Advanced traffic signal management system using RFID technology

Harshal N. Kolhe[1], Rushikesh A. Bhalerao[2], Ranjana G. Khairnar[3], Prasad V. Vartak[4], Juily S. Wani[5]

[1]*Asst. Professor, Dept. of Information Technology, PVGCOE, Nashik*

[2,3,4,5] *Department of Information Technology, PVGCOE, Nashik*

Abstract- **Smart traffic signal management system is a IOT based application which deals in various penalties and fines regarding the traffic rules and regulations using RFID sensor system. RFID is Radio Frequency IDentification which uses radio signals for tracking the objects (in this case: vehicles). A smart system where sensors are attached to signals who constantly monitors vehicles passing by and checks for ticket evades and speed limits. Radio frequency identification (RFID) is widely used in many applications like inventory tracking, personal identification, e-money and e-shipment transaction and gaming. RFID is a contact less wireless device consist of tag and reader. Complexity of RFID system differ from one application to another. RFID is very common in access control applications where access control information is usually stored in backend database. Traffic signals operate in pre timed, actuated, or adaptive mode. For the purpose of vehicle tracking from the database it is necessary to allow multiple keywords in the search request and return documents in the order of their relevance to these keywords. For privacy protection, such ranking operation, however, should not leak any keyword related information. A users bank details will be linked to their vehicles so that it can be fined as per the rules violation.**

Index Terms- **RFid, internet of things, sensors, tracking, traffic surveillance, actuator, multi-keyword search, indexing, detection, monitoring, RFID tags, instant messaging, GSM module, arduino.**

I. INTRODUCTION

This study encourages smarter monitoring of the vehicles and monitoring of the laws broken by the vehicles at traffic signal. Since every vehicle is pre-installed with a RFID tag, it becomes easier to track them on the traffic signal. The reader of RFID is installed on each traffic pole on every traffic intersection. This reader will track every vehicle with a tag who crosses the red signal and those vehicle's information will be fetched from the database. The database contains the RFID tag information, vehicle owner name and vehicle registration number and mobile number of the same. This information is linked with a E-wallet account for every registered vehicle the mechanism will deduct the said amount of fine from that particular wallet account. A messaging protocol using GSM module is used for alerting the vehicle owner on their mobile number about the law break and the fine deduction done for the same from the wallet/bank account. The RFID tag and RFID reader are contained in RFID technology. RFID means Radio Frequency Identification that consists of the tags which can be either active or passive tag. Passive tags do not have power supply, much economically cheaper to manufacture and small coil antenna is used. On the other hand, active tag must have own power supply. It has longer range and larger memories. It can store additional information sent the RFID reader.

II.LITERATURE SURVEY

Nowadays Traffic rules violation has become very usual, and it is impossible to seize or track all such violations physically by the traffic police. Hence a variety of researchers and scientists have violation system which can automatically detect the traffic rule violation to tackle the problem.

Today every vehicle is assigned a smart card which contains the necessary information about the vehicle and its registered owner. Also individual gets 'smart ' driving license from the RTO authority. Smart because, this license contains a magnetic chip that contains the information of the license owner. This can be checked as soon as the card is swiped through the reader. Rfid is much cheaper and efficient as it requires very less energy and overcomes geographical interruption.

A model was proposed in 2017 which was designed for traffic rule violation at railway track using Raspberry PI in Indian context. This paper proposed an idea of identifying individuals and their vehicle through smart electronic system. The system comprises of sensors, cameras, and Raspberry Pi. When crossing is closed and someone tries to go underpass it sensors will be activated and cameras will capture the photo of that riders, number plates and then detecting number by OCR, and send the number to appropriate department by text message.

Another paper was published in 2017, advanced automatic toll collection and vehicle detection during collision using RFID. This study consisted of three parts 1. Motion vehicle detection and segmentation approaches 2. Camera Calibration approaches and 3. Vehicle tracking approaches. It represents and classify the traffic surveillance systems to three types based o specifc methods which used for developing it.the system analyses and show how the traffic surveillance used th image processing methods for detection and tracking.

III.SYSTEM ARCHITECTURE
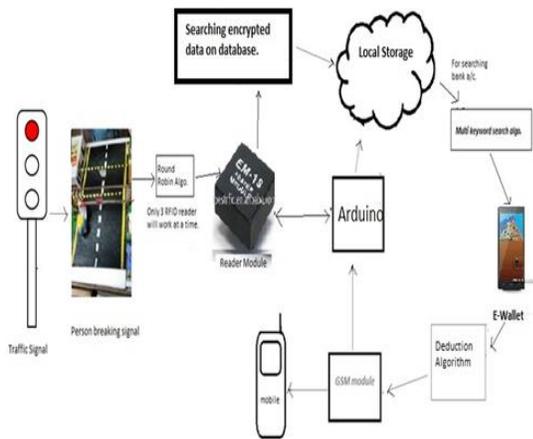A.   Architecture

FIG. ARCHITECTURE OF THE SYSTEM

B. DESCRIPTION
EM-18 RFID Reader:
The EM-18 RFID reader module operating at 125kHz is an inexpensive option for the RFID based application. The reader module comes with an on-chip antenna and can be powered up with a 5v power supply. This reader catches the RFID of the vehicle and generates a unique number of the card that is further processed in the database. Its main operation is to detect the signal violating vehicle's RFID information.

