

Automated Toll Plaza & Anti theft System using RFID

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Abstract- Now a days there is a huge rush in the toll plazas in order to pay the toll tax. Therefore in order to reduce the traffic jam and to save time, & also to reduce the money loss of 300 cores / year. we have designed project for the automation in toll tax payment using RFID. We have made the automation of toll plaza using combination of microcontroller, RFID and Load cell technology. This report explains the implantation of automation in toll plaza which is a step towards improving the monitoring of vehicles, travelling in predetermine routes. The aim of our project is to design a system, which automatically identifies an approaching vehicles and record vehicles number and time. If the vehicle belongs to the authorized person, it automatically opens the toll gate and a predetermined amount is automatically deducted from its account. This translate to reduced Traffic congestion at toll plazas and helps in lower fuel consumption. This is very important advantage of this system.

Index Terms- RFID.

I. INTRODUCTION

Design and develop a Automatic toll plaza which is based On microcontroller, RFID technology and load cell to save the time at toll plaza And having cash free operation” As the name suggests “Automatic Toll Plaza” the key theme of our project is the automation. So here we will just take the over look of what is mean by Automation. So in very simple language the Automation means to replace the human being from the process with the machines .Means what presently the human is doing on the process now onwards the machines are going to do. Before moving further we will just take the overlook of history of the toll plazas. So before the 90’s decade the toll plazas were fully manual controlled. Means there are two people for opening & closing of the gate & another two are for reception of the money & data keeping etc. But in 1995 when the Express ways had been developed the semi automatic toll plazas

were launched in which data is stored in computers & gate operation is automatic, only two personals are required for single booth. But here we are going to see the human less toll plaza

When the vehicle is going to enter into the toll plaza, the first aim is to detect the type & no. of the vehicle. For that purpose it has to first pass through the IR transmitter - receiver gate Then we have here the RFID system. In this system the tag which is stickled at the front glass of the vehicle is detected by the RFID reader & the data is matched with the data base provided at every toll booth. When further vehicle is going towards the Load cell plate it has to pass through the IR transmitter - receiver gate. Which we are using to detect the exact location of the vehicle on the load cell plate because the load cell plate has one property that it can’t weigh the objects which are not stable on the plate, So for detection of exact location & steadiness of the vehicle on the load cell plate we are using here the IR Transmitter Receiver gate. Now when the vehicle is at steady position on the load cell plate, it weighs the vehicle accurately & gives the analog signal to the controller which then displays the respective amount of the toll value. Then the consumer has to just swap his smart card so that desired amount of toll will be deducted from his account. This is the simple concept of our project.

II. LITERATURE SURVEY

Present Method

Present method is a manual method in which Toll Tax is collected by manually in form of cash. But due to several inconveniences and disadvantages we have tried to propose a new method with several advancements.

Proposed Method

In our method we have used RF Technology to automate the Toll Tax Collection System, in which

Toll Tax will be deduct from the user account as the vehicle moves from Toll Plaza and the Toll Gate will operate automatically with the command of microcontroller. We now continue to analyze some of the systems developed. The first paper discussed a system that was developed to provide with the following features:

1. Reduce time for collecting toll at the toll plaza.
2. RFID tags can be read at much greater distances; an RFID reader can pull information from a tag at distances up to 300 feet.
3. As the vehicle approaches the identification site, the computerized control unit placed near toll lane receives the identifier signal and calculates the toll to be debited and electronically debits the toll on the account of the particular vehicle.
4. This system allows a vehicle to persist past the scan point without stopping, thus offering maximum convenience to motorists, speeding up the flow of traffic, and reducing the number of human resources required at highway toll plazas.
5. Smooth traffic flow at toll gates.
6. Convenient toll collection without handling cash.
7. Reduction of management costs.
8. Convenient and quick service to the vehicle owners.
9. Stolen vehicles can be detected.

The first paper then discussed about RFID technology. RFID is the acronym for Radio Frequency Identification. The components of the RFID System basically include RFID transmitter, a RFID receiver and some processing machine (a computer). The paper then goes on to discuss about the types of RFID tags (RFID transmitters). Types of RFID tags include Active Tags and Passive Tags. Active tags are used to transmit information that includes the RFID tag's ID, as well as some other information that can be soft-coded into it. Soft coded information means that it can re-writable and can also be dynamic in nature. In this problem statement, the soft-coded information could include the Global Position Coordinates of the vehicle on which the RFID tag is attached.

