ISSN: 2278 – 1323
International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)
Volume 5, Issue 11, November 2016

A smarter shopping system

An Android Based skipQ app using NFC

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***Abstract* - skipQ contributes to the evolution of shopping that allows us to shop and pay product amount using m commerce without standing in a checkout line. This proposed system presents a novel method to recreate an android M-commerce app using near field communication. To practically implement this application all mobile devices using this app must support NFC technology. NFC is a short-range, high frequency, low bandwidth radio technology that enables deportation of data within a very small distance (cms). Typically in classic shopping, the customer needs to hand lift the items, carry them till the counter, then wait in the queue and also carry exact cash to tender or credit/debit cards with them to make payments. The app incorporate silent features such as increase the quantity of product(s) purchased, add and remove the product from the cart, clear all the items and get notification of products you are allergic to. The motive behind such an application is its necessity of generalized shopping from the same android app skipQ. Any shop following the protocol of this system can make this application available to its users for easy shopping. Google maps are made available for users to trace the location of shops that have this protocol being followed. This project will also throw light on NFC based payment system.**

Keywords— NFC:near field communication, RFID:radio-frequency identification.

I. INTRODUCTION

The transformation of a late wired world to a wireless lifestyle is quite evident in the year 2000 and thereafter. Mobility remains the mark of excellence in wireless world and the penetration rate of mobile devices in Europe and Asia is around 75 – 89 %. Emerge of M-commerce has taken up the popularity after E-commerce, M-commerce stands out to be the best available option for people who wish to trade overseas like financial transactions easily and securely, anytime and at anyplace. Conventional payment methods overrule the flaws of cash payment like to tender exact change. An upcoming technology in mobile devices for communication and suitable for mobile payments is the Near Field Communication (NFC). Leading companies like Samsung, Nokia, Microsoft, Visa Inc, blackberry, MasterCard Worldwide and NXP Semiconductors, are actively engaged in using this tech because of tremendous business potential. The combination of both M-commence and NFC technology can change the perspective of shopping. The proposed system elaborated below has been designed to pay for the user side as consumer and the merchant side as a trader or seller by using the NFC enabled technology for interaction of data, for instance HTC desire 820. The skipQ application implements the concept of security in M-commerce transactions by using communication protocols like SSL, Tag-to-Tag, so that the user's financial transaction securities are met. This research is focused on the introduction of a new shopping system in supermarkets and its ease to transact money using the conventional online payment method using M-commerce. The implementation of this system will show positive results in managing crowds in peak hours and also skip the payment queue.

II. LITERATURE SURVEY

A. M-commerce

M-commerce has come forward to become the hottest new trend in business transactions. M-commerce is an emerging discipline involving applications, mobile devices, and middleware and wireless networks. While most of existing e-commerce applications can be modified to run in wireless environment, m-commerce also involves many more new applications that become possible only due to the wireless infrastructure. It is a rapidly evolving arena, both strategically and technologically. M-commerce is considered as an effective way of delivering e-commerce to consumers regardless the time and location. To gain the advantages of m-commerce, companies have begun to offer m-commerce options for their consumers in addition to the e-commerce they already provide .In its present state, m-commerce can be viewed as an extension of conventional, Internet based E-commerce, which adds a different mode of network and accommodates different end users' characteristics.

B. NFC

Near field communication is a set of communication protocol that enables communication between two electronic devices, a portable device such as Smartphone establishes communication with another electronic device when brought about 3- 4 cm of each other. Near field communication protocols established a generally-supported standard. If a device has internet connectivity, the other transfers data with online services. NFC works on the principle of electromagnetic induction between two loop antennas. An NFC device, for example a Smartphone and a "smartposter" exchange data, operating within globally available unlicensed RF ISM band of 13.56 MHz on ISO/IEC 18000-3 via air interface at an average rate ranging from 106 to 420Kbit/s.

NFC devices can operate in 3 modes:

- NFC card emulation: It enables NFC devices such as Smartphone's to act like smart cards, allowing users to perform transactions such as payment or ticketing.
- NFC reader/writer: It enables NFC devices to read info which is stored on inexpensive NFC tags embedded in labels.
- NFC peer-to-peer: It enables two NFC devices to communicate with each other to exchange information in an ad-hoc fashion.

