

M-Toll Using Wi-Fi Technology

Shital Ladkat¹, Bansari Sanghvi², Aishwarya Tamne³, Shrinivas Rathod⁴ and Prof. Smita Patil⁵.

Student, Dept. of I.T, Atharva College of Engineering, Mumbai, India^{1,2,3,4} Assistant Professor, Dept. of I.T., Atharva College of Engineering, Mumbai, India⁵

Abstract - The existing toll collection system all over India is operated manually. A toll system is the place where toll is paid for passage of a vehicle from the toll plaza. In the existing toll tax system, we observe limitations like mismanagement of time, long queue for the payment. The aim of the project is to implement toll collection system using Wi-Fi technology to overcome demerits of existing toll system. A Mobile Wallet promises a future where users do not need to carry hard cash while travelling. Wi-Fi toll collection stations allow the traffic to flow continuously, and vehicle being stopping and starting again. It reduces fuel consumption and has positive effect on environment. By using M-toll payment system it leads to automatic and easy toll payment. The Android phone need to be included in each vehicle and details of vehicle owner must be stored in the database of toll tax system. Wi-Fi technology will develop the existing payment system used in toll collection.

> Key Words: Android Application, Wi-Fi Technology, M-Toll, Electronic Toll Collection System.

1.INTRODUCTION

The toll collection system all over India is the manual toll collection system. We have proposed an idea of making the toll collection totally electronic with the use of Wi-Fi and Android technology [1]. Electronic toll collection (ETC) is a technology enabling the electronic 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 vehicle is registered or not, and then informing the authorities of toll payment violations, debits, and participating accounts. The most obvious advantage of this technology is the opportunity to eliminate congestion at tollbooths, especially during festive seasons when traffic tends to be heavier than normal. It is also a method by which we can curb complaints from motorists regarding the inconveniences involved in manually making payments at the tollbooths. Other than this

obvious advantage, applying ETC could also benefit the toll operators.

1.1 Manual Toll Collection

Until somewhat recently, the most common approach for collecting tolls was to have the driver stop and pay a toll collector sitting in a tollbooth. The toll collector determines the amount to be paid by each vehicle based upon its characteristics or classification.

1.2 M-Toll

Automatic Vehicle Identification (AVI) technology can accurately identify a specific vehicle at highway speeds, thereby, enabling a wide variety of ETC applications. In its basic form, a vehicle passing through a toll collection point has its identification device read, after which the toll is deducted from the customer's pre-existing account or the customer is sent an invoice. The driver pays the toll without stopping and tollbooths are not required. ETC also determines whether the vehicles passing are enrolled in the program, and gathers information on the vehicle for further collection or enforcement action [1] [2].

2. RELATED WORK

In [1] the author discusses on the concept and technologies for the Wild Card, a programmable universal payment card. The Wild Card interacts with a mobile phone to receive both data and energy through NFC. To make the Wild Card programmable, he designed a magnetic stripe emulator that can be driven by a microcontroller to produce the magnetic field that is expected by card readers. In [2] the author explained that the RFID is one of the new technology emerged in ETC applications. He gives us idea about the application of ETC system on toll gates and gives many advantages, such as waiting time of the vehicles, no traffic congestion, assured and accurate collection of toll amount, free from cash, minimum emissions which are harmful for living. In [3] the proposed ETC system discussed in this work applies passive RFID technology. By doing so, increased efficiency will be guaranteed since RFID is known as a highly

International Research Journal of Engineering and Technology (IRJET)e-ISSN: 2395 -0056Volume: 03 Issue: 04 | April-2016www.irjet.netp-ISSN: 2395-0072

stable technology. With the elimination of human interaction in the entire toll collection process, it can also significantly improve the efficiency of toll stations and the traffic abilities of the toll road. In [4] implementation of Bluetooth technology in the application of toll tax system is explained. The Bluetooth is wireless technology was created to replace the cables used on mobile devices with radio frequency waves. The technology encompasses a simple low cost, lowpower, global radio system for integration into mobile devices, which can form a quick ad-hoc secure "piconet" and communicate among the connected devices. This technology creates many useful mobile usage models because the connections can occur while mobile devices are being carried in pockets and briefcases. In [5] author explained that Toll tax system in India has most of the highway projects are given on PPP basis, i.e. Public Private Partnership. In this the private organization finances and constructs the facility and recovers the capital from the users in the form of toll tax. This tax is collected for a reasonable period of time after which the facility is surrendered to the public. In [6] the Radio Frequency Identification (RFID) tags has been used in vehicles to automate the toll process on toll roads, bridges, and tunnels in a process called Electronic Toll Collection (ETC). These tags are mounted to the windshield or externally surrounding the license plate on a vehicle and read as the vehicle proceeds without stopping through special lanes at the toll plaza. In [7] author made security system that in the present age Mobile and electronic commerce has been the hot topic of application and research, and the E-cash system is the key technology and backbone of electronic commerce.

