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ELECTRONIC TOLL COLLECTION (ETC) SYSTEM USING SMART PHONE

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Abstract— A toll system is one in which a fee (or toll) is assessed for the passage of a vehicle through the toll way. In the existing toll tax system, limitations such as mismanagement of time, long queue for the payment of toll tax, the payment in cash are observed. The aim of the project is that the user can pay toll electronically. By using Android Smart phone, one can select toll area, time and pay. The user can locate the nearby toll booth with the aid of Global Positioning System and can offer to pay the amount using Electronic payment gateways equipped with the proposed application. This can greatly reduce the waiting time of the user in combination with reduced fuel consumption producing positive effect on environment. By introducing this technology, the system can be made automatic and easier and facilitates the user to pay the toll tax anywhere.

Keywords— Toll tax system, Global Positioning System, Android Application, QR Code

I. INTRODUCTION

In the current scenario, number of vehicles is increasing dramatically thereby substantially increasing the traffic. This results in huge waiting time of vehicles in the toll gates which causes inconvenience to the users. Also, the payment of tax through cash is not encouraged nowadays. Hence, we are proposing an alternative method to handle the above scenario.

The factors which are of great concern now are time and money. The proposed application overcomes these factors by using electronic payment methods which avoids payment through cash and encourages e-commerce and thereby reducing the waiting time of the users at the toll gate. A clear maintenance of all vehicles passing through all toll gates can be done systematically which avoid conflicts.

II. IMPLEMENTATION

2.1 Android Application

This concept is implemented as an android application. The main purpose of this application is to help different users to pay for the same toll at the same time (many to one mapping) without conflicts. The place dependency is also surmounted. The application uses java for the database connectivity with the help of PHP.

2.2 Working and Databases

The main aim of the application is the provision of toll gates to the users and payment for the toll gates electronically. Once the list of toll gates are given, the user can select the tolls and pay tax by the payment gateway provided. Manual search and GPS search are given. Vehicle details, trip status are got and payment is done.

The application has its database in the public cloud, Hostinger. The application has 5 tables for its operation. The first table holds the user data and the second for verification details. The payment details are maintained in a separate table and booking history in another. And the fifth table is for the Toll gate list which is provided to the user by the admin.

III. WORKFLOW

The workflow explains the whole working process of the application. The application has two different flows as there are two operators. The one is the user and the other is the admin. The user flow goes as follow: Any user has to register when using the application for the first time (Refer Fig.3). The user is verified by the system by OTP (One Time Password). Once the registered user is verified, the user is given access to the application directly. The user will be provided with list of tollgates where they can filter their tollgate by means of two methods. The first method performs GPS search where the location of the user is obtained by enabling the GPS and as a result the tollgate according to the location is filtered and shown to the user. The next one is the method by which the user can manually search a toll gate by its district (Refer Fig.4). Once the user selects the tollgate, they will be asked to provide certain details like vehicle number, trip status and finally they will be directed to the payment page where they need to give the banking credential details. The receipt and QR code for the receipt will be generated (Refer Fig.5). Using QR code, the user can pass through toll gates without waiting.

The next flow is that of the admin. The admin will be provided with a separate login where, the admin has the right to add information of toll gates to the system. The next important work of the admin is scanning the QR code and granting permission for the users to pass through the toll gate.

Admin reviews the work status and notifies user about the completion of work. If admin is not satisfied with the work done he can re-assign the work to the engineer. User can review the work and give feedbacks based on the quality of work completed which is used in calculating the efficiency of the engineers.

3.1 Workflow Diagram

The general workflow for the user is as follows:

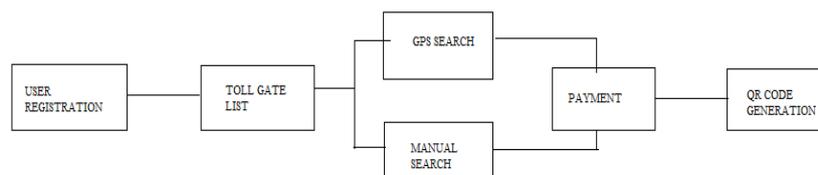


Fig.1. User Workflow

The general workflow for an admin is as follows:

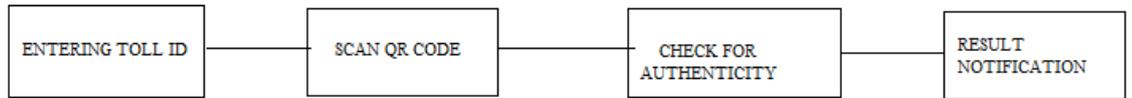


Fig.2. Admin Workflow

3.2 Important features

- Verifying registered user using OTP
- Listing of all toll gates to users
- Search mechanisms: GPS, Manual search
- Payment process and QR code generation
- QR code scanning and verification.

