

# Integration of RFID Scanning and Multi Account Payment System Using Zigbee in IoT

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**Abstract** – Radio frequency identification system (RFID) is an automatic technology or computers to identify objects, record metadata or control individual target through radio waves. Connecting RFID reader to the terminal of Internet, the readers can identify, track and monitor the objects attached with tags globally, automatically, and in real time, if needed. This is the so-called Internet of Things (IOT). RFID is often seen as a prerequisite for the IOT. The automatic toll e-ticketing system is the approach used for the vehicle when it reaches the toll plaza, this is detected by using Infrared Proximity Sensor. RFID tags are used to read each vehicle with the help of RFID reader. Depending on this information, appropriate toll tax is deducted from the pre-paid account of the vehicle's owners. The owner receives an SMS message on his/her mobile about the details of the payment. If the balance in the owner's account is low or if the vehicle is not equipped with an RF system, the toll gate remains close. Using RFID card we identify the theft vehicle. RFID card is embedded on every vehicle and RFID reader is embedded on every signal, So when theft vehicle is crossing on signal reader will compare with the database and identify the vehicle.

**Keywords:** infrared proximity sensor, radio frequency Identification, radio frequency signals

## 1. INTRODUCTION

RADIO-FREQUENCY identification (RFID) technology is a contactless automatic identification and data capture technology. In an RFID system, RFID tags are affixed to items to be identified and monitored. RFID readers communicate with the tags and to the information system that utilizes the tag information for some purpose. Readers are either located at specific locations to capture the data stored on the tags or are mobile or hand-held devices. Tags communicate with a reader through radio-frequency (RF) signals. A primary objective for each reader is to read the identifier stored in each tag within its read zone.

The automatic toll e-ticketing system is the approach used for the vehicle when it reaches the toll plaza, this is detected by using Infrared Proximity Sensor. RFID tags are used to read each vehicle with the help of RFID reader. An IR receiver is used to receive these pulses and sends it to a controller (MSP 430 Launch pad), which then transmits the vehicle number through the RF transmitter located in vehicle. We assume that vehicles have 16-bit identification numbers. The RFID tags to readers read the signal and information about vehicles owners. These RF signals are received by an RF receiver at the toll plaza, which send data to a computer's parallel port. A software program running on the computer retrieves vehicle details from its vehicle database.

Depending on this information, appropriate toll tax is deducted from the pre-paid account of the vehicle's owners. The owner receives an SMS message on his/her mobile about the details of the payment. If the balance in the owner's account is low or if the vehicle is not equipped with an RF system, the toll gate remains close. Next method proposes a very simple method for enhancing the performance of infrared electronic-toll-collection systems, in such a case, the vehicle owner will have to pay the toll tax in case and collect the receipt, explains the concept in the form of a block diagram. We need a system for handling violation and acknowledgement when a vehicle does not have an RFID module installed, a vehicle's ID number is not found in the database, or a driver has insufficient funds to pay toll. If an acknowledgement is not received in a predefined time from the database, the toll plaza gate remains closed. Existing automatic toll collection techniques incur power loss since the receiver is continuously turned on, even when no vehicle arrived at a toll plaza. In our technique, only the IR sensor is turned on to detect the arrival of vehicles. Only when a vehicle is detected, RFID Tag to RFID reader reads the data.

## II RELATED WORKS

In passive RFID systems, the speed at which tags are identified is of utmost importance. This is necessary due