3. IMPLEMENTED SYSTEM

Automatic Vehicle Identification (AVI) technology can accurately identify a specific vehicle at highway speeds, thereby, enabling a wide variety of ETC applications. In its basic form, a vehicle passing through a toll collection point has its identification device read, after which the toll is deducted from the customer's pre-existing account or the customer is sent an invoice. The driver pays the toll without stopping and tollbooths are not required. ETC also determines whether the vehicles passing are enrolled in the program, and gathers information on the vehicle for further collection or enforcement action.



Figure 1: Architecture Diagram for M-Toll using Wi-Fi Technology

The above architecture diagram describes the working of M-Toll using Wi-Fi Technology. There are different phases for the system. They are described below.

Following are the phases for android applications:

PHASE 1: REGISTER

Each vehicle passing through must have a Smartphone which must be registered with the M-Toll system. The registration can be done at Toll Booth only. The registration process includes verification of personal and vehicle documents. After the verification is done the user will be provided with unique username and password which will be used for login. User can recharge their account after registration.

Add New User	* +		100 H
Add Ward User We windows Bits The Cohones, why dold provide age @ The Space # # # # # # # # # # # # # # # # # # #	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Meet Valled (3 Suggested Stee	👵 Getting Started 🤿 Web Silca Gallery		
		Add New User	
	Username:		
	Address:		
	Phone Number :		
	Email id:		
	Vehicle Number :		
	venice type:		
	Balance :		
	Password -		
🤊 (e 🔡	o 😻 🜍 👁 🕕 🖾		• t i = 4 to 25/01/201

Figure 2: Registration phase for Application login



PHASE 2: LOGIN

The user first needs to scan and connect to the open Wi-Fi on the Toll Booth. This phase includes logging in to the application to pay the toll using Username and password provided at the time of registration. The username and password will be verified in the database. If the user already exists and the input given by user is correct then the login will be successful and user can perform further activities or else the login will be unsuccessful.

2 🕲 🗢 C 🔊 🖉 👘	11:43 ам
🎦 Login	=
Email Id :	
<u> </u>	
Password :	
Login	

Figure 3: Login for M-Toll using Wi-Fi Technology Application

PHASE 3: TOLL PAYMENT

The user can then pay the toll according to his/her vehicle type by just clicking on pay toll button. The balance will be automatically deducted and the balance will be updated to the database. The updated balance will be shown to user after the transaction. The users will automatically logout after the transaction is completed.



Figure 4: Toll Payment for M-Toll using Wi-Fi Technology Application

PHASE 4: E-MAIL RECEIPT

Here the user will receive an email for the payment of toll with Transaction Id, Vehicle Type, Vehicle number, Amount Paid and updated balance.



Figure 5: E-mail receipt for Payment of Toll

Following are the phases for website:

PHASE 1: LOGIN

The admin needs to login to the website to access services provided by website. The Admin will have his own username and password so that nobody else can access the website.



Figure 6: Login for Admin to access services

PHASE 2: ADD/DELETE/EDIT USER & DETAILS

The Admin can add, delete or edit the user after verification of user documents. He can update the balance, vehicle type and other user details.