SIM 800 GSM:
Designed for global market, SIM800 is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features GPRS multi- slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

Its function in our project is to identify the information generated by the RFID processor and detect the mobile number of the signal violating vehicle owner. Further it will send a message to its registered number that the signal is violated and an amount is been deducted from the respective wallet account.

ARDUINO:
Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing..

Arduino is used for the purpose of Led lights that will work differentially based on the given time slice.Leds are used to depict the traffic signal at an intersection.Every signal will work for set time (green) and (red) automatically. This is achieved using the arduino board.

IV. RESULTS

1) By using this system we have overcome the drawbacks of cameras and police officials dependency.
2) The RFID works in any weather conditions and zero light as it generates radio signals for the targeted object.
3) This is an automated system because every vehicle is assigned a RFID and an E-Wallet account that will be used for deducting the signal violation fine.

4) The database of the vehicle and owner information can be uploaded to the cloud(so that it can be easily accessed from anywhere).

5) The system will keep track of all the signal violators and stored on to database for the analysis and daily/monthly report.

6) Admin will have access to the system using his credentials.

7) It will also manage the E-Wallet accounts of the users and provide live updation of the balance and mini statement.

8) Text Message will be sent to the signal violator registered mobile regarding the signal break and amount deduction for the same.
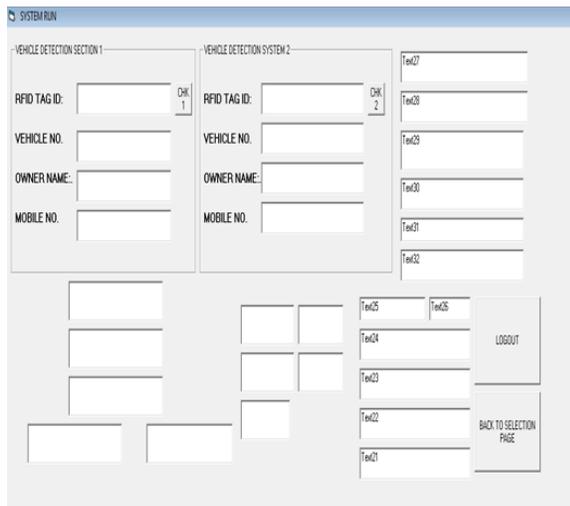
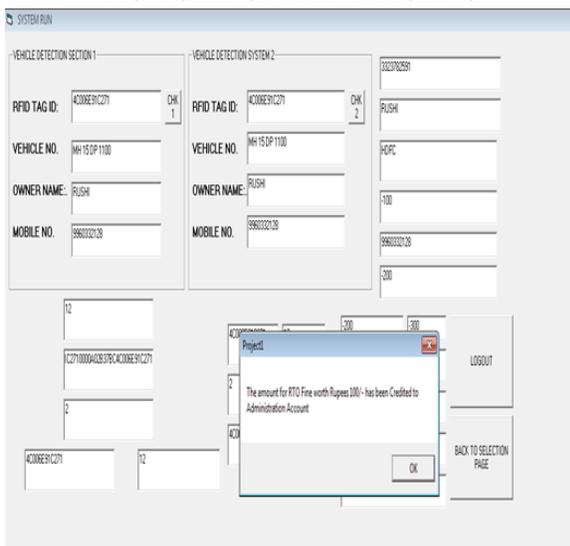## V. SNAPSHOTS OF PROJECT

