



Automated Penalty Collection for Traffic Signal Violation Using RFID

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Abstract:

Today in the 21st century everyone needs everything instantly. We can say that the world is run by smart devices and gadgets which have caused the digital transformation. Well, we all know how easy it is to get a driving license in India. Also, punishment for errant drivers is light. A bribe is all that needs to be given and the rash drivers are free to go. People tend not to follow the traffic rules and signals. Incidentally, India holds the dubious distinction of registering the highest number of road accidents in the world. According to the experts at the National Transportation Planning and Research Centre (NTPRC), the number of accidents for 1000 vehicles in India is 35, while the figure ranges from 4 to 10 in developed countries. Well, there are always solutions and in some ways we are moving towards that. We will use active RFID tags which will be mounted on each individual vehicle to monitor the vehicle's movement and simplify the traffic management and which will apparently decline the accident rates in the country and also will eradicate corruption on the other hand.

Keywords: Database, Message/Email, Penalty Collection, RFID Transponder & Reader, Traffic Signal.

I. INTRODUCTION:

India is the second most populous country in the world and is a fast growing economy. Because of more population the growth in the number of vehicles is increasing exponentially day by day. But the infrastructure growth is slow due to space and cost constraints [5]. As a result, India is facing terrible road congestion problems in its cities. Also, Indian traffic is non-lane based and chaotic. There are many issues related to increasing traffic such as accidents, numerous types of pollutions, time wastage and health related problems. The major reasons for traffic problems are increase in the number of vehicles, violation in the traffic rules, etc. The main objective of the project is to collect penalty for violating traffic signal. The project will include deploying RFID tags on the car and RFID readers at the signal. The RFID reader will be responsible to detecting the cars violating traffic rules. The RFID tag will have a unique ID. The RFID tag details will be linked to the bank account of the car owner. Whenever a car violates the traffic rules the fine amount will be automatically deducted from the car owner's bank account. When account balance is insufficient the other necessary action can be taken such collecting from their residents, etc. So, ultimately it will help in inducing traffic discipline. The Project Mainly Emphasize on creating an automated penalty collection which in turn will reduce corruption as well as accidents happening at traffic signal.

1.1 RFID Introduction

Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects.

The tags contain electronically stored information. An RFID system comprises of three components: an antenna, transceiver (often combined into one reader) and a transponder (the tag). The RFID component on the tags has two parts: a microchip that stores and processes information, and an antenna to receive and transmit a signal. To read the information encoded on a tag, a two-way radio transmitter-receiver called a reader emits a signal to the tag using an antenna. The tag responds with the information written in its memory bank. The reader will then transmit the read results to an RFID computer program.

1.2 RFID transponder

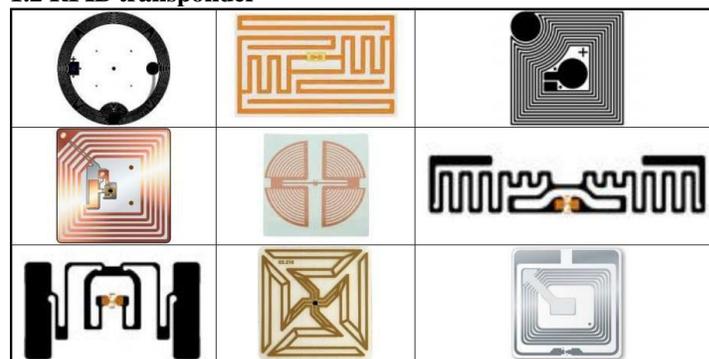


Figure.1. RFID Transponder/Tags

1.3 Tag Classifications

RFID tags are classified into three categories

i. Active Tag

Has its own battery that is used to broadcast signals over great

distances. Usually bigger in size and capable of carrying more information

ii. Passive Tag

No inbuilt power source. The signal from the RFID reader creates an electromagnetic field that powers the tag. Much cheaper.

iii. Semi-Passive Tags

Equipped with an onboard battery that drives the chip's circuitry but power for communication of the signal is derived from the reader's electromagnetic field as in the case of passive tags.