C Read Control Co	Web/Manage_Disers.aupo	Successful and starts										
Add New User Add New User Updated Successfully User Vehical Number Vehical Number Action 1 shub 999255779 mt408/87987 2000 Ed/Cholere 2 Bansart 75/7645465 mt408/87987 2000 Ed/Cholere 3 Adhwaya 912355799 mt408/87987 5000 Ed/Cholere		rrigi upraeten.		c	Q. Sninth		4	0	۵	+ 1	1 0	=
Manage Users Manage Users Manage Users Add New User Updated Successfully Updated Successfully Under Md Usersame Priore Number 1 shelad 960265779 2 Bancarit 7x6646465 3 Additiving 912556789	Getting Started 🛞 Web S	lice Gallery										
Manage Users Manage Users Manage Users Add New User Updated Successfully Under Id Username Vehical Number Balance Add New User Updated Successfully Updated Successfully Updated Successfully User Id 1 1 shalal 9693567789 mk08h87787 2 Barnarit 7/676864665 mk09h6767 3 Alshwary												
Initial Provide Control								-				
Manage Users Add New User Updated Successfully User Id Username Phone Number Vehical Number Balance Action 1 shital 9602658789 mholth#07967 2200 Edit/Delete 2 Banacati 7676864655 mholth#0767 1850 Edit/Delete 3 Ashwanga 9123453789 melding#0788 5000 Edit/Delete	II Collec	tion Sy	stem	Porte M	anage Users	Transactions	Lagar					
Manage Users Add New User Updated Successfully User Id Username Pleone Number Vehical Number Balance Action 1 shital 9902654789 mh0lth#7997 2200 Ed/Delete 2 Barnaul 27/0845465 mh0lth#777 1850 Ed/Delete 3 Ashwarya 9123454789 mt9086787 5000 Ed/Delete												
Add New User Updated Successfully User M Username Phone Number Vehical Number Balance Action 1 shital 9802654789 mb08h87987 2200 Ed/2Delree 2 Barnaut 7x76845465 mb08h6767 1850 Ed/2Delree 3 Adhwarya 912345789 mb98g678 5000 Ed/2Delree			Manag	e Users								
User Id Username Phone Number Vehical Number Balance Action 1 shtal \$993554789 mh08h87987 2200 Ed/Dolete 2 Bansari 7676846465 mh08h6797 1850 Ed/Dolete 3 Abhwanga 9123459789 mh08hg9878 5000 Ed/Dolete	Add New		Updated Successfully									
1 shital 9892654789 mh08h879677 2200 Ed/UDviete 2 Bansari 7676845455 mh09h6767 1850 Ed/UDviete 3 Abhwanya 9123459789 mh98g96778 5000 Ed/UDviete	User Id	Username	Phone Number	Vehical Number	Balance	Action						
2 Bancari 7676845465 mh09H6767 1850 EdUDviete 3 Abhwarya 9123452789 mH98g9678 5000 EdUDviete	1	shital	9892654789	mh08h87987	2200	Edit/Delete						
3 Aishwarya 9123456789 mh98gg9678 5000 Edit/Delete	2	Bansari	7676845465	mh09h6767	1850	Edit/Delete						
		Alshwarya	9123456789	mh98gg9878	5000	Edit/Delete						
4 Shrinivas 90909090 mh01b3456 3000 Edit/Delete	34 1	Shrinivas	9090909090	mh01b3456	3000	Edit/Delete						
	1 2 3	shital Bansari Aishwarya	9892654789 7676845465 9123456789	mh08h87987 mh09h6767 mh98gg9878	2200 1850 5000	Edit/Delete Edit/Delete Edit/Delete						
			12						• •	44	114	7.444
		Il Collec Add New User M 1 2 3 4	Il Collection Sy Add New User User Id Username 1 shal 2 Barsari 3 Ashmarya 4 Striebas	Il Collection System Manag Ad New User Updated Successfuly <u>Der Id Username Phone Number</u> 1 ashtal 9992557789 2 Bansari 7676845465 3 Ashmarya 9123456789 4 Strinkus 90909990	Il Collection System Lange User Add New User Updated Soccessfully New Idea Usersame 1 abital 9893554789 2 Bartanti 2575865455 1 abital 9893554789 2 Bartanti 2575865455 1 abital 989355789 1 abital 98955789 1 abital 9895578 1 abital 98955789 1 abital 985578 1 abital 98557	It Collection System we deprese Hange User Manage User	It Collection System we deep term around the system and the system	It Collection System we weard weare we we have been been been been been been been be	It Collection System we were and the system of the system	It Collection System Item Manage Users Manage Users	Il Collection System Maagubars	It Collection System Itel Marge Larr. Marge Larr. Marge Larr. Marge Larr. Marge Larr. Marge Larr. Larr.

Figure 7: Manage users for Admin

Add New User	x +						-	Os -	×
(Iscalhost 1080)	Toll_Collection_Web/AddVewUser.aspc?Action=edit8:User_ld=1	C	Q, Search	合自	0	÷	ŧ		≡
🙆 Most Visited 🛞 Sugge	ssted Sites 👼 Getting Started 🗟 Web Slice Gallery			_					
	Username:	shital							Î
	Address:	Andhesi							l
	Phone Number :	4							1
	Email Id:	shial@gmail.com							L
	Vehicle Number :	mh08h87987							
	Vehicle Type :	Car							1
	Balance :	2200							I
	Password :	ladiat							l
	Save	Delete							
👧 🤅 🚺	📄 🛛 😉 🚺 🕫 🕕 🗄	1					6	11:50 AM	6

