Toll Collection System by using RFID & Cloud Computing

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Abstract RFID is a system in which it uses radio waves for the identification using the RFID tag and reader. The RFID toll collection system it is designed to help the vehicle handling operation in toll plazas which helps the vehicle movement in toll facilities. This work is an attempt to design a system which uses the secure cloud concept with RFID for an intelligent toll collection system that eases the toll operations. The cloud contains all the facilities which are needed for the toll collection system. So that the cost for implementation, operation and maintenance reduced a lot. The RFID system at the toll collection system accesses the resources which is present in the cloud through internet.

Keywords—RFID; cloud computing; authentication

I. INTRODUCTION

Toll Collection technology enabling the collection of toll payments. It has been studied by researchers and applied in various highways, bridges, and tunnels requiring such a process. This system is capable of determining if the car is registered or not, and then informing the authorities of toll payment violations, debits, and participating accounts [2]. The most obvious advantage of this technology is the opportunity to eliminate congestion in tollbooths, especially during festive seasons when traffic tends to be heavier than normal. It is also a method by which to curb complaints from motorists regarding the inconveniences involved in manually making payments at the tollbooths.

For collecting the toll from the motorist there is a need for an efficient method. In the current manual toll collection system, as the traffic increases the system becomes inefficient that leads to a huge congestion in the toll plaza. To minimize the congestion in the toll plaza and for a seamless access through the highway there is a need for an automated system for toll collection. Here we propose a system that uses the RFID and cloud for the toll collection in highways. The concept is based on existing toll booths; however, human interaction is no longer required. The Vehicles will be given a tag in the form of a sticker which could be affixed on the windshield, just like the existing road tax system.

Along with the development of cloud computing, cloud based RFID becomes a new promising architecture. Data storage and processing is moved from the backend server to a cloud offering pervasive RFID services. It is accessible using fixed or mobile readers over the internet whenever and wherever needed.

The information housed on the cloud is often seen as valuable to individuals with malicious intent. There is a lot of personal information and potentially secure data that people store on their computers, and this information is now being transferred to the cloud. This makes it critical for you to understand the security measures that your cloud provider has in place, and it is equally important to take personal precautions to secure your data.

II. PROPOSED SYSTEM

A. Tracking Current Location of the Vehicle

Suppose the vehicle can be thief then we can track the current location of that vehicle by using the tracker information which is storing in the RFID tag. This information can get with the help of cloud database, and then we can easily track the location of the vehicle.

B. Protect from Accident

In the database we also include the manufacturing date as well as expire date of the vehicle. If any vehicle can be expired then the accident can be occurred because of the bad or damage parts of the vehicle. Many motorists can be use the vehicle by renewing the colour & other part of vehicle. Then no one know the actual condition of the vehicle and accident can be arises.

III. RELEVANT THEORY

A. RFID

Radio Frequency Identification (RFID) this is a wireless technology which uses radio signals to identify tagged objects automatically and remotely. It has been used in supply chain management, inventory control, contactless credit card, and so on.

RFID authentication is a primary approach to secure an RFID system and make it privacy-friendly. Identifying a tag without authenticating it causes serious security issues. Attackers may intercept, manipulate, replay messages from the tag to pretend to hold the tagged object (like an ID smartcard). There is an extensive literature addressed RFID Authentication schemes. Most of them are backend-server-based, in which architecture a reader relays signals from tags to a backend server; and the backend server helps the reader to verify tags according to the backend database. A basic assumption of the architecture is a reliable and always accessible connection between the reader and the backend server, which limits the reader's mobility. For

instance, the backend server is truly trusted by readers in traditional RFID schemes. Secrets of tags are stored on the backend server without any encryption; and the backend server is knowledgeable about from which reader and to which tag a session is started.
None of current RFID authentication protocols meets the requirements of cloud-based RFID applications.

