SMART TOLL COLLECTION USING QR CODE
Digital Toll Payment

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Abstract—The Smart Toll System is developed for toll collection to avoid traffic congestion, long queues, with the help of QR technique. Also, by using this system, time will be saved, i.e. By avoiding long queue as there will be less stopping of vehicles and less manual transaction. The current system for toll collection is manual transaction. Here every vehicle stops at the toll plaza for payment. This causes traffic congestion, increase in air and noise pollution, and wastage of time. In proposed system there will be the use of QR code, where the user has a card with QR code mounted on it or QR code sticker on the vehicle, which will be scanned through the camera. After detecting QR code and verifying the credentials of the vehicle with the system, the balance from the customer’s account will get deducted and he will get SMS on his registered mobile number. So this system is designed for faster movement of vehicles on toll plazas and increases overall user efficiency.

Keywords—QR Code, Toll Automation, Camera, Vehicle, Efficiency.

I. INTRODUCTION

The earlier works for extracting QR code from an illustration do not consider a non-uniform background. Here implementing the applications of QR code and a proficient algorithm is proposed to Extract QR code from the non-uniform background all the other methods are very much time consuming and expensive, hence the use of QR code overcomes those problems. A QR code is an alternative to the existing system which is based on RFID tags and as well as the manual toll system[2]. QR code reduces the data space in the database; it also reduces the cost as compared to other existing system. The proposed system is based on the QR code, capturing QR code by using a camera and recognizing the details present in the QR code[3]. Once the details are verified which was provided by the user during registration then, the amount will be subtracted from the respective account based on the type of vehicle. It has strong encoding and error correcting function. Some of the existing system used RFID technology. Thus every car has to be provided RFID tags and RFID reader at toll collection and other existing system uses GSM and Infrared technology[2]. The other toll system includes an electronic toll collection using barcode. It is very cheap for implementation, it uses barcode for storing user data at the time of payment, and barcode scanner is used for the transaction. But data storage of barcode is very less so it's not efficient in terms of data storage. The proposed system mainly focuses on the QR code. The system will generate the QR code with all the user details which will be more help full from security point of view and will make the communication easy and using it more comfortably[4]. At sender side the data that is encrypted earlier is divided into various smaller parts[2]. The QR code pattern or sample is generated for each part. Each sample is multiplexed and represents each module in QR code with black and white symbol at the receiver side; QR code with black and white symbol is decoded to give the same number of QR code patterns that were multiplexed. These decrypted QR code samples are read by general QR code readers and then data can be displayed on the display. The proposed system focuses on Capturing and Scanning of QR Code for toll payment for reducing traffic.
II. LITERATURE SURVEY

Literature survey has been done on various toll systems. Comparison between various toll systems is shown, literature survey helps in selecting an optimal toll system[5]. The first system is a Manual, toll system, it is generally used system at various places for toll collections it requires manual processing, it increases levels of service, but it has many drawbacks of it like money problems, big manual workforce, etc. The second system is Toll system using RFID it is faster than most of the systems, but it is very expensive and requires proper environmental survey for installing this type of system[1]. Third system is Toll system using barcode it is cheaper for implementing these systems, but, the barcode has less storage capacity for storing information. Fourth system is Toll system using QR code it is cheaper and faster for using this system but, it is not fully automated.

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Table 1. Literature survey

III. PROPOSED SYSTEM

The proposed system is based on the QR code; camera and web application is developed for toll collection[3]. Capturing QR code by using a camera and recognize it. The QR code will contain a system generated unique code which will be linked with the customer's details in the database. This is done for the protection of the information as it will only show the unique code to others who scan the QR code which would stand meaningless without the access to the database. Once the details are verified the amount will be deducted from the respective bank account which would be stated at the time of registration. If there is a successful transaction barrier will open for passage of the vehicle or else barrier won't open until successful transaction. The proposed system proves to be a better approach in many aspects. It uses technologies that will enable users to save time and at the same time provide security.

3.1. System Architecture

The System Architecture of the project is shown below, it includes various components which are as follows user with QR code on the vehicle it contains all the user details in it, camera to scan the QR code at the time of payment, scanner decodes the QR code and fetches all the details from it. These details are verified with their database and then the transaction is performed if the details are correct. The database keeps all the data of all users, there transactions, vehicle details it is updated after every time after every transaction.
3.2. The proposed system will work as follows.

- On User side: the user will first register its account on the web application by providing various details. The registration process is shown below:

![Registration Form]

**Figure 2. Registration**

- Now the user will be asked to provide images of their registered vehicle for manual verification.

![Vehicle Pictures Form]

**Figure 3. Vehicle pictures**

- After clicking on the submit button user will be redirected to its homepage. Home page of user consist various information like account details provided at the time of registration,
balance, vehicle pictures, QR code, log of all the transactions with date-time-location and also recharge option.

Figure 4. Home Page

- On Toll Side: Workers at the toll naka side will be provided their own device with id and password for scanning the QR Code. They will scan the QR code, after scanning the QR code all the details of the QR code will be fetched.

Figure 5. Scanning of QR code

- After clicking on verify button it will check all credentials with the database and also manual verification is done so that it is the same vehicle with its own number plate. If the data provided is true and after clicking on submit button if there is sufficient balance then it will show successful transaction else it will provide insufficient balance or invalid credentials if the data provided is not correct.
Busy highways where traffic jam is a regular scenario due to manual toll collection process, our proposed system will reduce the wait time. The ability to make payments from your bank account itself. Overall lowered toll collection costs. By full automation it will be more efficient usage and provide quick service.

REFERENCES