Figure 8: Add/Delete/Edit User for Admin

PHASE 3: TRANSACTIONS

This phase contains the list of all transactions in tabular format along with Transaction Id, User Id, User Name, Charge, Date & Time, etc. The Admin can check for any transaction if required. The following figure gives an overview of this phase:

Toll Collection	n Sys	stem	1	ome M	inage Users. Transactions	Logout		
			Transactions					
Transaction Id	User Id	Username	Vehical Number	Charge	Date Time			
		sheetal	mh08h87987	100	28/03/2016 3:07:58 PM			
	:1	sheetal	mh08h87987	100	28/03/2016 10:03:31 PM			
3	1	shital	mh08h87987	100	29/03/2016 11:51:53 AM			
4	1	shital	mh08h87987	100	30/03/2016 9:52:11 AM			
5	1	shital	mh08h87987	100	30/03/2016 10:33:51 AM			
6	:1	shital	mh08h87987	100	30/03/2016 11:42:14 AM			
7	1	shital	mh08h87987	100	30/03/2016 11:47:57 AM			
8	3	Aishwarya	mh98gg9878	200	10/04/2016 3:41:37 PM			



Phase 4: IMAGE PROCESSING (BROWSE & VALIDATE)

In this phase the Admin will browse the captured image of user's vehicle number plate and will validate the image. If the vehicle number in image matches the vehicle number in transaction table then the pop will be displayed on the website & vehicle is allowed to pass Toll Booth.

http://localhosactions.aspx × M Inbex (38) - ashwaryatams × +						
0 localhost 8080/Toll_Collection_Web/Transactions.aspx	× Q, Search	☆ 🛍		÷ 🕆	0	
also_astein age x If Boo (B) = showpton, x I And BDD Trig Collection, Your Transition age al @ Lagostet Der @ Geling Stored @ You Sico Colley						
the second se						
Venica	No: MCLRNF1 is Allowed to GO.					
and the second						
	OK					
Ferring data from fonts googleanis.com.						

Figure 10: Image Processing

PHASE 5: LOGOUT

This phase allows Admin to logout from website and terminates all the services which are assigned to Admin.

International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Www.irjet.net p-ISSN: 2395-0072



Figure 11: Logout for Admin

4. CONCLUSION

Wi-Fi toll collection stations allow the traffic to flow continuously and vehicle having been avoided stopping and starting again. This in combination with reduced fuel consumption has positive effect on environment i.e. pollution created will be minimum. Implementing the Wi-Fi technology is also not so costly. Man power and cash risks are also reduced to minimum. Furthermore, only a minimum of traffic disruption is caused during installation. The system also increases safety, as bottlenecks and long queues are avoided. Society and business community also gain from the system as it results in faster transportation. The system is cost-effective, time saving and easy to install which benefits the operator as well as user.

REFERENCES

- [1] Mastooreh Salajegheh, "Unleashing The Wild Card for Mobile Payment", in IEEE International Conference on Pervasive Computing and Communications (PerCom), 2014.
- [2] Ganesh K. Andurkar, "Smart Highway Electronic Toll Collection System", in IJIRCCE, 5th May, 2015.
- [3] Khadijah kamarulazizi and Dr. Widad Ismail,"Electronic toll collection system using passive RFID technology", in Journal of Theoretical and Applied Information Technology, 2005-2010.
- [4] Soni Rani, "Bluetooth Approach For Toll Tax Application" http://dspace.thapar.edu:8080/dspace/bitstream/ 123456789/260/1/91889.PDF

- [5] Tom Matthew, "Toll operation", Chapter 46, http://nptel.ac.in/courses/105101008/downloads /cete_46.pdf
- [6] F. Don, "Electronic Toll Collection: An Introduction and Brief Look at Potential Vulnerabilities," in SANS Institute info Sec Reading Room, 1.4b ed. 2004.
- [7] Akash Shetty,Yash Chapaneri, Shrikant Parte, Tushar Ghalsasi, Smita Patil, "Elliptical Curve Cryptography in MobiCash", JCT Volume 3 Issue 4, ISSN: 2278-3814, April 2014.
- [8] C. Karlof, N. Sastry, and D. Wagner. Tinysec: link layer security architecture for wireless sensor networks. In SenSys'04, pages 162–175, New York, NY, USA, 2004. ACM.
- [9] http://asmith40.blogspot.in/2011/10/advantagesand-disadvantages-of-google.html.

L