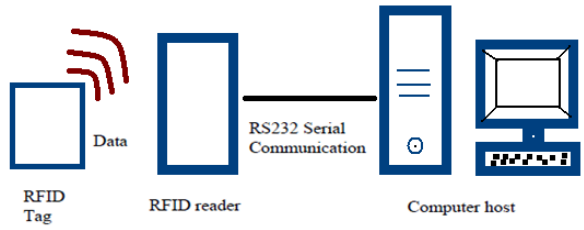

Fig.1 RFID system

A complete RFID system consists of a transponder (tag), reader/writer, antenna, and computer host are as follows.

Tag- Transponder, better known as the tag, is a microchip combined with an antenna system in a compact package. The tag can be containing the detail information of the motorist. It can be contain the lichens number, vehicle certificates, account number, person detail information like address, mobile number.

RFID Reader/writer- A reader contains an antenna to transmit and receive data from the tag. The reader also contains a decoder and an RF module. It could be mounted or built as a portable handheld device. The computer host acts as an interface to an IT platform for exchanging information between the RFID system and the end-user. This host system then converts the information obtained from the RFID system into useful information for the end-user.

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IV. CLOUD COMPUTING

Cloud computing is receiving a great deal of attention, both in publications and among users, from individuals at home to the U.S. government. Yet it is not always clearly defined. Cloud computing is a subscription-based service where you can obtain networked storage space and computer resources. One way to think of cloud computing is to consider your experience with email. Your email client, if it is Yahoo!, Gmail, Hotmail, and so on, takes care of housing all of the hardware and software necessary to support your personal email account. When you want to access your email you open your web browser, go to the email client, and log in.
The most important part of the equation is having internet access. Your email is different than software installed on your computer, such as a word processing program. When you create a document using word processing software, that document stays on the device you used to make it unless you physically move it. An email client is similar to how cloud computing works. Except instead of accessing just your email, you can choose what information you have access to within the cloud.

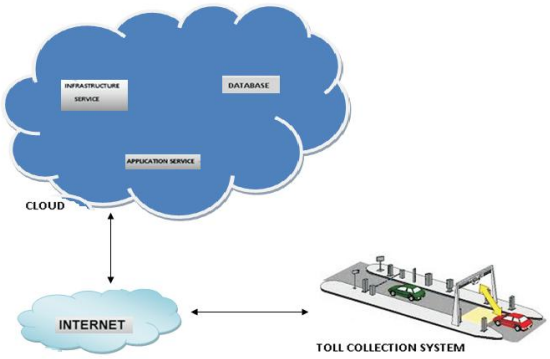

Fig.2.Cloud Computing

Many companies are delivering services from the cloud. Some notable examples include the following:

- Google — has a private cloud that it uses for delivering many different services to its users, including email access, document applications, text translations, maps, web analytics, and much more.
- Microsoft — Has Microsoft SharePoint online service that allows for content and business intelligence tools to be moved into the cloud, and Microsoft currently makes its office applications available in a cloud.
- Salesforce.com — runs its application set for its customers in a cloud, and its Force.com and Vmforce.com products provide developers with platforms to build customized cloud services.

V. THE BENEFITS FOR THE MOTORISTS INCLUDE

1) Fewer or shorter queues at toll plazas by increasing toll booth service turnaround rates;
2) Faster and more efficient service (no exchanging toll fees by hand);
3) The ability to make payments by keeping a balance loading a registered RFID tag and
4) Other general advantages for the motorists include fuel savings and reduced mobile emissions by reducing or eliminating deceleration, waiting time, and acceleration. Meanwhile, for the toll operators, the benefits include:
5) Lowered toll collection costs;

A. Scope:

In this system easy toll collection process implemented as well as implementation cost is low.

B. Objective:

This system reduces the traffic, emerging at toll gate due to payment delays. In the existing systems it consists of servers connected to data canter which overloads the traffic in data connection. The main aim of the system is to provide existing toll booths system; however,
1) Human interaction is no longer required.
2) Reduces the traffic.
3) No one can neglect the toll.