C. HybridCheckout

A concept of parallel scanning at the cashier and customer is being implemented at peoplePos. It's a far vision hybrid concept. To increase the throughput, customer scanning area is added next to the cashier scanning area. HybridCheckout is a combination of cashier scanning and customer self service. Demerits of this system are that it may consume a lot of time if there is a rush hour in the store especially on the weekends. Making many machines available is a solution to this problem. Feasibility becomes a major threat. An overload on the system database cause of simultaneous and rapid updating of data.

D. Quickly

Quickly app uses image scanning of barcode as a tool to recognize the product with users phone, when the user is ready to check out, press the submit button to pay the bearer shop its rightfull amount, all this is automatically paid electronically. Quickly app has a major drawback with respect to a mobile device's camera quality.

E. Snapscan

Its working is similar to self-scanning system, but it does not scan the barcode rather it scans the QR code. Mobile camera is used to scan the product QR code.

Disadvantage:

- Scan time is more.
- Theft issues are high.
- Not every product has QR code.

The whole application is dependent on camera quality

III. PROPOSED SYSTEM

The proposed system is a combination of both M commerce and NFC technology, thus to implement this system all Android based mobile devices must integrate with NFC technology. This conventional system uses an android app known as skipQ. The customers can make the entire shopping process with the help of this android app skipQ. NFC technology works in 3 modes: NFC card emulation, NFC reader/writer, NFC peer-to-peer. SkipQ makes use of NFC emulation mode. The app reads and processes the tap to the NFC tag of the products, which are to be purchased. Every product in the supermarket is assigned to an NFC tag, these tags assigned to the products would retrieve the product details which are stored in the server side. The product details are globally updated and not locally at the supermarket, thus a centralized database is being maintained. The supermarket products whose NFC tags were tapped (read) will be stored in skipQ cart. Various operations can be performed in the cart such to add new product, to remove products, to increase or decrease a product quantity, or to clear the entire product in the cart. Furthermore, users will be informed about the ongoing offers in the store and could avail them right from the application itself. This system would help the customer to be aware of the expenditure made by them and could verify the same. This system increases the ease of the customer to understand by providing them with knowledge of product and calculates the total price all the time, to insure expenditure does not exceed the financial margins. The customer will checkout and confirm the same to the merchant by performing a handshake with merchant device. After payment, the bill is generated at both merchant machine and user history.The application features the transfer of details (receipt) from user mobile to merchant devices takes 1-2 seconds, this transfer done at supermarket assures no external hacker can corrupt the receipt. The communication time span of 2-3 seconds are needed to connect to the centralized server. Development and advancement in NFC tags could be applied for the prototype application in near future.

A. Problem Statement

With the ever growing population of the universe and rush at supermarkets standing in a queue to purchase is not an ideal method for shopping. Retail shops in and around the country will face these problems of queue, theft, shop management, etc. Considering a need to revolutionize the practice of

traditional shopping with a prototype application which aims to remove as many inconsistencies as possible from these systems which is consumer friendly and high performing. The system's ultimate aim would be consumer convenience and time efficiency. This goal could be achieved by using M-Commerce system implemented using NFC technology. The use of NFC would benefit the system in many ways, mainly with automation and security. As regular shopping, customers only need to tap on NFC tags, not necessarily pick up goods. These details of products purchased need to be communicated at the counter using NFC communication. After online payment, a bill is generated at both ends. This bill could be traced any time with its bill number. The desired product could be collected within a few minutes or could be home delivered. The address of delivery could manipulate before online payment in the mobile.

B. Design

The supermarket supporting the NFC shopping protocol comprises of NFC tags which will contain all the information about the product. The NFC tag consists of a description of the product, Image of the product, price, contents of the product, etc. Customer can wave their mobile on NFC tag and add the product into the cart, and the shopping cart will have options for editing the same during the time of shopping.

1. Architectural Diagram

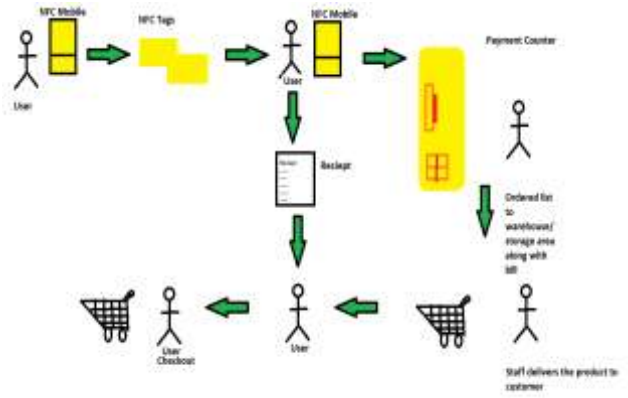

Figure 1: System architecture

The administrator would be responsible for managing all the shopping process at the merchant end. Every employee has login id and password to access the computer for billing purpose. Once done with a shopping customer need to give their login id to get product billing done. A customer could pay for their goods by cash, smart card, credit card, mobile wallet. After payment a digital bill is generated containing infos like customer_id, employe_ id, product_id, date and time of delivery will be stored in the database.

