Electronic Toll Collection (ETC) of Transportations System with active RFID

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ABSTRACT

This paper focus on an automatic toll collection system using RFID technology. The technology uses a active tag that are mounted on the vehicle each tag has contain a unique identity code. In this system we used the concept of Radio Frequency at toll plaza The RFID reader (receiver) is connected when the vehicle reaches the toll plaza the connection between the vehicle and toll plaza is automatically created so there is no need to stop a vehicle at the toll plaza. It provide   ease of payment to vehicle user at toll plaza. The amount of toll tax is automatically deducted from ID. And the user receive an SMS on this mobile after pass the toll plaza so the RFID technology reduce the man effort reduced time wasting and reduced congestion at toll plaza.
Keywords: Active RFID, authentication, automatic transmission, GSM, multiple tag reader.

I. INTRODUCTION

Active RFID technology is used for transmitting the unique ID code to receiver Electronic Toll Collection Technology is very useful and advance technology. Security of barcode technology is less. In the RFID tag more information is store. The line of slight is not required for communication through radio wave. In previous system the toll plaza is under manually operated so, congestion, wastage of time and wastage of fuel these are the problems created in toll plaza is under manually operated so, this process is speed up at toll plaza. We will make a device i.e. RFID based automated electronics toll collection system. In this system accuracy is high for the toll plaza and vehicle owner. In active RFID technology system fuel loss is avoid, time is saving and reduce, toll payment is easy, toll gate entry for illegal vehicle is reduce. In active RFID technology using GSM for the message on the vehicle owner about the detail of payment after crossing the toll plaza.

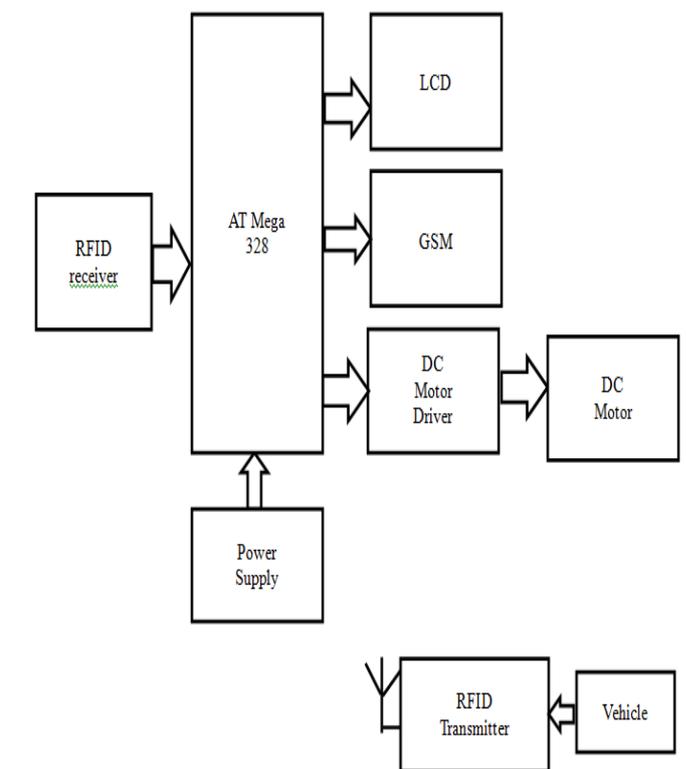## II. BLOCK DIAGRAM AUTOMATIC TOLL COLLECTION SYSTEM: SYSTEM

Figure 1

III. PROPOSED SYSTEM

In this system we focus on automatic toll collection system. Every vehicle will be attached with a RFID tag which contains a unique ID of user. The RFID tag continuously transmits the information in each 3 seconds when vehicle reaches at the toll booth. Then the RFID reader read the given signal. And pass over to the controlling device. i.e. microcontroller then by the programming microcontroller 328 works, it first check the authority of the vehicle or user if the vehicle is authorized then specific tax for particular vehicle is automatically deducted from moving vehicle, which is pass through the toll plaza. Here it is assume that the owner maintain a ID for deduction of money.

