Automation in Highway Administration System

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ABSTRACT

The Main idea is to develop QR based smart toll .Where we will use QR based payments. The first step is, the user should register and obtain a unique QR code from our official website by inserting some of the essential details. After this process a QR code will be generated, which is to be placed on the front glass of car. Prior the travel the driver or the owner of car , should send the message regarding the travel to toll free number from registered mobile number so as to activate the QR code only for that route for the purpose of security. On toll plaza there will be different lanes for different type of vehicles, (example: trucks, four wheelers, busses, military or VIP people).When a vehicle reaches the toll plaza the scanners which are placed at the toll plaza will scan the QR code which is placed on the vehicle's front glass and the specified amount will be deducted automatically from the drivers or owners bank account and on successful payment the barriers will open.Also the heavy vehicles are weighted at toll plaza to check if they are overloaded. If they are not overloaded and are having appropriate weight the same payment procedure is followed as specified above and the barriers are opened after payment. But if they are overloaded specified fine amount will automatically deduct from drivers or owner's account, and only after managing the appropriate weight the heavy vehicles will be allowed to pass the barriers. In addition to this the time taken to travel from one toll to other toll is also measured, if the time taken by vehicle to travel from one toll to other is more than the prior defined time i.e. the actual time taken to travel is more than the assumed time, this means the speed limit has been exceeded somewhere .On basis of this result the fine amount is automatically deducted from the vehicle owner's account if speed limit is exceeded.Also the car owner/driver can pay the toll amount prior the travel and can enjoy the journey without waiting on toll plazas.

Keywords: QR Code, Toll

I. INTRODUCTION

In current system, on toll plaza if there is a long waiting queue for toll payment then lot of time is wasted. Thus due to this there is more traffic on toll plazas. Currently toll plazas support toll payment by cash or cards(debit card, credit card etc.),for both ways people have to wait in queue for payment .Our invention helps in reducing the traffic on toll plaza's with help of QR code based payment due to this the unnecessary waiting time is avoided.The second this is lot of accidents take place because of the heavy vehicles which are overloaded, and this contributes in death of innocent people.

Therefore our invention helps in reducing these accidents at high extent by checking the weight of heavy vehicles at toll plaza and letting them pass the barriers only if the weight of vehicle is appropriate.Thespeed of vehicle also contribute in accidents on highways, for this purpose our invention involves testing the speed limit and charging appropriate fine if the speed limit is exceeded.Also the car owner/driver can pay the toll amount prior the travel and can enjoy the journey without waiting on toll plazas. This is not supported in any of the current system.The current toll payment on toll plazas also supports payment by using RFID TAGS (FASTAGS). This system is costly as the RFID tag deposit should be paid prior. The tag joining fee is 200rs in addition to this the tag should be recharged after some interval. Thus as compared to RFID, QR code is open source. It does not involve any cost of QR code generation. As its name indicates it is a Quick Response code and is more efficient in performance as compared with RFID tags. If the RFID tag is lost or is damaged, the owner of car should again buy the tag, but if the QR code print is lost
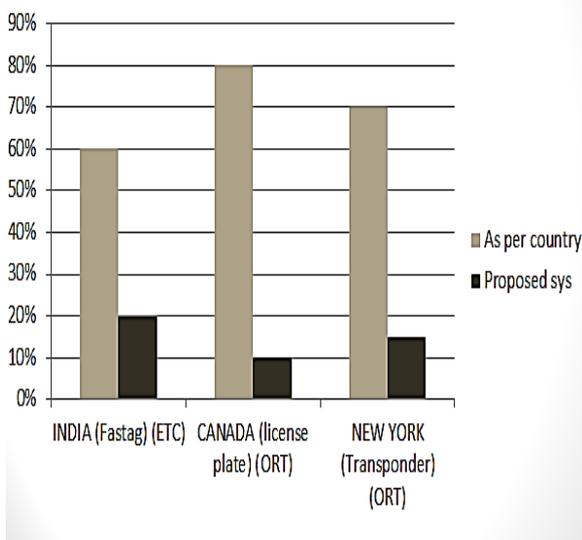
we can regenerate it for free. Thus comparing with RFID tag, the QR code is preferred more and has more advance features.
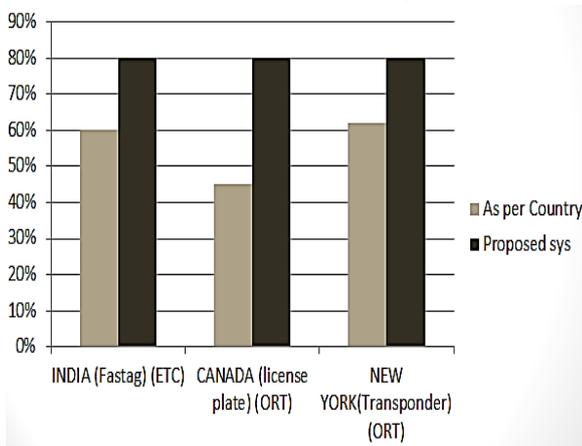
II. LITERATURE SURVEY