to the application requirements such as identifying vehicles at a high speed or reading large numbers of tags simultaneously within a supply chain. As Schoute [3] showed, the use with imprecise knowledge of the number of tags in the field yields poor throughput. Consequently, a significant amount of research has been performed to develop accurate estimates of tag numbers, typically using the information contained in the tag responses (or lack thereof) in each slot [6]–[13]. Tag estimation approaches based on the use of hybrid anticollision and binary grouping approaches have been proposed. Zhang et al. [14] utilize a binary grouping of tags to enhance the accuracy of the tag estimation. They are able to achieve an expected throughput of 0.617. In [15], every tag is equipped with a unique key and a simple modulo circuit, which allows each tag to select the slot to reply. The characteristic of the unique keys helps with the grouping of tags. Wu and Zeng [16] utilize a deterministic slot assignment approach to estimate the total number of tags in the field. An electric vehicle is a promising and futuristic automobile propelled by electric motor(s), using electrical energy stored in batteries or another energy storage device. Due to the need of battery recharging, the cars will be required to visit recharging infrastructure very frequently. This may disclose the users' private information, such as their location, which may expose users' privacy. In this paper, we provide mechanisms to enhance location privacy of electric vehicles at the right time, by proposing an anonymous payment system with privacy protection support. Our technique further allows traceability in the case where the cars are stolen.

**Electronic Toll Collection Based on Vehicle-Positioning System Techniques** After carried out DSRC-based ETC field trials project in Taiwan at SL and LT toll stations on freeway No.3 for 27 months, millions of electronic toll transactions help ChungHwa Telecom Company (CHV) get plentiful achievements and experiences on ETC related technologies. At the same time, CHT has invested in development of ETC related products and technologies since 1998. The products we developed include not only DSRC-based ETC including IR and 2.45Ghz microwave technologies, but also new ETC technology based on Vehicle Positioning System (VPS). We have tested all those technologies for different traffic situations and climate condition for evaluating the suitable toll collection technology. In this paper, we will share the VPS experience and its test results on expressway No.66 in Taiwan, and propose some research topics for reference.

### III EXISTING SYSTEM

The RFID reader and identity verification through the internet to bind the driver's behavior and driver's license account to manage the driver's authority and responsibility attribution of the actual control. In existing system, the UHF based signal recovery and collision detection system is used in that also there is no automatic process. The existing manual paper work is carried. We need to wait for longer time for the toll payment. There is no automatic process is achieved.



Figure 1 represents the use of simple anti-collision algorithms such as a dynamic frame slotted Aloha (DFSA) algorithm. With our novel collision detection and signal recovery anti-collision algorithm, the RFID reader can retrieve multiple valid communications from each collided slot in a DFSA-based anti-collision protocol.

### IV PROPOSED SYSTEM

Zigbee hardware is connected in vehicle and toll end. Vehicle details are registered in the main server along with the bank details as well as Vehicle ID which is Zigbee ID. In the user registration part two accounts are enrolled. First one is the main account which is called default account. If balance is insufficient in the first account then automatically amount is taken from the second account. When vehicle comes nearer to the toll Zigbee from the vehicle communicates with the Zigbee attached in the toll automatically vehicle ID is communicated and amount is subtracted from the bank of the concerned user. Using RFID card we identify the theft vehicle. RFID card is embedded on every vehicle and RFID reader is embedded on every signal. So when theft vehicle is crossing on signal reader will compare with the database and identify the vehicle. The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole

system. They are used by software engineers as the starting point for the system design.



**Figure 2 proposed system for toll payment**

It shows what the systems do and not how it should be implemented. The software requirements are the specification of the system. It should include both a definition and a specification of requirements. It is a set of what the system should do rather than how it should do it. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating cost, planning team activities, performing tasks and tracking the team's and tracking the team's progress throughout the development activity. Once user shows the RFID Card which contains all the vehicle License details of the owner, which is verified automatically by the police and in case of any deformity penalty is collected from the account itself.

**V WORKING SYSTEM**

**i. Automatic toll payment with multi account:**

Today more number of vehicles are moves anywhere but in every area toll gates are there and they collect some amount based on their vehicles. Zigbee hardware is connected in vehicle and toll end. Vehicle details are registered in the main server along with the bank details as well as Vehicle ID which is Zigbee ID. In the user registration part two accounts are enrolled first one is the main account which is called default account. If balance is insufficient in the first account then automatically amount is taken from the second account. When vehicle comes nearer to the toll Zigbee from the vehicle communicates with the Zigbee attached in the toll automatically vehicle ID is communicated and amount is subtracted from the bank of the concern user. . If the balance in the owner's account is low or if the vehicle is not equipped with an RF system, the toll gate remains close.