VI. DESIGN AND IMPLEMENTATION DETAILS

A. System Overview

[I] User:
The user of the system can be anyone. The user will use the vehicle.
[II] Input RFID tag:
The input RFID tag will be included the detail information about user and vehicle.
[III] Objectives:
1) By using this system also we will be able to control the traffic and its functionality of managing the toll booth system.
2) Moreover we can also save the time by avoiding the user stand in waiting queue for paying toll amount
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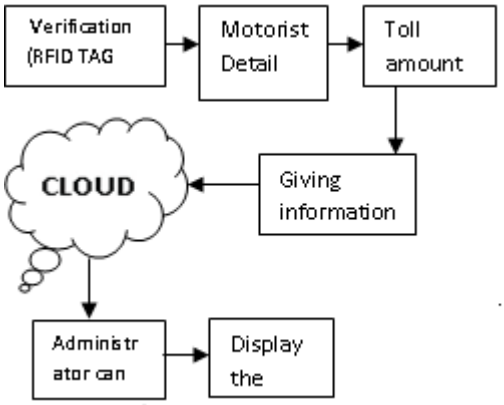

Fig: 1.4 Internal Working of System

B. Mathematical Module:

Mathematical definition:

S= {M, W, D}
Where,
M ⟶ RFID Tag
W ⟶ Web Server
D ⟶ Cloud
M = {M1, M2, M3, M4, M5}
W = {W1, W2, W3, W4}

Where,
M1 ⟶ RFID tag on vehicle
M2 ⟶ check account balance
M3 ⟶ toll amount cut from account
M4 ⟶ Open barrier
M5 ⟶ Display Message on Mobile
W1 ⟶ Reader
W2 ⟶ Cloud
W3 ⟶ Server
W4 ⟶ Update Information

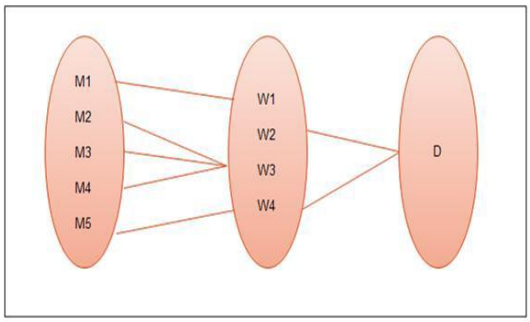

Figure 1.5: Relationship Model

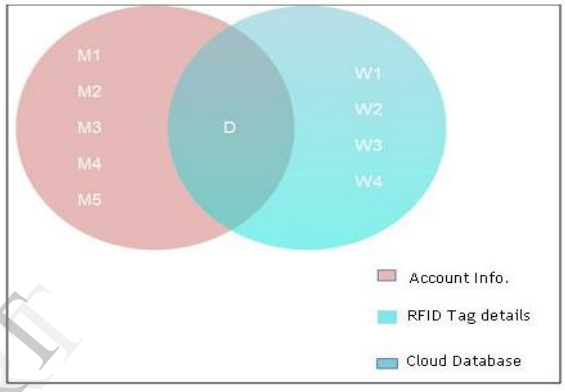

Figure 1.6: Venn diagram

VII. REQUIREMENTS

A. Software Requirements

- Operating System – Windows XP/7 / More
- .NET 3.5
- My SQL server 2007 /more

B. Hardware Requirements

- Serial port
- Parallel port
- Intel Pentium 4GHZ
- RAM 1GB
- RFID tag
- Reader

C. Non-Functional Requirements

- Internet
- Mobile

VIII. ACKNOWLEDGEMENT

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Conclusion

In this technology the construction of Toll booth Management System (TMS) leads to the revolution in traffic management. One of the main objectives is to minimize the average waiting time at toll gate by the user. Here the system is scalable due to the usage of multi-cloud system. Thereby it will greatly reduce the cost involved in installing and maintaining the data centres. Usage of multi clouds provides faster retrieval and consistency of data is maintained.

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