

RFID Based Auto Toll Collection System

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Abstract— this paper describes the RFID based mostly automatic toll-tax assortment system for toll gate. Most of the toll assortment systems ordinarily utilized in India is manual dealings. Now days, streams of traffic are increased and toll gate on highways are congested. It will cause the holdup and waste time. The objective of this project is to transform manual transaction to automated toll collection with the help of RFID technology. There are three portions in toll collection system. They are RFID system, balance deduction system in host computer and toll gate control system. For the RFID system, 13.56 Mc passive RFID reader and tag pairs are used. The balance deduction system is enforced by Microsoft Visual Studio and C# language is employed to implement this technique. The AVR microcontroller is additionally accustomed management the dc motor and shows the deposit on the liquid crystal display. AVR microcontroller will check the ID numbers, vehicle numbers and the amount of balance with the database on PC. By victimization this technique, it will save time, i.e. by avoiding long queue as no have to be compelled to stop the vehicle and no want of manual dealings at the toll gate.

Key words: RFID, Card, Reader, Microcontroller, LCD

I. INTRODUCTION

As we all know that transportation is the backbone of any country's development. Improvement in transportation systems result into the good access to remote places in which we achieve extraordinary freedom for movement, immense trade in manufactured goods and services, as well as higher rate of employment and social mobility. In fact, the status of a nation has been closely associated with economical ways that of transportation. Increasing range of vehicles on the road, result into number of problems such as congestion, accident rate, air pollution and many others. All economic activities totally different for various tasks use different strategies of transportation. For this reason, increasing transportation is a direct impact on productivity of nation and therefore the economy. Reducing the price of transporting resource at production sites and transport completed product to markets is one amongst the necessary key factors in economic competition. Automatic toll assortment may be a technology permits the automatic electronic assortment of toll prices. As it is studied by researchers and conjointly applied in numerous expressways, bridges, and tunnels need such a method of Automatic piece of land. ATP is capable of crucial if the vehicle is registered or not, so informing the management center close to method violations, debits, and participating accounts. The most excellent advantage of this ATP system is that it is capable of eliminate traffic in toll plaza.

The Benefits of this System are:

- Shorter queues at toll plazas by increasing toll booth service rates.
- Faster and more efficient service

- The ability to form payments by keeping a balance on the cardboard itself and
- The use of postpaid toll statements
- Other general benefits embody step-down of fuel wastage and reduced emissions by reducing swiftness rate, waiting time of vehicles in queue, and acceleration.

For Toll Operators, the benefits include:

- Lowered toll collection costs
- Better audit control by centralized user account
- Expanded capacity without building more infrastructures

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A. Purpose of the Paper

The base idea behind implementing RFID Based Toll System is to make automation of the toll collection system and by reducing manual operation in toll booths and the long queues at toll booths using RFID tags installed on the users vehicles. In addition to we will not solely facilitate the vehicle homeowners and system directors from vehicle felony detection however can also track over dashing vehicles, and crossing the signals. Here we have a tendency to be reaching to see some points relating to the purpose behind selecting this subject the need of this sort of the project in our day to day life.

- Avoid the fuel wastages.
- Saving of time in collecting toll.
- Avoid financial losses.
- To monitor the traffic.

The loss in toll collection is in corers so, in this situation we have to control this loss. Now the present system we have with us on the high ways takes few minutes to complete the toll collection process for one vehicle. With this automatic method, it'll take simply but a moment. to complete the whole process. So using this system there will be less time taken to complete toll collection process and it will avoid queue so avoid waste of petrol or diesel too i.e. reduction in travel time & also the money loss will be reduced at large extent.

II. BACKGROUND OVERVIEW

A. Existing System

There are 2 strategies of collection tax presently used they're initial is that the ancient manual methodology wherever one

person collects cash and problems a receipt. The other one is the Smart Card method where the person needs to show the smartcard to the system installed at the toll tax department to open the Gate.

Drawbacks of Existing System each the higher than mentioned methodology for collection tax is time intense methodology. Chances of escaping the payment of tax ar there. It leads to queuing up of following vehicles.