**ii.Theft vehicle application and RFID reader**

When the vehicle was missing it is upload on the theft vehicle application.It involves the user registration details and vehicle details and submitted into the application.The another part is the RFID reader Using RFID card we identify the theft vehicle . RFID card is embedded on every vehicle and RFID reader is embedded on every signal , So when theft vehicle is crossing on signal reader will compare with the database and identify the vehicle and automatically shared the vehicle location to the user. Once user shows the RFID Card which contains all the vehicle License details of the owner, which is verified automatically by the police and in case of any deformity penalty is collected from the account itself.

**VI SYSTEM ARCHITECTURE AND IMPLEMENTATION**

The proposed framework is an efficient IOT automatic toll payment system where the server side stored the user details,vehicle details and bank details.when the user reaches the toll from the certain distance it automatically communicated and the amount is detected and the notification is sent to the user mobile that the given amount was detected.Using the rfid card we identify the theft vehicle when it reaches the signal.

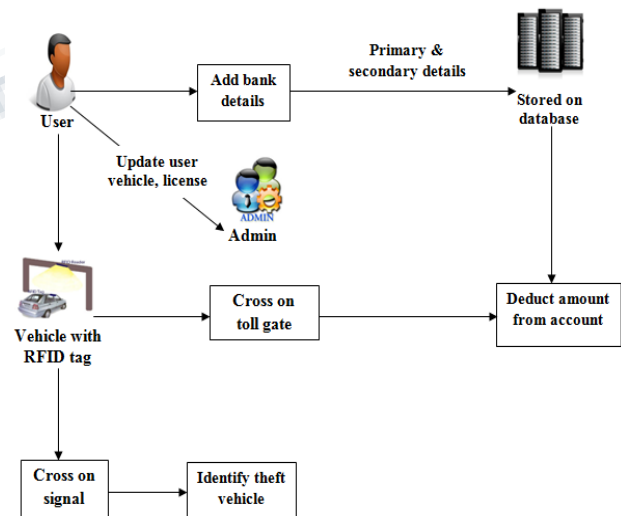


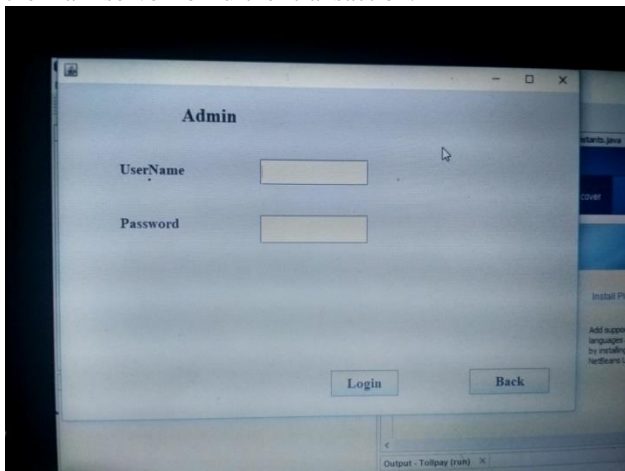
Figure 3 is the system architecture for the proposed system. The user crossing the toll gate pay the amount via the banking system the vehicle attached the rfid card once it crossing the signal it is scanned by the rfid reader



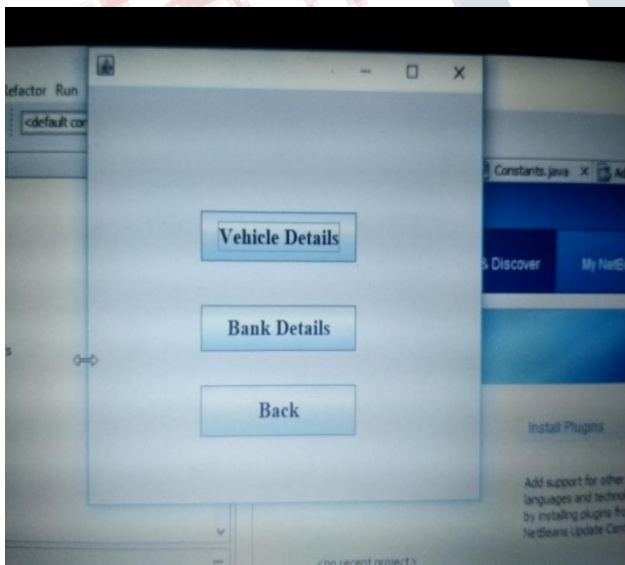
if any theft vehicle is identified it is automatically shared the vehicle location to the user.