III. REASEARCH METHODOLOGY

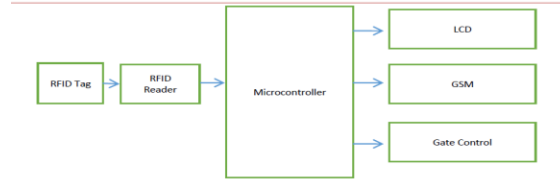


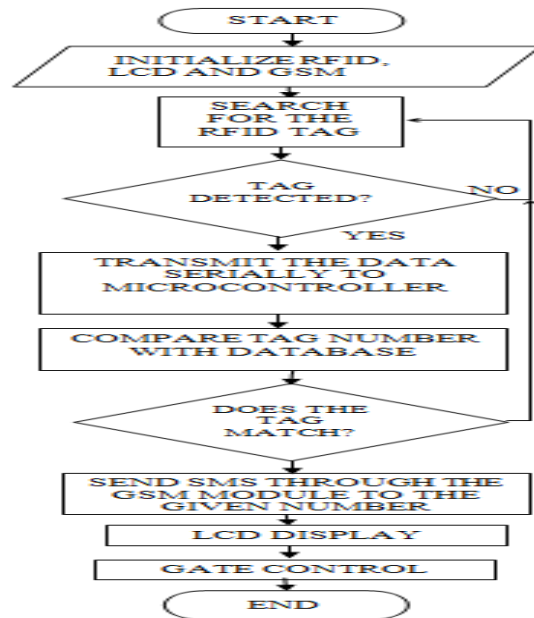
Figure 1: Block Diagram of the system

As you are able to see in the above fig. there is the engineering block diagram of our project that we have designed at the primary stage of our project. So, the diagram consist of RFID tag, RFID reader, IR transmitter receiver, signal conditioning unit, micro controller, Raspberry pi, camera, amplifier, ADC,LCD display. Then what is the flow of the diagram? so, the flow starts from the RFID tag which is detected by the RFID reader & sends the data i.e. type & no. of vehicle stored in 12 digit code form in the tag to the controller to match with data base provided at booth. The controller then compares the signal with the stored value of respective toll & displays on LCD. So the desired amount will be deducted from his account.

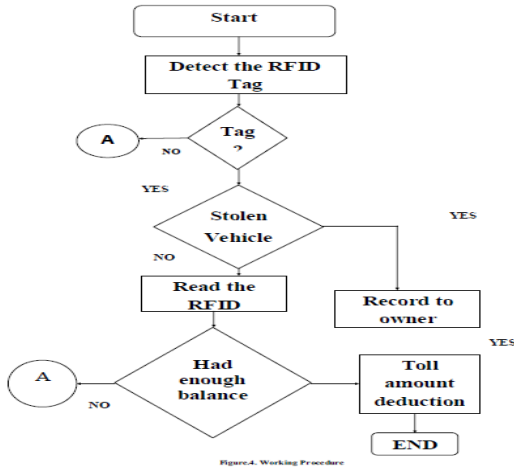
The signal conditioning unit is the device which converts the analog signal coming from analog sensor & digital signal from digital sensor will be converted to 0-5 v which is suitable for controller. This is the simple working of our engineering block diagram that we have designed at the primary stage.

FLOW CHART

1)For Authorized Vehicle



2) For Stolen Vehicle



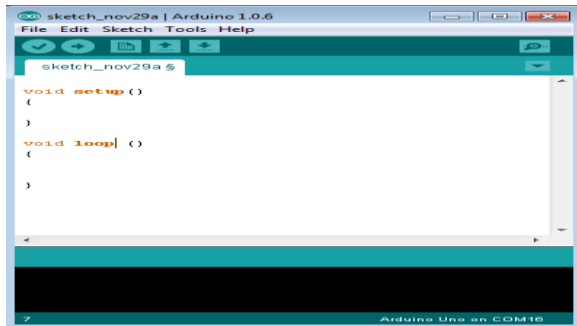
In order for an RFID system to function, it needs a reader, or scanning device, that is capable of reliably reading the tags and communicating the results to a database. A reader uses its own antenna to communicate with the tag. When a reader broadcasts radio waves, all tags designated to respond to that frequency and within range will respond. A reader also has the capability to communicate with the tag without a direct line of sight, depending on the radio frequency and the type of tag (active, passive, or semi passive) used. Readers can process multiple items at once, allowing for increased read processing times. They can be mobile, such as handheld devices that scan objects like pallets and cases, or stationary, such as point-of-sale devices used in supermarkets. A toll tax collection implementation system that will save time, space and money. Taking the case study of manual toll tax collection system, we came to the conclusion that if the system is made completely automatic, the time require for collection of tax will be reduced, there will not be need for any vehicle to stop, thereby enlarging the space and the system can be efficiently implemented on a large scale with low capital. AUTOMATED TOLL COLLECTION SYSTEM (ATCS) is an automatic collection system based on RFID i.e. RADIO FREQUENCY IDENTIFICATION where every vehicle will have a tag (RFID) with a unique tag identification number. This identification number will be associated with the complete information such as vehicle number, owner, etc. and also most importantly with a cost value. This value will be deducted automatically every time the

