

Open Road Tolling Using NFC

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ABSTRACT- Automated toll Collection framework is considered as a viable technique keeping in mind the end goal to conciliate movement blockage and jams, upgrade the comfort and security of voyagers, and minimize fuel consumption and air pollution for environmental protection need. The paper proposes Architecture for collecting toll using Near Field Communication (NFC) technology. The basic idea is that the client having NFC enabled android mobile taps on NFC enabled toll tab at toll station, which reads the information like NFC Id and automatically sends an acknowledgment to the owner of vehicles and simultaneously the request is forwarded to the server. The system proposed shows a high transparency level in transaction and amount collected. The system is able to develop the auto-generated message as acknowledgment for toll station, client and the server. The automated toll collection system is also able to census traffic flow and audit road maintenance fees. This system is necessary to improve expressway management.

Keywords-NFC(Near field communication),RFID(Radio frequency identifier),ETC(Electronic toll collection)

I. INTRODUCTION

The modernization of transport has become one of the essential signs for the urban modernization level, the increase in the number of cars leads to serious problems concerning transport system. Electronic Toll Collection facilities offer travellers the ability to pay toll electronically. The electronic toll collection using NFC & android application is a technology that will allow user to make the payment of highway tolls automatically. This system also allows authorities to keep track of black listed vehicles that pass through tolls. This terminology will in turn save the time as well as the money by decreasing the waiting time as well as the queues of vehicles at the tollbooth. The NFC tag will be having a unique identification number (UIN) provided by the toll authority and customer's details. The active NFC tag is used in the tollbooth. Whenever the vehicle passes through the tollbooth, the NFC tag data will be read by NFC reader & same will be sent to the server for verification. Server will check tag details & depending upon the type of the vehicle, the toll amount will be deducted from the user's account.

Electronic toll collection (ETC), otherwise called electronic instalment and estimating framework, is one of the significant exploration subjects in wise transportation framework. And so on is an execution of a street estimating idea with a specific end goal to make advantages, for example, decreasing toll paying time, upgrading the comfort and security of explorers, and minimizing air contamination and fuel utilization? As we know normal toll collection takes a lot of time and there is also traffic jams and won't get the transparency in toll amount collection. For this firstly the introduction to RFID was done. RFID is abbreviation of Radio Frequency Identifier which plays vital role in electronic toll collection. RFID is also used for

tracing of the vehicles. The drawback of RFID is that it doesn't work properly in the cloudy and unconditional climate. So, to overcome from this drawback we introduced NFC i.e. Near Field Communication. NFC's full-form itself tells that it is a communication protocol that works within 10cm area (near field) for data transfer.

The client communicates with server through a NFC Android mobile Application which is able to store the information of user and its unique individual NFC ID generated and given by server. For this the user should contain the NFC enabled mobile and registration should be done online.

A. Goals And Objectives

- i. Reducing traffic at Toll Areas
- ii. Transparency in Toll Agent Collection
- iii. Enhancing security at toll station

B. Relevant Mathematics Associated with the system

i. System Description:

a) Input: Registration Details, First Recharge and Tapping of NFC Mobile.

b) Output: Transaction acknowledgment, Proceed as response.

ii. Data Structures: Queue, RDBMS Database.

iii. Functions:

a) NFC id of client: Transferred on to toll device.

b) Transfers client's NFC request to server: On Match process client request.

c) Transaction details from server to toll device: Stores and Transfers to Client through message/ acknowledgement.

d) Success Conditions: Proper transaction is done.

e) Failure Conditions: Transaction is declined.

II. PROPOSED SYSTEM

we propose a fully automated system and secure system which uses an nfc enabled smartphone interacting with a payment terminal to quickly and securely process involving the toll collection and receipt delivery. the new system also maintains the database that log all transaction.in case of failure the system tracks the vehicle and deliver and sends an email and notifies the defaulter with outstanding changes. In this project, the main is secure toll transaction with better interaction features in transaction through website and Android App which can improve the availability of toll collection amount directly to government without any corruption. With help of this project, transparency will be maintained towards all customers, toll agents and the government. Customers can view their amount deducted, all toll transactions operated successfully with their corresponding toll location referencing through their id, and remaining balance on their respective accounts. The toll agents will be paid a certain salary as per decided amount by the government on the basis of individual toll collection of the month.

