

IOT BASE SMART TOLL COLLECTION SYSTEM

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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. We have designed project for the automation in toll tax payment using RFID. We have made the automation of toll plaza using combination of Arduino , RFID & IR sensor technology. 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 toll collection system.

Keyword:- Arduino Uno, RFID Reader , RFID Tag , Wi-Fi module, etc.

1. INTRODUCTION

Each and every day more and more vehicles are increasing rapidly and the graph of the rate of buying vehicles is exponential, which has become a major problem at the site of toll booths due to heavy traffic causing endless number of problems such as high petrol/diesel consumption leading to depletion of hydrocarbon deposits below earth's crust and also death casualties due to heavy traffic. The sole purpose of this paper is to motivate cashless transactions by installing automated e-toll collection system and the technology that we used is the use of RFID readers/tags. Basically to tackle this problem, the use of RFID tags that must be uniquely fixed onto subject's vehicle and RFID reader module must be fixed at e-toll tooth. When a subject's vehicle passes through the gate, the reader will detect an incoming frequency of 125 kHz of the RFID tag and read a unique no that has been assigned by govt. authority and the toll fee will be deducted from linked bank a/c or the e-wallet of system.

This system is capable of saving time as well as fuel conservation which can save a lot of individual's economy. This particular system is far much better and very efficient towards people as they will not stay in a long and lengthy queue thus automated e-toll system will eliminate the hardships of people parking vehicles in a long queue. RFID has the potential of eliminating corruption at local level and also reduce operational costs as well as errors in human operations. WSN's i.e. wireless sensor networks are basically used in different scenarios such as home, office, healthcare, agriculture and also at toll collection plaza which can capture and transmit data from all incoming vehicles and outgoing vehicles because of their consistent and distinctive properties. 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 make payments by keeping a balance on the card itself and The use of postpaid toll statements Other general advantages include minimization of fuel wastage and reduced emissions by reducing deceleration rate, waiting time of vehicles in queue, and acceleration.

2. PROBLEM STATEMENT

Each and every day more and more vehicles are increasing rapidly and major problem at the site of toll booths due to heavy traffic causing endless number of problems introduce.

High petrol/diesel consumption leading to depletion of hydrocarbon deposits below earth's crust and also death casualties due to heavy traffic.

3. LITERATURE SURVEY

ATC system in the paper "A review on automated toll collection system" the two types of study were compared namely the RFID based study and Leach-C based study showed promising and efficient way to develop The the system but it also showed us lack of a point where the Leach-C system worked on digital image processing where the number plate of subject's vehicle was scanned using high-tech camera. Using the RFID based implementation and eliminating the DIP based implementation to make system better time efficient. The survey done in the paper named "A 5.8 GHz ISM band Micro strip antenna for RFID applications" showed us the path using and developing RFID antenna for scanning the details of subject's vehicles from a handy distance thus enhancing the distance of vehicle and RFID reader would cover a large area.

The review was done of the paper "Automated toll collection system using RFID" Enlighted us the various components that can used while developing our own system in time saving and in efficient way so as to make a hybrid system that is mentioned in the paper "A revieon automated toll collection system". "A Survey in Image Mining" showed a path towards machine learning and data mining concepts and helped us in mining databases in the form of people's feedback. The survey done in the paper named ATC turned out to be good step for developing ATC as we tried the best option in choosing the components in terms of reducing operation costs, time saving, flexible and also added the theft detection module in our system enabling security on high alert and detecting of stolen vehicles.

4. BLOCK DIAGRAM

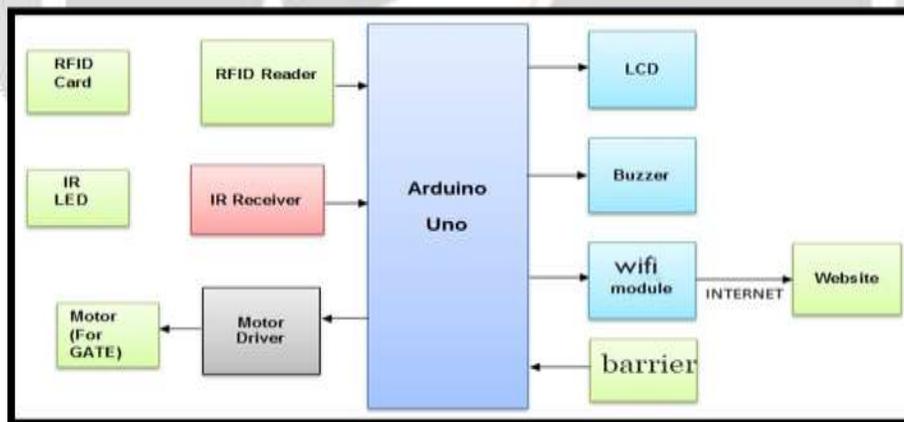


Fig-1 Block Diagram Of IOT Base Smart Toll Collection System

5. Block Diagram Description

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, Arduino, Servo motor, Buzzer and 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. Then the IR transmitter receiver assembly will detect the exact location of the vehicle.

The controller then compares the signal with the stored value of respective toll & displays on LCD. So the consumer has to just sap his smart card so 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.

5.1 Hardware part used-

- Arduino board
- RFID reader and tags
- Wi-Fi module
- Servo motor
- IR sensor
- LCD display
- Buzzer
- Power supply

5.2 Software requirement-

- Wamp Server
- Sublime Text
- Arduino IDE

6. APPLICATION

- Toll Plazas
- This project can also be used at Octroi Collection booth.
- City Mall.

7. CONCLUSION

By doing automation of toll plaza we can have the best solution over money loss at toll plaza by reducing the man power required for collection of money and also can reduce the traffic indirectly resulting in reduction of time at toll plaza. In our project we have introduced the techniques such as Radio Frequency Identification .This technique will include the RFID tag & reader which in coordination with each other can be used to detect the vehicle identity. The load cell plate which is introduced for weighing the vehicles so as to classify them in different categories as light & heavy vehicles The IR Trans receiver is used for detecting the presence of vehicle at different locations which will act as the gate pass to the toll plaza.

By effectively utilizing these three techniques at different stages of our project we are able to represent the automation in toll plaza which will reduce the complete processing time by few seconds which is very important as well as helps to reduce money leakage in a very cost effective manner.

8. REFERANCES

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