vehicle passes the collection unit. No one will have to wait for any time. This cost value can be recharged at the recharge center. This system can be effectively implemented on a highway or freeway, where vehicle with a RFID tag will be allowed to pass by deducting an amount from the tag balance. For the vehicles that do not have the tag, their identification will be sent along with the description of the vehicle to the control center identifying an illegal entry, thereby action can be taken. Then it can be done that, the particular vehicle not having the tag will be billed at their residence or via mail. The abovementioned losses can put huge burden on Government and the citizens. Reducing these losses is the ample reason for which the need for ATCS is there. The loss of time puts in a lot of frustration in everyone having to wait for their turn to pay the tax. Most of us want a speedy transport without any obstruction. When it is a known fact that oil is depleting day by day, just standing, waiting and wasting oil does not make any sense. Loss of fuel is most at reduced speed. So there is a need for continuous motion. When a number of vehicles have to wait nobody bothers to witch off the engines while waiting and so fuel emission is most at this level. This is a major contributor to the already increasing pollution. So there is need for ATCS which will cut down on every loss and make it possible to achieve a speedy and non obstructed transport.

IV. RESULT AND CONCLUSION

We can reduce the prevalent problem of skipping the payment of toll at toll plazas because of automatic deduction and enhance the security of the vehicle due to GSM interfacing. The long queues at the toll plaza and need for human intervention is reduced greatly. This system will ensure a smoother and safer journey for the passengers. In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of RFID module. RFID is increasingly used with biometric technologies for security. The significant advantage of all types of RFID systems is the non-contact, non-line-of-sight nature of the technology. Tags can be read through a variety of substances such as snow, fog, ice, paint. Hence, this project can be very much useful and can be

implemented in real time applications for recording the attendance.



A computer program is a sequence of step-by-step instructions for the computer to follow. The computer will do exactly what you tell it to do, no more no less. The computer only knows what's in the program, not what you intended. The set of valid instructions comes from the particular programming language used. There are many languages, including C, C++, Java, Ada, Lisp, Fortran, Basic, Pascal, Perl, and a thousand others. The Arduino uses a simplified variation of the C programming language. For any programming language, the instructions must be entered in a specific syntax in order for the computer to interpret them properly. Typically, the interpretation is a two step process. A compiler takes the language specific text you enter for the program and converts it into a machine readable form that is downloaded into the processor. When the program executes, the processor executes the machine code line by line

REFERENCES

- [1] AUTOMATED TOLLPLAZA SYSTEM USING RFID by Sachin Bhosale.
- [2] RFID Based Toll Collection System by Rakhi Kalantri, Anand Parekar, Akshay Mohite, Rohan Kankapurkar
- [3] Automatic Toll Tax Using RFID by Sudha Bhalekar, Adesh Chanageri G., Indra Prakash Chauhan
- [4] AUTOMATED TOLL COLLECTION SYSTEM USING RFID TECHNOLOGY by Preeti Giri, Priyanka Jain
- [5] Priyanka Chhoriya, "Image Processing Based Automatic Toll Booth in Indian Conditions" http://www.ijetae.com/files/Volume3 Issue4/IJETA_E_0413_71.pdf
- [6] Shilpa Mahajan, "Microcontroller Based Automatic Toll Collection System" http://www.ripublication.com/irph/ijict_spl/09_ijict_v3n8spl.pdf
- [7] Aung Myint Win, "RFID Based Automated Toll Plaza System" <http://www.ijsrp.org/research-paper-0614/ijsrp-p3009.pdf>
- [8] Khadijah Kamarulazizi "ELECTRONIC TOLL COLLECTION SYSTEM USING PASSIVE RFID" TECHNOLOGY <http://www.jatit.org/volumes/research-papers/VoI22No2/1VoI22No2.pdf>
- [9] Sachin Bhosale, "AUTOMATED TOLLPLAZA SYSTEM USING RFID" <http://ijsetr.org/wp-content/uploads/2013/07/IJSETR-VOL-2-ISSUE-2-455-460.pdf>