**Module-1:Registration/login**

In this module, we will create registration part. In this register the owner name, bank details and vehicle details. In this Module User details including Name, Mobile number, Email ID, Vehicle ID ( Zigbee ID), Default Bank, Secondary Bank & etc are collected and stored in the main server for further transaction.



**Figure 4**

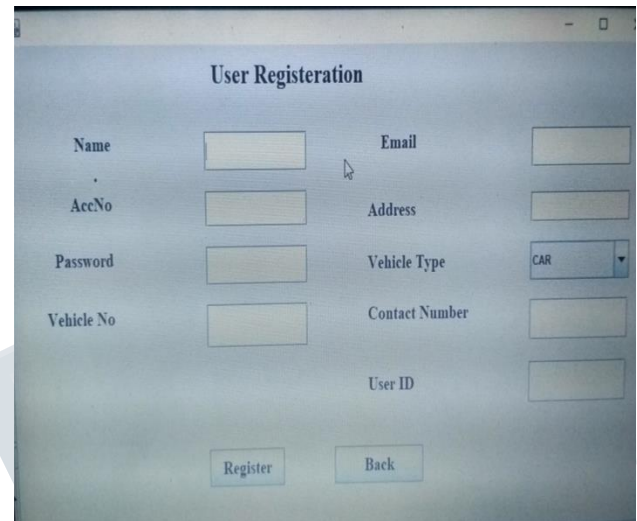


**Figure 5**

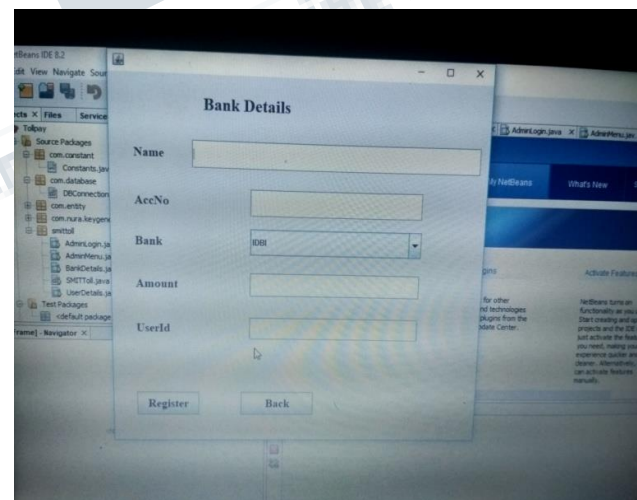
Figure 4 and 5 are the registration and upload screens.

**Module-2:User registration and bank details**

When we click the admin page it enters into the user registration or vehicle details page once the details are filled and click into the register button then the vehicle details are stored. On the same format the bank details also stored.