Literature Survey based on Delay:
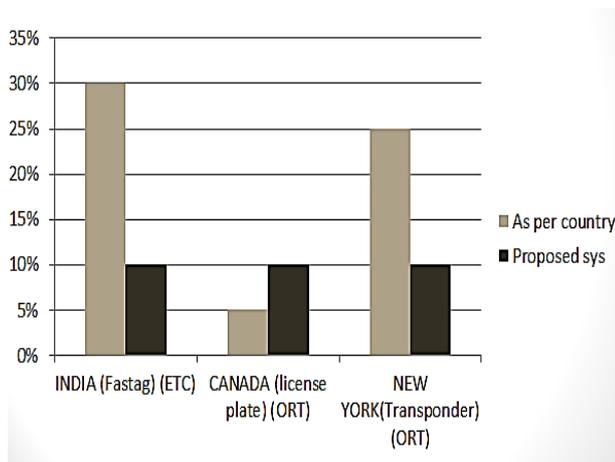
Literature Survey based on Cost:

Literature Survey based on Security:

Algorithm:

Mapping of the vehicle on the basis of route.

1. Registration of the vehicle to get Encrypted QR-Code for that Vehicle.
   1. Zxing Open Source Library
   1. Obj.encrypt(Version , "DATA")
2. Scanning QR Code
   1. Solar cell and laser beam connected to our micro-controller.
   2. As soon as vehicle will arrive, the voltage level of solar cell will gets changed and hence then Vehicle will be detected.
   3. Image capture from particular angle according to location.
   4. Image processing to find out the QR code.
   5. Decoding of QR code.

3. Socket Programming used to send scanned data to Server System.
4. Toll amount Deduction and Rule Violation Check.
5. Successful Barrier Open if Vehicle has paid the toll amount.
6. Prepaid toll payment
   1. Enter Source
   2. Enter Destination
   3. Make Payment
   4. Successful.
7. Analytics
   1. Daily data representation Graph wise.
8. Suggestions
   1. Enter Source and Destination
   2. Enter Date
   3. Enter Time
9. END

- Time Complexity of Scanning QRCode is O(1)
- Time Complexity of Calculating weight of vehicle is $O(n^2)$
- Time Complexity of socket program is O(n)

III. PROPOSED WORK

Our idea is to develop QR based smart toll .Where we will use QR based payments   which are currently supported by government's BHIM applications as well as m-VISA by VISA and some private companies like PAYTM, Free charge from India. In addition to this with the help of QR code we can detect and track the car which raises its speed on highways.We will also check

if the heavy vehicles are overloaded. All these operations are based on QR code. QR code is Quick response code. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji) to efficiently store data; extensions may also be used. A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed usingReed-Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.The current system is based on FASTag (RFID tag). FASTagis reloadable tag which enables automatic deduction of toll charges and lets you pass through the toll plaza without stopping for the cash transaction.

FASTagis linked to a prepaid account from which the applicable toll amount is deducted. The tag employs Radio-frequency Identification (RFID) technology and is affixed on the vehicle's windscreen after the tag account is active.This system is costly as the RFID tag deposit should be paid prior. The tag joining fee is 200rs in addition to this the tag should be recharged after some interval.