III. RELATED WORK

Electronic toll collection system deals with DSRC(Dedicated Short Range Communication) Technology. In some countries like China they have introduced a GPS based Automatic Toll collection system[2]. It preinstalls an OBU(On Board Unit) mounted on the vehicles and the RSU(Road Side unit) communicates within very short range RFID tags are also used for the same system. There two kinds of RFID tags- Active and Passive. Active RFID tags can communicate within the range of 30 m.

This range of communication can be extended with the help RF modem[4].NFC is one of the high frequency RFID's. Mobile phones in today's generation have NFC technology enabled in them. It has been proved very efficient and reliable for data transfer. Mobile ticketing using NFC has been considered to be the most promising applications in real time[6]. Finkenzeller [5] states that the public transport domain is of great potential for RFID and contactless chipcards. He suggests that transport associations in Europe and the USA operate at a huge loss, which can be improved using contactless chipcards for EFM. Windmann has proposed the usage of the VDV core application which has been implemented in Germany[8]. It implies cashless payment, electronic ticket and automatic fare management. In [3] Grechenig a pilot project was conducted by the OBB and the Austrian Mobile Network Operator and A1 Telekom in the first quarter of the year 2009. The implementation was on the basis of VDV Core

Application. For two rail routes 100 test users could buy electronic tickets via a special application on their Nokia 6212 mobile phone over the air. The validation of the tickets by the train staff was accomplished using a second Nokia 6212 mobile phone. It enables customers to purchase

tickets with their mobile phone via SMS or WAP. The ticket is a simple sms service provided with a security code which is used for the mobile verification.

ZigBee is a high level wireless communication protocol which uses small low power digital radios based on personal area network. It is simpler and less expensive than other WPAN's. The only demerit is that it cannot be used in mobile phones.

IV. SCOPE OF PROJECT

In this project, the main aim is to demonstrate secure toll transaction with better interaction features in transaction through website and Android App which can improve the availability of toll collection amount directly to government without any corruption. With help of this project, transparency will be maintained towards all customers, toll agents and the government. Customers can view their amount deducted, all toll transactions operated successfully with their corresponding toll location referencing through their id, and remaining balance on their respective accounts. The toll agents will be paid a certain salary as per decided amount by the government on the basis of individual toll collection of the month and get cars details for crime detection for police.

V. SYSTEM ARCHITECTURE

The block diagram mainly consists of four components those are user NFC device, Toll NFC device, Server and presented web Application. The web application is hosted for purpose so that initially user can register his details and make android app available in his device may be tab or smart-phone which supports NFC communication protocols. During the registration process, client/user will be provided with the NFC-Id that will be unique as per user's filled details. The whole required details will be saved into user's respective account database (Server). The web Application can be serviced from PC Desktop, tab, smart-phones. User NFC Device can be tab, smart-phone. It is used to share the user's NFC-Id with the toll device which is represented by the user request for payment at toll booth. The request passes through toll device and hits to server for payment processing.

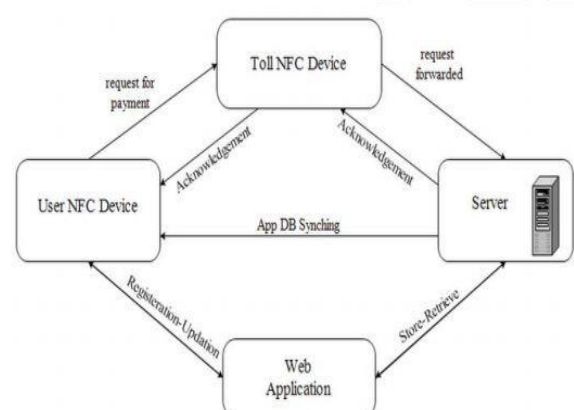


Fig 1: System Architecture diagram

VI. CONCLUSION

The Automated Toll Collection System provides a better way to carry out operations of a toll booth very effectively and efficiently. The users do not have to spend a long time in queues for payment of toll tax. Through the system it enables user to pay toll tax from his previously created account within seconds after reaching the toll booth. Users need not carry documents related to their vehicle like Registration certificate, Emission certificates, etc. The system allows Police officers to get notifications about blacklisted vehicles when they pass through tolls.

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