The Microcontroller stored all the required information of the user in database and, then after the deduction of money a user receives an SMS on his/her mobile about the detail of payment then also toll gate will be open by using active RFID. We reduced the time   consumption at toll plaza also reduced the vehicle congestion at toll plaza.
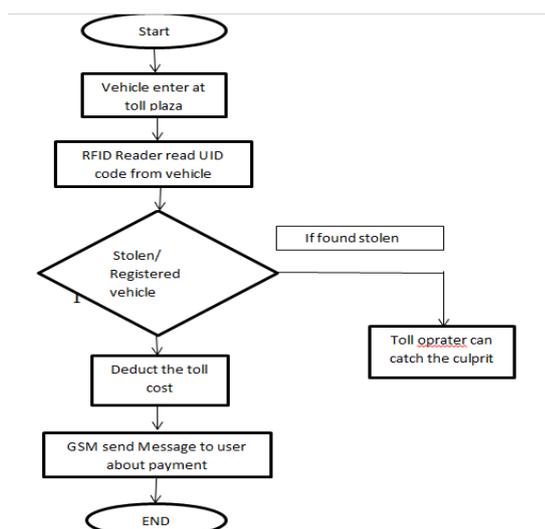
IV. FLOW CHART

Figure 2

V. HARDWARE COMPONENT

1) **RFID Tag:** RFID stand for Radio frequency identification.   The RFID tag is mainly divided into two type, active tag and passive tag. Active tag comes with internal power supply and passive tag required UID (unique identification) code to RFID reader when they are comes in contact with each other.

2) **RFID Reader:** A radio frequency identification reader (RFID reader) is a device used to gather information form an RFID tag. The concept of radio ave are used to transfer data form the RFID tag to RFID reader can read multiple tag at once.

3) **GSM :** In this system we used SIM 900 GSM module it is used to send the message of amount deduction on the registered mobile number, when the vehicle crosses the toll plaza.

4) **MICROCONTROLLER:** It is the most important component in over system. In this system we used AT Mega 328 Microcontroller. It is single chip Microcontroller created by Atmel in the mega AVR family the power consumption of this microcontroller is very low and Arduino Uno is used as development board for this controller by using we can easily dump a program in Microcontroller.

5) **MOTOR DRIVER:** In this system motor driver is used to open and close the toll gate, after the authentication of the vehicle. We used L293D motor driver IC in this system L293d can drive small and quit big motor as well. Motor driver are basically a current amplifier which takes a low current signal from the microcontroller and gives out a proportionally higher current signal. This can control and drive the DC motor.

VI. SOFTWARE USED:

1) PCB Artist:

For designing a PCB layout we used PCB artist softsoftware PCB artist is just one of many PCB layout softsoftware tool. This freely available on internet. We used thissoftware, has a version of 3.1.

2) Arduino IDE software

The Arudino software is a programming tool. The program written using Arduino software are called sketches. We used Arduino IDE software has a version 1.6.10. it is connect to the arduino.

Advantages:

1) Communication through Radio wave so, line of sight is not required.
2) RFID reader read multiple tag signals at once.
3) Every tag has unique identity.

Application:

1) Automatic collection of vehicle toll tax.
2) This system also used in advanced vehicle parking.

VII. CONCLUSION

After implementing this system we easily detect the vehicle identity. By utilizing this system in toll plaza it will reduced the complete processing time by few second which is very important as well as help to reduce vehicle congestion at toll plaza.

VIII. REFERENCES

[1]. Sanchit Agarwal, Shachi Gupta, Nidheesh Sharma, "Electronic toll collection system using barcode laser technology" IJETTCS volume 3, Issue 2, March-April2014.

[2]. Kasturi Shah, Projakta Joshi, DishaGarg, "automatic toll collection using QR code".IRJET, volume 03 Issue 10 Oct-2016.

[3]. Sarik Bharambe, Priyankakumbhar, pragatipatil, kavitasawant "Automated toll collection system using NFC and theft vehicle Detection" IJECS volume-5 Issue 4April2016.

[4]. Mrs. R.B.Takbhate, Mrs. S.D. Chavan "Automated toll booth system using NFC"IJRSCSE, vol 3, July 2014.

[5]. Shilpa Mahajan, published paper on "Microcontroller Based Automatic Toll Collection System", International Journal of Information and Computation Technology, Volume 3, Number 8 (2013).

[6]. Ankita Bhore, Prof. Gunjan Agre, published paper on "The Survey on Automated Toll System for Number Plate Detection and Collection", in IJIRCCE, Vol. 5, Issue 1, January 2017.