IV. OBJECTIVE

There are in all 4 main objects of invention:
1) QR code based toll payment and automatically deduction of toll amount from associated bank account on Toll Plaza for reducing the traffic and unnecessary waiting time at toll plazas.
2) Tracking the vehicle, if the vehicle raises its speed , then deducting fine amount automatically with help of QR code, on Toll Plaza for reducing accidents on highways with respect to speed of vehicles.
3) Checking the weight of heavy vehicles and if the vehicles are overloaded deducting fine amount automatically with help of QR code on Toll Plaza and restricting to travel further unless the load is reduced, for reducing accidents on highways with respect to overloaded heavy vehicles .
4) Before starting your journey you can pay the toll amount in prepaid, for all the tolls that come in your way while travelling so as to reduce the overheads in journey.
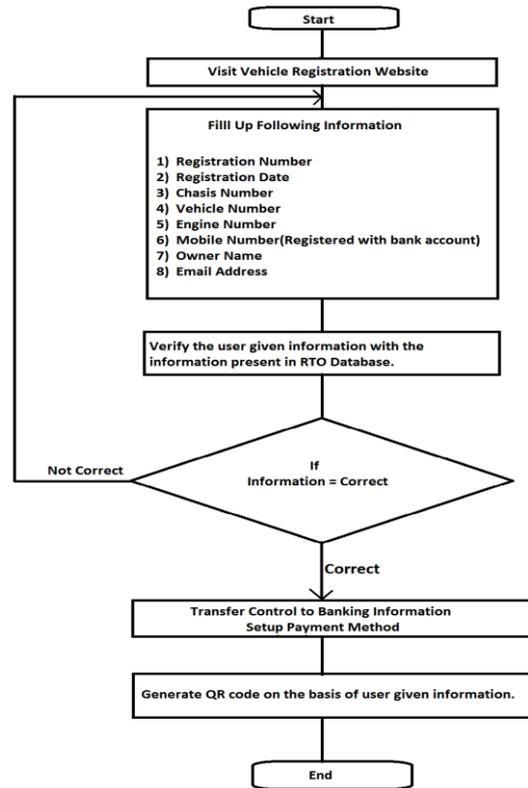

Figure 1. Flow of Registration of Vehicle for obtaining QR code

- ✓ In figure 1, the actual flow for registration of vehicle is there.
- ✓ Here the user has to register his vehicle by providing unique and correct information provided by RTO in form of "Smart Card" or "RC Book".
- ✓ Then if the information matches with the information present in RTO database then our System will provide QR code for that particular vehicle.
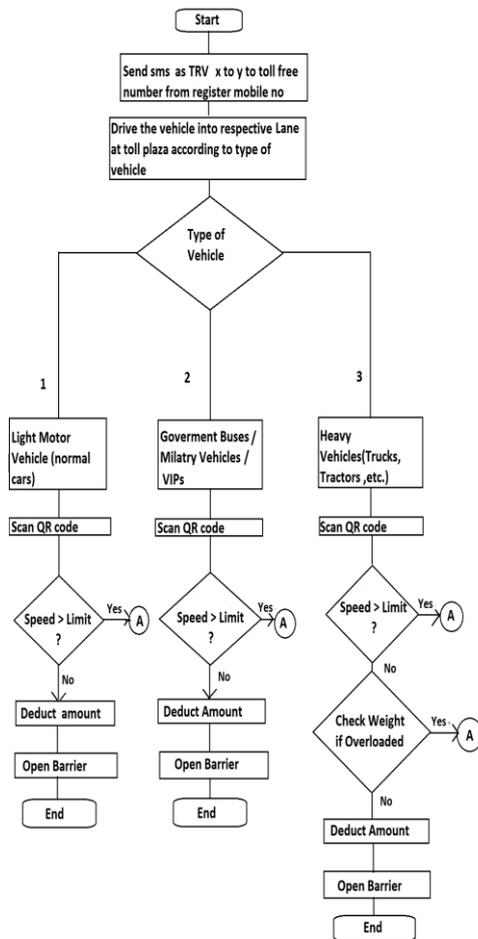
Figure 2.1

Where,
x=City Code of Source City
y=City Code of Destination City
"A" is the Condition where User Break The Rule

Figure 2. System Work Flow

The System

- ✓ User has to send SMS from Registered Mobile No (RMN), from which source to destination he/she wants to travel.
- ✓ On the basis of Source and Destination that QR code will be activated between those cities.
- ✓ The user should drive the vehicle in particular lane on the basis of type of vehicle.
- ✓ The QR code will get scanned and the specific amount will get deducted from the owner's account and the barrier will open.
- ✓ Time of arrival will be recorded for the purpose to check if speed limit is exceeded .If exceeded then the Control goes to Rule Checking module, which is explained in Figure 2.

V. CONCLUSION

In this paper, we explained about how to develop Automated Toll System based on QR codes. In our system rules validation System which will validate the Speed Checking, Weight Checking, Prepaid toll payment system, Mapping and tracking the vehicles between tolls and Data analysis on daily basis.

VI. REFERENCES

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