

# RFID Based Smart Toll Collection System

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**Abstract :** These days most highways toll plazas are operated by hand, wherever operator collects money from the driver and provides a receipt. Since this procedure are often slow, we frequently makes traffic jams at the toll plazas on busy highways. Smart toll assortment can save time, man power and effort. During this work purpose an occasional value and economical technique known as IoT based toll gate system using Arduino that automatically collects the toll from moving vehicles after they cross the toll plaza tract. We also assume that an owner maintains a paid account, so that toll tax is subtracted automatically from the driver's account at plaza. The owner will gets details of the payment, that is stored in server and there is no need for him to stop the vehicle. The project detects the unregistered vehicle entry as well since the database of all the vehicles is maintained. Since Arduino is enabled with IOT vehicles data base can be created and it can be linked to the server using an app installed in any mobile. The system also sends SMS to concerned authorities in case vehicle met with an accident with the location of incident by using GPS.

**Key words:** GPS, GSM, SMS, RFID Reader, RFID Tag, Arduino, IoT.

## I. INTRODUCTION

From the terribly past, the development, extension, maintenance and operating prices of highways, roads, bridges and tunnels were collected directly or indirectly. Within the old/ indirect methodology, the expenses are stipendiary either by the tax payment for fuel or by budget allocation of the national income. The shortcoming of this method is that a number of taxpayers, who do not use any of the roads and carriageways, have to pay extra money. However, within the alternative system, referred to as direct methodology, the Amount are taken directly from the drivers passing that road or street, these are often operated manually. The defect of this methodology is that time consumption, slow method, traffic jam, will increases vehicle expensive, power loss due to continuous turning on of receiver system. The recently aspect the importance for secured access is growing in many fields and on the other with technology advancements the RFID cards and readers are getting low value. The IOT based mostly automatic toll gate system using Arduino is that the approach used for the vehicle when it reaches the plaza to pay the toll fees automatically. RFID tags are used to read each vehicle with the assistance of RFID reader. We tent to assume

that vehicles have 16-bit identification numbers. A software program running on the digital computer (Arduino) retrieves vehicle details from its vehicle information. Depends on this information, acceptable toll tax is subtracted from the prepaid account of the vehicle's owners. The owner receives an message on his/her mobile regarding the main points of the payment. If the balance within the owner's account is low or if the vehicle isn't equipped with associate RF system, the toll gate remains close. the vehicle owner will have to pay the toll tax just in case and owner collect the receipt. We'd like a system for handling violation associated acknowledgement once a vehicle does not have an RFID module installed, a vehicle's ID number is not found within the information, or a driver has deficient funds to pay toll. If associate acknowledgement is isn't received in a very predefined time from the information, the toll plaza gate remains closed. Only if a vehicle is detected, RFID Tag to RFID reader reads the info.

## II. LITERATURE REVIEW

In this paper the design and analysis of Automatic check post and fast track toll system using RFID and GSM module with security system. This paper proposes on electronic toll payment which is very flexible that automatic the verification process of vehicle pass by toll both. In this paper they used AT mega 328 Arduino microcontroller it has inbuilt GPS and GSM. This Ideology can drain the prevalent botheration of bouncing the a edit action at the check post and decreases man power.[1]

In this proposed system various controller are used in the arm. Automated toll cash collection system by road transportation. The expressway transportation has become more and more important in today's road network and the manual toll collection system has become outdated due to its number of drawbacks. By employing automated toll collection system, driver of vehicles need not to stop at a window or and waste time for waiting in a long queue to pay their toll. This reduces the consumption of fuel; reduce congestion, increase road safety. An Automated Electronic Toll collection (ETC) system is basically designed for an uninterrupted toll collection, which has become an important part of intelligent transportation system. This paper presents the concept of Automated ETC using

GPS system. This work eliminates the need for motorists and toll authorities to manually perform ticket payments and toll fee collections, respectively. Data information are also easily exchanged between the motorists and toll authorities, thereby it is able to eliminate possible human errors for efficient toll collection. [4]

In this paper author explained, the first and foremost goal of this research and development project is to build an Automatic toll collection using RFID. Design an Automatic toll plaza which is based on GPS system to save the time at toll plaza & having cash free operation. The ETC system based on the E- PASS system, uses Tran scoretechnology. It reads by receiver automatically balance deducted from account. Most important impacts is to development of sustainable technologies to reduces traffic conjunction & save energy & time.[5]