III. PROPOSED SYSTEM

This project provides the simplified procedure to passengers to pay toll at toll booths by creating them machine-driven, vehicle theft detection, signal breaking avoidance, tracking over speed vehicles. All these activities ar carried victimization single RFID tag therefore saving the efforts of carrying cash and records manually [5].

A. Automatic Toll Collection:

The RFID Readers mounted at toll booth can browse the postpaid RFID tags [4] mounted on vehicles windscreen and mechanically various quantity are going to be subtracted. If the tag is off from the windscreen then cameras mounted at 2 sites at piece of land take snaps of the front and back range plate. Since each vehicle registration ID is joined to users account, toll can be deducted from the account bank directly.

B. Vehicle Theft detects:

When vehicle is stolen the owner registers complaint on the website with its registration ID and unique RFID tag number. Now once taken vehicle passes by the piece of land, the tag fixed on it is matched with the stolen vehicle's tag in the database at the toll booth.

C. Stopping Signal Break:

The vehicle ignoring the traffic signal will be detected by the RFID readers fixed at signal crossing and will be notified to the traffic police. This can be done efficiently and great accuracy.

D. Tracking high speed:

Vehicle travelling above speed limit can be tracked with 100 % accuracy.

The following ar the main blessings over current system.

- Automatic collection of toll tax.
- Free flow of traffic.
- Time saving.
- Record maintenance.
- Problems with pursuing toll evaders.

IV. METHODOLOGY

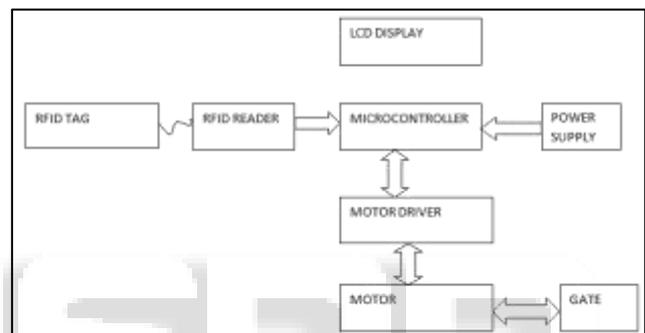
Flow of RFID based toll tax is:

- Detection of vehicle weighing of vehicle
- Display of toll
- Payment through RFID card

Whenever someone buys any vehicle, first he need to do her vehicle registered. RTO will assign a number plate to it along with it they will give a RFID tag. This card will have a unique ID only feasible to use with that vehicle only. They will also create an account for that particular card and

maintain transaction record in database. Every time a registered vehicle approaches the toll booth, first the sensors will detect the presence of the vehicle which in turn activate the RFID circuit to read the RFID enable card fixed on the particular vehicle. Transaction will happen, depending upon the balance available toll will be debited directly or else he has to pay it manually if ID does not match. The software further updates this procedure in the Centralized server system. It also proceed mechanism to generate the invoice and will be sent to user as message on his or her mobile. Whenever any vehicle owner registers a complaint at the RTO office regarding theft of the vehicle respective entry is made in the database of RTO to process the search of vehicle. any vehicle inward at toll booth with same ID as already gift in taken vehicle class are going to be simply known because the ID assigned with it's distinctive. And in this way both the task will be achieved.

V. BLOCK DIAGRAM



The following ar the transient explanations of the working rule of the assorted major blocks or sections employed in the system

A. RFID card:

This is one of the most important part of the project. RFID cards ar used for applications as access management in security system, cashless payment etc.

B. RFID reader:

A RFID reader may be a device that is employed to interrogate associate RFID tag. It reads the distinctive range from the RFID cards and sends it to the microcontroller.

