### 4. CONCLUSION

In this way, we have thought of the usage of a framework that will automatically cause punishment for an infringement of traffic signal principles and thus will prompt restrained

traffic in our nation. We trust these endeavors will help in limiting numerous issues identified with traffic, which carries an unsettling influence on the entire traffic system and will help in diminishing the quantity of catastrophe, congested roads that devour our valuable time, and will likewise lessen contamination up to some extent.

In our framework, we are checking the vehicles that cross the signal when it demonstrates Red by introducing a camera on the traffic signal and an ultrasonic sensor overhead the stop line, which will keep a note of the considerable number of vehicles that abuse the traffic signal.

The framework will work very well, despite there still being an opportunity to get better. At present, there are sure some cutoff points on parameters like the speed of the vehicle, content on the vehicle number plate, covering of vehicles which can be expelled by improving the algorithms further.

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