1.4 Working of RFID

A RFID system is made up of two parts: a tag and a reader. RFID tags are embedded with a transmitter and a receiver. The RFID component on the tags have two parts: a microchip that stores and processes information, and an antenna to receive and transmit a signal to read the information encoded on a tag, a two-way radio transmitter-receiver called a reader emits a signal to the tag using an antenna. The tag responds with the information written in its memory bank. The reader will then transmit the read results to an RFID computer program.

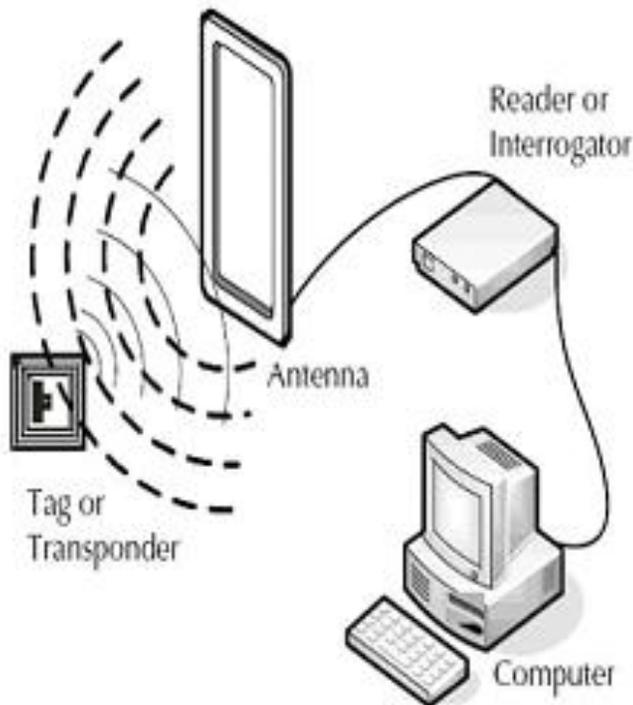


Figure .2. Working of RFID

II. RELATED WORK:

Traffic congestion is a major problem in cities of developing countries like India. Growth in urban population and the middle-class segment contribute significantly to the rising number of vehicles in the cities [1]. In [2], priority based traffic lights controller using wireless sensor networks was discussed which was used to provide clearance to any emergency vehicle

by turning all the red lights to green in the path of the emergency vehicle depending on the priority assigned to them. The advantage of the system is that it can control the traffic over multiple intersections but it has few drawbacks.

Firstly, having sensors on all the roads is very costly especially when we are taking into consideration an economically poor country like India. Secondly, communication in wireless sensor network is still a research field and the data exchange between sensors is not reliable. Finally, the sensors need to be robust in order to survive in Indian weather. In [3], traffic light control using image processing was proposed. This system used images to detect the vehicles. The image sequence captured by the camera is analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road traffic light is controlled. This system showed that image processing is a better technique to control the state change of the traffic light and it is also more consistent in detecting the presence of the vehicle as it uses actual traffic images than those systems that used sensors.

But there are many drawbacks such as installation problems and cost. Secondly, detecting congestion requires an intelligent image processing technique which in turn requires skilled personnel with adequate software background. And more importantly during bad weather conditions due to wind, rain, fog etc. the images captured by the camera is distorted by noise and it becomes difficult for the system to identify the vehicles. Hence, it can't provide 24x7x365 days surveillance. Hospitals but it has a drawback that it can't be implemented for Government ambulances because the system needs all the information about the starting point and the end point of the travel. But the Government ambulances don't have a particular place from which they regularly leave to pick up the patients. And also, the system may not work if in case the ambulance needs to take another route due to some reasons.

III. NEED OF PROJECT:

The need of the project "Automated Penalty Collection for Traffic Signal Violation Using RFID" is because presently, only the traffic signals are automated based on time. The Cops have to catch hold errant drivers by themselves, which may injure them as well. Fine is being charged manually which is paid through cash or digitally (with recent transformation). Mostly people don't know the charge for a particular violation, cops may take advantage of fellow drivers and charge them more i.e. like for violating signal may charge 200 instead of 100. In present system after being caught, the cops may take fewer amounts than the actual fine in the form of bribe.