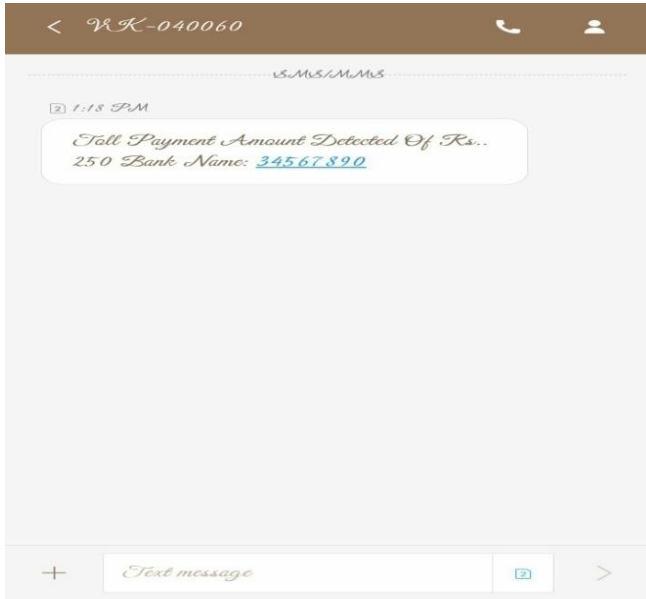
**Figure 6**



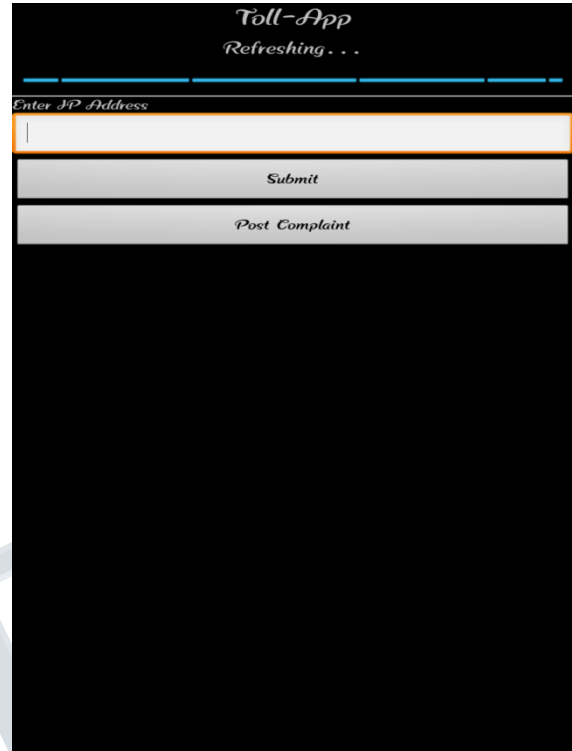
**Figure 7**

Figure 6 and 7 are the user registration/vehicle details and bank details part.

Figure 8 shows the amount detected from the toll plaza. once the amount was detected it sends the notification message to the user.



**Figure 8**



**Figure 9**

**Module-3: Vehicle theft detection application**

In this module, Radio Frequency Identification (RFID), is integrated along with the vehicle for unique identification of vehicle chasis number. RFID (vehicle chasis number) is communicated to the charging bunk server so that the vehicle ID is verified only then the charging is initiated in the bunk server. We also deploy an application for posting compliant for vehicle theft, user need to register the complaint with respect to the vehicle chasis number. Once the vehicle chasis number is identified in the centralized server, then automatically alert is created in the bunk so that once theft vehicle is identified then automatically, charging is no initiated from the bunk.



**Figure 10**

Figure 9 and 10 shows the complaint posted for the missing vehicle in the application.

#### Module-4:RFID Reader/Scanner

The rfid card is attached to the every vehicle.the rfid card shows the vehicle owner license and other documents.when the vehicle crossing the signal it will be scanned by the police using the rfid reader.And also checks or compares with if any vehicle is matches with the missing vehicle in the theft vehicle application. If any theft vehicle is identified it sends the location to the user.



**Figure 11**

Figure 11 shows the pop up message details for the user.

#### VII FUTURE SCOPE

The aim of our project is to collect the toll amount automatically from the registered bank details from a particular distance so this process will surely avoid manual payment system. Automatically identify the vehicle details without paper process. Automatic toll payment system.Reduces waiting time for payment. Integration of multiple banks so as to process payment very easily.

#### VIII CONCLUSION

Overall, Automatic toll payment is achieved when the vehicle approach the toll gate. Zigbee based communication is used for payment through user details are transferred via Zigbee. Payment is made from the default account, in case of insufficient balance then amount is subtracted from the second account. The theft vehicles are identified using the vehicle theft application.By this we can reduce the theft of vehicles.And the documents are scanned by the rfid scanner it saves the time consuming and also finds the theft vehicle.

#### IX ACKNOWLEDGEMENT

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#### X REFERENCES

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