Here author explained that a Automated tollgate system using online payment and image processing. In our daily life, travellers pay an amount of money in the form of tax through tollgate to the government. The national highways have toll gates where people pay tax for using the highways by standing in the queues. This will cause in the break of journey and waste of time. To overcome the waiting problem this system was proposed where automatic toll tax will be collected from the people using image processing and online payment of the money. In image processing system the image of the number plate will be captured and compared with the database. To capture the image of the vehicle number plate the camera will be fixed at tollgate. And in the online payment tax will be given where money deduction will take place only if the user getregistered. This makes tollgate transaction more convenient for the public use[11]

In this paper, RFID based Automated Toll Collection System is introduced as a solution of the traffic problems and also to maintain transparency in the toll collection system. The proposed system aims to make a digital toll collection system which can eliminate the delay on toll roads, toll bridges and toll tunnel without cash and without requiring cars to stop. This paper focuses on an electronic toll collection system which uses radio frequency identification (RFID) technology to identify a vehicle specifically for collecting toll. The proposed RFID system uses tags that are mounted on the digital number plate of the vehicles, through which information embedded on the tags are read by RFID readers. It is possible to reduce the need for vehicle owners and toll collection authorities to distribute tickets and collect tolls manually in this system. Information on the toll payment can also be easily exchanged between the vehicle owners and toll authorities. As a result, transparency in toll payment can be ensured with reduced manual labour and human errors. Thus, building smart transportation system will become easier.[15]

### III. 3. METHODOLOGY

The SmartToll system is to produce fast and safe environment and automatically control the vehicle movements at the toll station. IR sensors are used to detect the vehicle, this sensor placed at certain distance. At this time LED shows red colour. RFID has 16 bit information in its tag.

The information such as vehicle's number and person's information and bank account details. Vehicle's number and person's information fed in RFID tag LCS displays the data. Server with data base matches the details of vehicle and the amount will deduct, while deducting the amount, LED shows yellow colour.

After deduction of amount, motor will run on clockwise and the LED shows green color and the vehicle is get rid from toll plaza, after some delay motor run on anticlockwise, LED is back to red color. At the vehicle part we have IR sensor used for accident detection, if the vehicle comes near the other vehicle, buzzer makes sound, in blynk app we fed the information about user id and password, if the card shows invalid card number RFID will get damaged, if the card id damaged then we come to know that card is abused, if the card is abused sliding switch turns on and sms is sent to near by police head quarter through GSM otherwise it is in off condition