IV. PROPOSED SYSTEM:

In [4], it proposed a RFID and GPS based automatic lane clearance system for ambulance. The main focus of this paper was to clear the lane in which the ambulance is travelling by communicating wirelessly with the nearest traffic signal, so that the green light is turned ON and hence the traffic is cleared. The communication between the ambulance and the traffic light controller is done using transceivers and GPS. Here, the use of RFID in the ambulances

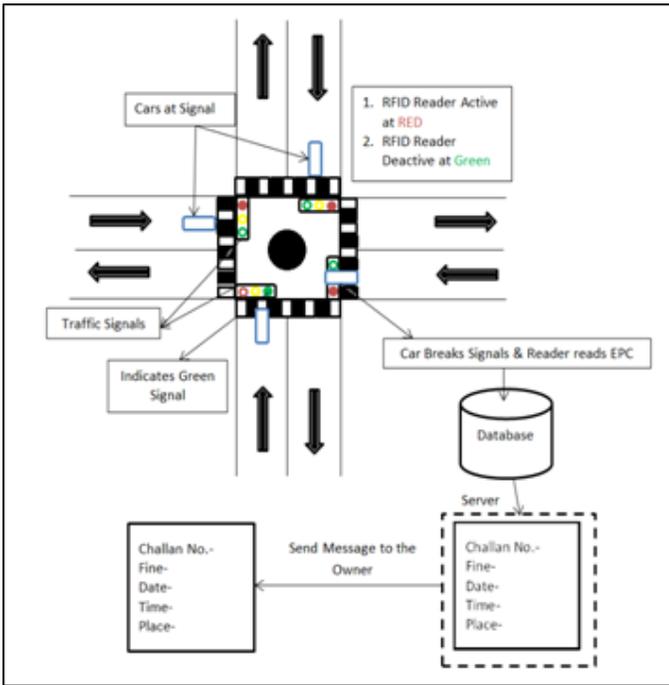


Figure.3. Proposed System

Working:-

Distinguishes amongst the emergency and non- emergency cases. The system is fully automated and can be implemented for the ambulances in service of Fig.3 shows the proposed system that consist a RFID tag will be deployed on the car which will be having a unique ID. The RFID readers will be deployed at the signal post. The RFID tag details, car owner's information such as name, contact number, email address, license number, car number, car model and bank account details will be stored in a database. Fine for violating any of the traffic rule like over speeding, skipping tolls, breaking stop signals, etc. will be estimated in prior. Fig.4 shows the flow of the model. Taking into consideration a scenario of breaking a traffic signal, suppose once the stop signal turns on, the RFID reader will be activated. If any car passes the stop signal, the reader will read the tag that violated the rule and will retrieve its information from the database. The fine to be charged for breaking signal will be deducted from the car owner's account number and a notification regarding same will be sent to the owner through message or email. Also crime count will be increased.

Sample Message Content:

1. Challan No.
2. Fine Amount
3. Vehicle No.
4. Rule Violated
5. Place
6. Date & Time
7. Crime Count

In case if there is insufficient balance in account, cops can take necessary action like visiting the person to collect fine. A limit of violating a certain rule will be set in prior. If any person exceeds this limit legal action like cancelling his/her license for a certain period can be taken thus, the system will help to

normalize the violation of traffic rules. It will help in reducing the manual efforts taken by the cops. It will be an automated system for penalising violator and maintain traffic disciplines. The system will make people oblige to the traffic rules which will induce road discipline among people. It will help in minimizing the haphazard caused due to violation of traffic rules. It will also provide safety to pedestrians. Also in future, it will create job opportunities in IT-sector for monitoring work flow, maintaining database, etc.



Figure 4. Flow Diagram

V. RESULTS

1. Proposed system which ensures of creating smart environment which includes:
 - Automatic fine collection from bank accounts.
 - Completely legal cash flow without any bribes.
 - Detection of vehicles violating traffic signals by means of RFID tags.
2. The system will make people oblige to the traffic rules which will induce road discipline among people, apparently the accidents at the traffic signals will decrease substantially.

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