FIG. FORM OF RFID TRACKING

FIG. SYSTEM TRACKS THE RFID SIGNAL FROM VEHICLE AND POPS UP THE INFO OF VEHICLE.
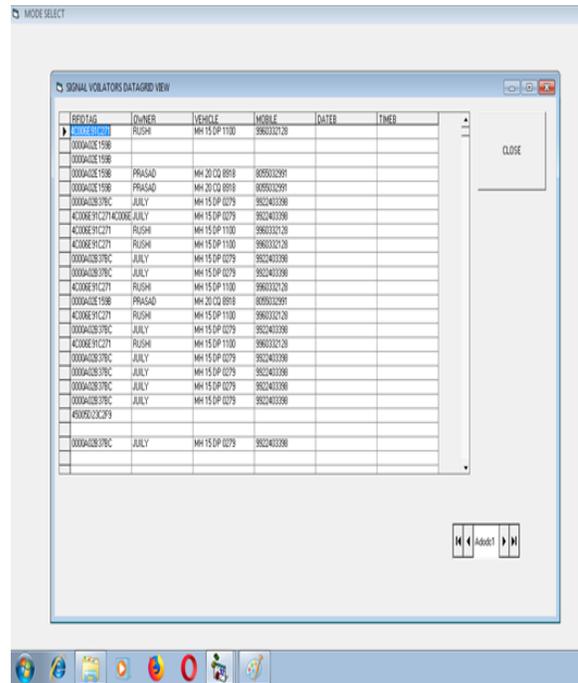

Fig. The grid view of all the vehicles that violate the signal with their respective details and timestamp(admin view)
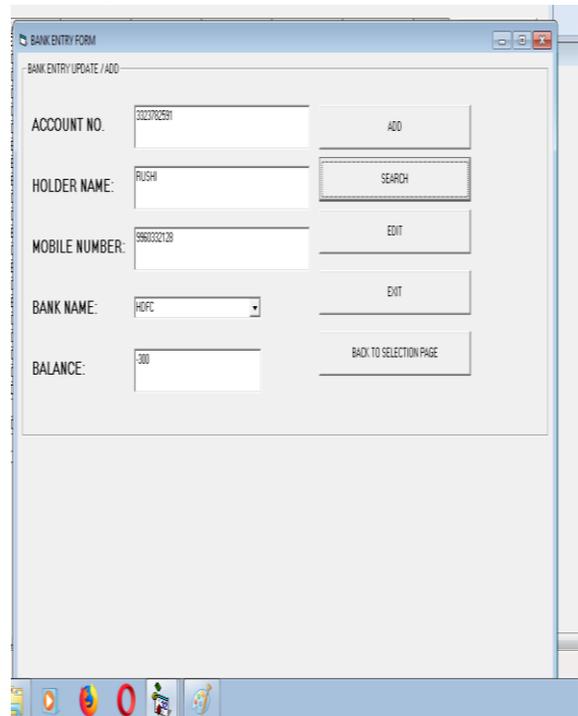

Fig. Bank/wallet details of particular vehicle owner from which the fine gets deducted.

Alert! Vehicle No.: MH 15 DP 1100 is violated the RTO Signal Terms at on at . Fine Rs. 100/- will be charged. - RTO

Trasaction Alert! Your Account No.# 3323782591 is debited with Rs. 100/- on at . Your Remaining Balance is 300. Thank You. - Bank
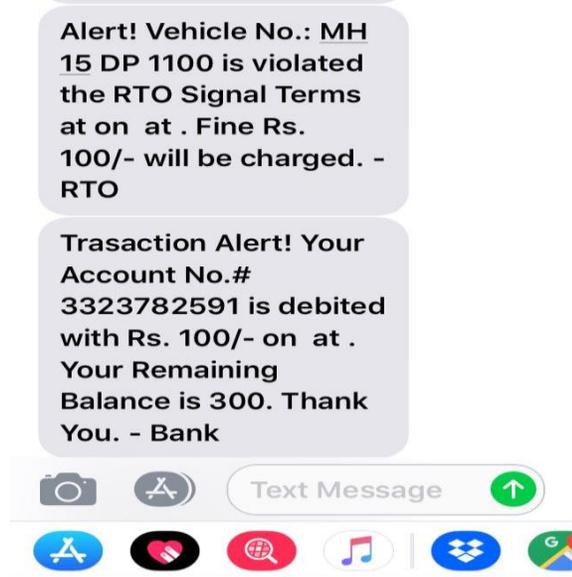
Fig. the message received by the signal violator on its registered mobile

VI. CONCLUSION

In this paper we have described the use of RFID in traffic signal management which will improve the traffic flow without breaking the law. Vehicle will avoid to break the rules at traffic signals which will lead to less accidents and traffic collisions

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AUTHORS

[1] Prof. H. N. Kolhe, Assistant Professor, Dept. of Information Technology, PVGCOE Nashik B.E M.E.(Comp). Exp: 5 years. Area of interest: Theory of computation.
[2] Rushikesh A. Bhalerao, B.E Dept. of Information Technology, PVGCOE, Nashik.
[3] Prasad V. Vartak, B.E Dept. of Information Technology, PVGCOE, Nashik.
[4] Juily S. Wani, B.E Dept. of Information Technology, PVGCOE, Nashik.
[5] Ranjana G. Khairnar, B.E Dept. of Information Technology, PVGCOE, Nashik.