### BLOCK DIAGRAM

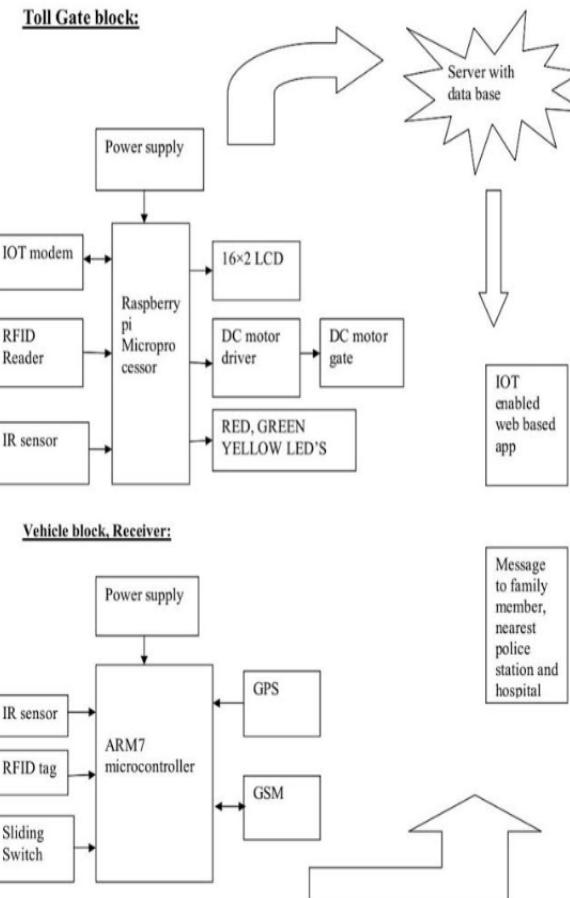


Figure 1 :Block diagram of toll collection system

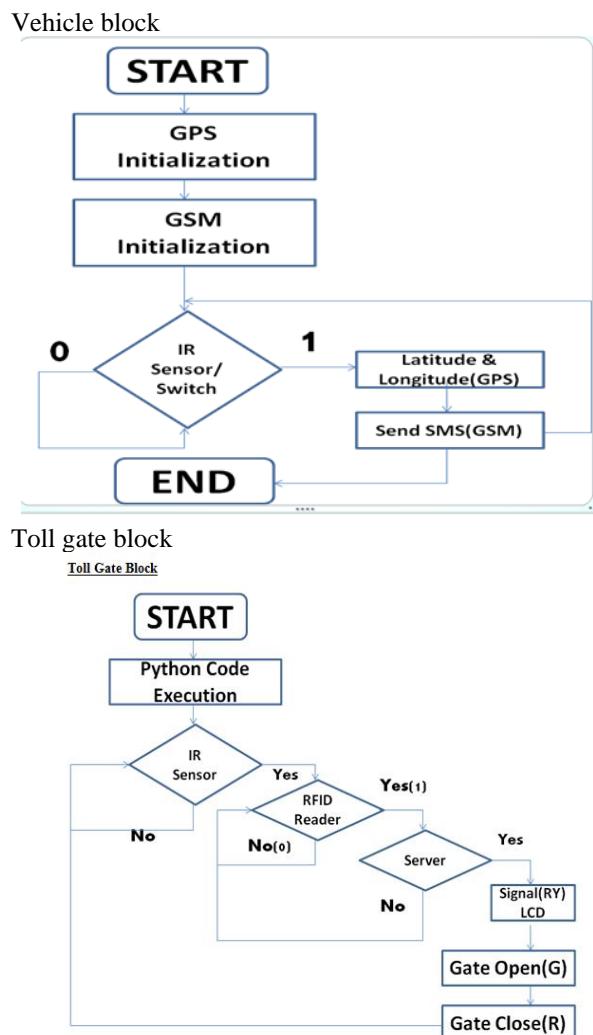


Figure 3.2: Flow Chart of Proposed System  
Figure 2. Flowchart of the proposed system

#### IV. ADVANTAGES AND APPLICATIONS

##### Advantages

- While moving itself vehicles Toll will be collected and no for the vehicle to stop.
- Avoids queue at the toll plaza.
- It prevents issues related to modification with change since payment is completed via card.
- Saves time.
- Vehicle accidents can be detected and information can be sent to Ambulance and police station immediately.
- Unregistered vehicles can be tracked easily and necessary actions can be taken.

##### Applications

- The project can be applied at Paid parking centres in the shopping malls.
- The project can be applied in the parking slots in cities.
- It can be used in emergency police application.
- The project can be applied in the garage parking system.

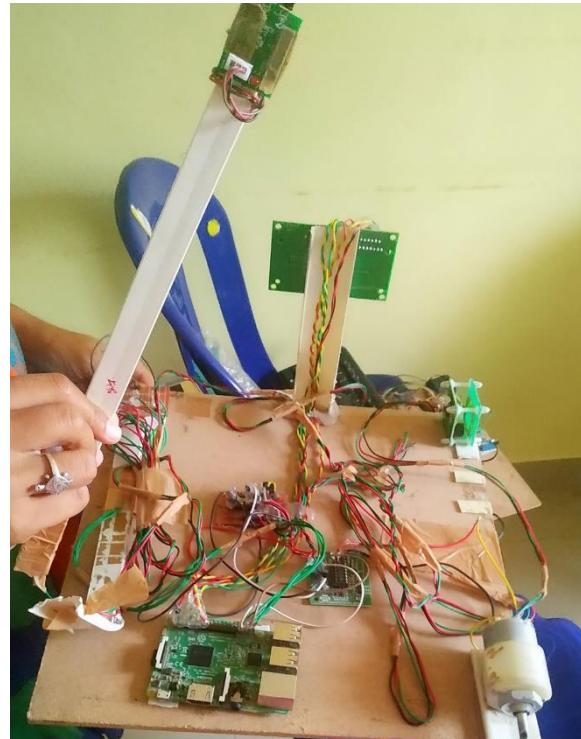
#### V. CONCLUSION

The RFID based Smart toll gate system using Arduino and Node MCU for non-stop journey is the best solution over the existing manual toll plaza by reducing the man power required for the collection of money and also to reduce the traffic indirectly resulting in reduction of time. We have used an innovative approach where a traveller will be able to pay the toll while in motion using RFID communication technology.

Through this method of toll collection will save time, effort and man power. How many vehicles passing through the toll gate stored in the database. what percentage vehicles passing through the toll gate hold on within the info. The vehicle is also getting monitored against accident and regarding its authorization. The web app provided to concerned authority will also get updated with all the information of all the toll gates.

#### VI. RESULT

The SmartToll collection system works as proposed; it is low cost, high security and efficiency etc.it greatly reduce noise and pollutant emission of all toll station and Anti-theft solution have been designed.



#### VII. FUTURE ENHANCEMENT

- Vehicle type identification system will also be implemented in future for more secured and valid payment.
- Automatic metal depot rod will be added in road for security purpose.

### VIII. ACKNOWLEDGEMENT

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