C. Microcontroller:

The ATmega AVR is a low-power, high-performance 8-bit microcontroller with 8Kilo bytes of In System Programmable Flash memory. The device is manufactured using Atmels high-density nonvolatile memory technology and is compatible with the industry- standard AVR instruction set and pin out. Microcontroller is the brain of the complete system. It is truly chargeable for all the method being dead. It will monitor all the peripheral devices or parts connected within the system. In short we will say that the whole intelligence of the project resides within the package code embedded within the Microcontroller. The controller here user will be of AVR family. This unit requires +5VDC for it proper operation. Microcontroller is the CPU of our project. The various functions of microcontroller are:

Reading the RFID card range from the RFID reader.

Sending this information to the digital display in order that the person operative this project ought to browse varied informative messages.

Sending the information to the motor or buzzer relying upon the RFID automated range and balance within the car.

D. LCD:

It is called Liquid Crystal Display. We are going to use 16x2 characters LCD. This will be connected to microcontroller. The job of show[LCD|digital display alphanumeric display} are going to be to display all the system generated messages coming back from the controller. LCD will provide interactive user interface. This unit requires +5VDC for it proper operation. This module is employed for show this standing of the system.

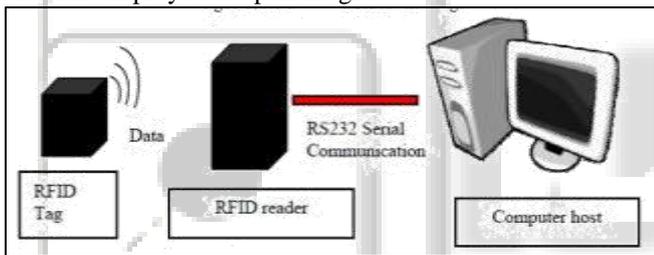
E. Power Supply:

This unit can provide the assorted voltage needs of every unit. This will be consists of electrical device, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC.

Motor driver: Motor driver is associate IC that is employed to drive the motor.

F. DC Motor:

Motor is employed to open the gate.



G. RFID Chip



RF Transmit frequency	125KHz
Supported standards	EM4001 64-bit RFID tag compatible
Communications Interface	TTL Serial Interface,
output Communications Protocol	Specific ASCII
Communications Parameter	9600 bps,8,N,1
Power Supply	4.6V-5.5V DC +/- 10% regulated
Current Consumption	50mA<10mA at power down mode
Reading	Distance Up to 100mm , depending on tag

Table 1: features of RFID chip

RFID based toll collection system is used as a technology for fast and more reliable collection of toll at the toll plaza. This is doable for the vehicles passing through the piece of ground needn't stop to pay toll and therefore the payment mechanically is subtracted from the account of the motive force. The electronic toll lanes square measure setup with special antennas which will channelize signals incessantly. These signals square measure accustomed establish the vehicles that travel through them. To use the electronic toll facility the drivers ought to setup associate electronic electrical device (tag) mounted within the vehicle. These transponders (tags) are fitted on the windshield of the vehicle. The tags have all the knowledge concerning the users account. The antennas constantly send RF pulses which returns only when hits a tag. These pulses square measure came back from the tag and square measure received by the antenna. These mirrored pulses from the tags contain data concerning the motive force variety, drivers account, balance etc. After encrypting the contents of this pulse the unit uses cellular modems or wireless transmitters to send it off to a central location where computers use the unique identification number to spot the account from that the price of the toll ought to be subtracted. The main system components are as follows:

- 1) RFID tag on vehicle
- 2) Toll booth with RFID scanners
- 3) Vehicle registration plate
- 4) Centralized database (server)
- 5) Infra-red sensor

VI. CONCLUSION

By doing automation of tract we are able to have the simplest answer over cash loss at tract by reducing the person power needed for assortment of cash and also can cut back the traffic indirectly leading to reduction of your time at tract. This system principally reviewed the analysis and development work for toll assortment at the toll gate on road with the assistance of passive RFID technology. For this technique, passive tags ar higher than the active tags owing to low price, low power consumption and conjointly radio signals environmental factors. By victimization RFID primarily based machine-driven toll assortment system, the vehicle will check for security with the passing time, save the time for toll assortment and cut back traffic jam at the toll plaza. Therefore, the RFID primarily based Automatic toll-tax assortment system is that the best method for toll assortment at the tract.

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