E-Toll System Using RFID

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ABSTRACT

ETS (E-Toll System) is an electronic Toll Tax collection system by which we can collect the toll charges using RFID card detection and scanning.These RFID Cards are related to the respective vehicle holders.This project hence, reducing common problems like traffic congestion, Pollution caused due to vehicles, Time dilemma, requirement of labours etc. Makes it effective to collect the required amount of charge from the driver. There will be an RFID tag implemented on every vehicle. Whenever vehicle passes through the toll plaza RFID reader with the help of sensors will detect tag and the required amount will be deducted. Driver don't need to stop to pay the money ,and this RFID card is used to track & bill the vehicle owner through a payment gateway.

Keywords : Electronic Toll Collection, RFID, XAMPP, Vehicle, Tag.

I. INTRODUCTION

The world is changing furiously, the role of automation in our day to day life is increasing at a very fast rate, hence the consumption of fuel and use of road is increasing proportionally. People charge of using roads as nothing in this universe is free of Cost. This leads to the motive of our project i.e. "The Automation".We have chosen this topic because digitizing current toll plaza will overcome disadvantages like time delay, traffic congestion etc.

The charge form of manual and semi-manual will not meet demand of the charging management system and may lead to many vehicle blocked at entrances and exits causing huge economic losses when it reached a certain threshold enhancing the convenience and safety of the travelers.

The current status of RFID-based ETC system worldwide exampled and described as follows:

Sanral:-**E-toll (in South Africa**) consists of the **electronic toll** collection (ETC) processes employed by **South Africa's** roads agency Sanral on selected **toll** roads or **toll** lanes, subject to the Sanral Act of 1998.

FASTag:-**FASTag** is an automatic electronic toll collection system operated by National Highway Authority of India[1] (NHAI). It is also based on Radio Frequency Identification (RFID) technology for making toll payments from savings account linked to it

E-ZPass:-The E-ZPass Group is comprised of toll entities stretching across 17 states that operate the extremely successful E-ZPass *electronic toll collection* program.

II. THE COMPOSITION

Our Toll Collection system is madeup of following modules:-

- **Hardware part:** This is a hardware-cum-sensor system which manages vehicle detection and is installed at the toll booth. The hardware is based on Arduino boards development platform.
- **Server:** This is the backend server hosted in XAMPP which is responsible for authenticating, identifying and billing a vehicle based on the unique RFID tag. Thus it manages the complete toll collection process.
- **Database:** Consists of user and administrator data and information regarding the total transaction and input output of the vehicles in and through the toll plaza.
- **User website:** It is a web site frontend we have created in PHP for users and toll people to register new drivers,Tolls,Vehicles and updating information regarding the vehicles.

III. DESIGN AND IMPLEMENTATION

When a person buys a new vehicle she'll need to register herself and her vehicle at the toll office or RTO office. The RTO officer will allot a unique ID to the RFID card the user along with No. Plate which will contain a unique ID related to the Card only. At this time the officer will also create an account for the user although user can herself make her account using the website by signing up. After it has registered the vehicle a password and user id will be generated and once it is generated the user can recharge his/hers card any time.

Each time the drivers vehicle approaches the toll plaza the IR sensor implemented on the plaza(Hardware)will sense the vehicle approaching and sends a ready signal to the RFID reader and Scanner the scanner will scan the Card and

processing will be done. Transaction will begin depending upon the balance in the account of the drivers card the amount will be deducted as the toll tax if the vehicle has to encounter another toll plaza through the journey she can request for deduction of amount wrt the upcoming toll also.All these tolls are connected using the centralized server using LAN.If there is no sufficient amount of money present the user can pay manually or other transactions means. The software updates the data of the transaction after the process successfully terminated.

Following is the algorithm associated with the project:-

Step 1: Start

Step 2: Sensors 0.5 km before the toll plaza detects transport.

Step 3: Scanner and Camera will start processing according to step 2.

Step 4: Vehicle slow down for some seconds at the same time High quality scanner scans QR-Code

Step 5: if Vehicle= Truck or Other transport then return the amount of tax to be deducted.

Vehicle = special Transport then
Return(null);

Step 6: At the same time the high quality Camera clicks picture of the vehicle.

If{

Traffic rules are followed then
return (null);
else
return(penalty);

Step 7: if the Transaction is completed successfully then the Tax will be delivered on their address.

Step 8:Message will be sent on owners phone

Step 9:END

IV. HARDWARE SETUP

At the toll booth, Arduino board hardware are situated which manages the toll total collection processes .We have used Arduino UNO which is a microcontroller board ATmega328P consisting of 14 digital input/output pins ,6 analog input ,a quartz crystal, USB cable connection , a power supply jack, ICSP header and a reset button.

We have simply connected it to the computer using USB cable.

Fig1. Arduino Uno Rev3,Code: A000066

To track the vehicles, *Arduino* UNO is interfaced with the RFID reader and scanner for getting the information regarding the vehicle.

Both the RFID reader and the tags comes with the coil in them power supply is given and the data is fetched We collect the read data.

Fig 2. Interfacing Arduino with RFID

.Power supply requirement of RFID Readers varies for different products. Reader we have used is of 12 Volts. There are 2 outputs from RFID Reader.

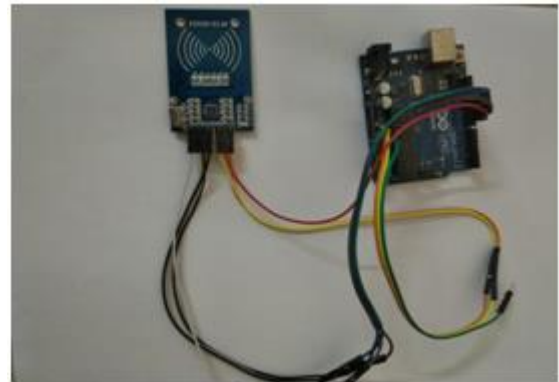(a)RS232 compatible output and (b)TTL compatible output. A TTL compatible output pin is connected directly to Arduino.

Fig 3. RFID with Arduino Uno Rev3

V. DATABASE

Database is the Heart of our project. We have used MY-SQL for database query generation and updating the entries. We obtained a database for user, admin and transaction using XAMPP control panel .There are three Data information's stored in the database as follows:-

1.Admin's Database:-Administrator database consists of all the details of central database and all tolls under Construction.I.e. RTO's Database.

2.Central Database:- Central database consist records of all toll plaza in work. This is managed by the RTO administrator.The Customer registers themselves into this account system. This account information about the users is stored into The RTO database. When the registered customer passes through the particular toll plazas then, automatically data will be updated.

3.Integrated database:-Integrated database is disconnected to the central database This database will update automatically. This database includes all Registered vehicles and the details of vehicle such as vehicle owner, vehicle number, license number, account ID, account balance,current charges, etc.

VI.CONCLUSION

In this report, the conclusion that came out is that, to implement modern system of toll collection new technique RFID came into light. The RFID safety is key important o this project.

This project is reliable and easy way to pay toll as compared to manual one.

Project is all about automated toll system which will overcome disadvantages of current toll system. Our project helps driver to pass through toll without stopping his vehicle to pay the toll tax. RFID tag on each vehicle will be detected by RFID reader and amount will be deducted. Open Road Tolling System[2] and Automated Toll system[3] these are two previously implemented projects similar to our project. We have studied them and we are trying to overcome disadvantages of these two. The project if implemented by government then toll system will be fully automated and one who is passing through toll don't need to wait for a long time this will also reduce pollution, traffic and accidents.

VII. REFERENCES

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