IV. RESULTS

4.1 SCREENSHOTS

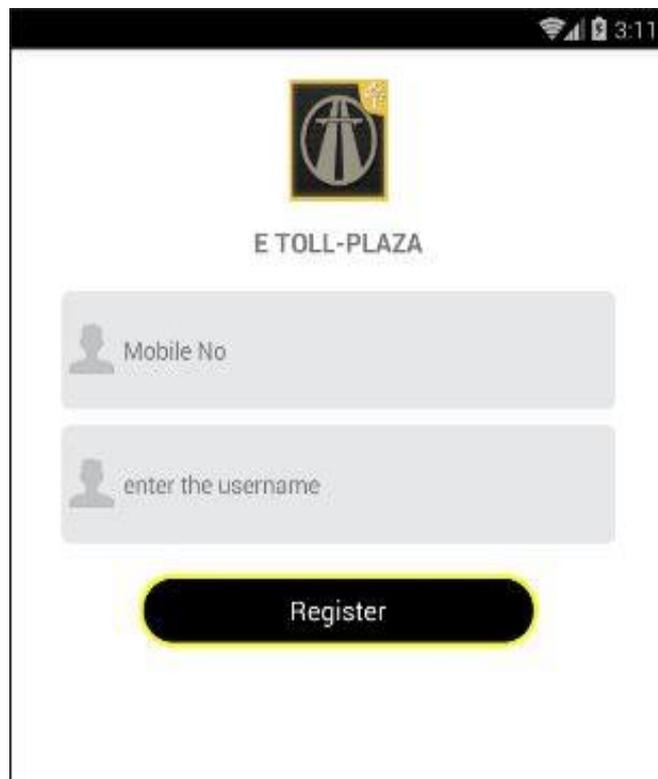


Fig.3. User Registration Page

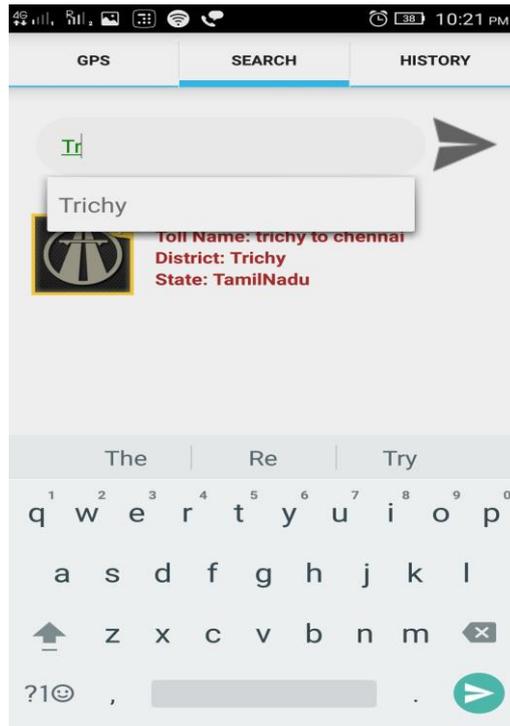


Fig.4. Toll gate manual search



Fig.5. QR Code

V. Conclusion

With help of Smart Phone, the user can pay the amount and get receipt at anywhere. All the data is stored in the cloud, and according to user query this application will retrieve and fetch data to user's smart phone. At the same time, the service provider can also verify the transaction details from the cloud. It is fully automated, more reliable and place independent. The user can select the toll gate and once the user makes the payment, he can easily pass through the toll gate by showing the QR code. From the admin perspective, the scanning of QR code is done and the users are verified and allowed to pass through without waiting.

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