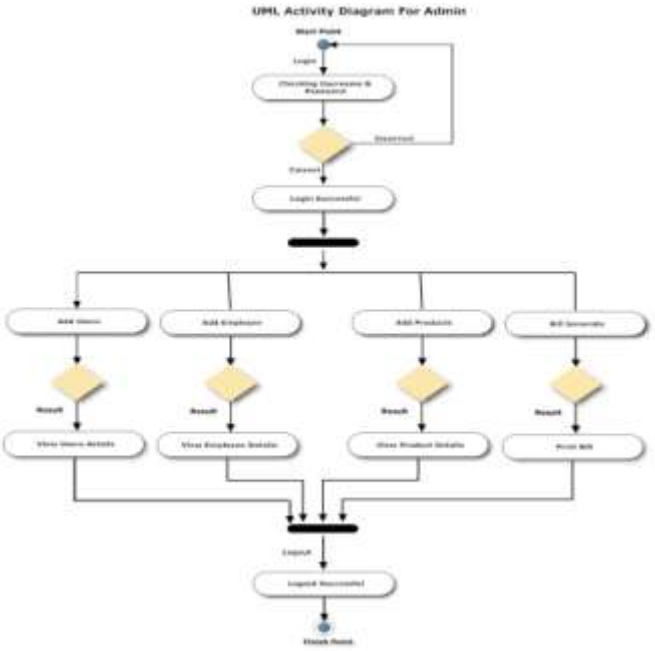

Figure 2: Activity diagram for Admin side

The above diagram describes the 4 main functions at admin side, namely add user, add employees, add products, bill generation.

2. Component Diagram

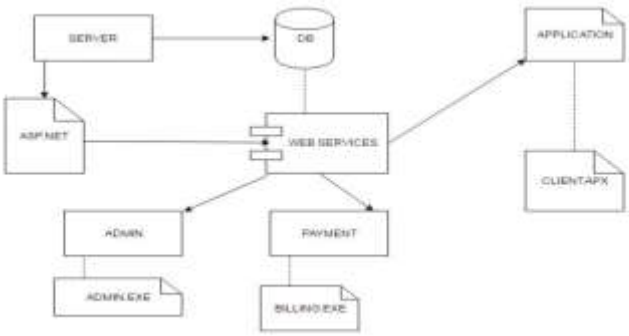

Figure 2: Component Diagram

3. Sequence Diagram

Figure 3: Sequence of interaction

4. Hardware Requirement

Mobile: android version gingerbread and above.
Ram 512 and above.
Storage around 60 MB.
Comp: Administrator PC
1 GB of ram @ 1333 Hz, 500 GB of HDD space Intel graphics (on board) 256 bits
Internet connection

5. Software Requirement

- Visual Studio 2010
- Windows Operating System
- Eclipse
- Microsoft SQL Server 2008
- Android SDK

C. Scope

Technology is evolving continuously with the spin of the earth at its axis, benefits of M-commerce using NFC could result in a positive outcome in shopping domain. The application can be enhanced further by adding new products & updating the existing product information depending upon market scenario. Another feature which binds up with this application is notification messages. The merchants could come up with new offers depending on market conditions, festive offers, etc. and the same could be displayed within the application. The tech used and the application development would be scalable and capable enough to adapt to the future demands of the consumer enhancing the futuristic scope of this application. The added benefits of membership and available coupons can be applied. Since the whole system is digitalized therefore no paper is wasted in printing thus it is Eco friendly. NFC Mobile Payment would utilize information that users want to keep private. Personal data and financial transactions must then be protected by the usage of NFC Secure Elements utilizing robust security concepts similar to the security levels provided by certified credit cards.

D. Advantages

1. Hand free shopping: It just scans of products NFC tags, and not carrying them.
2. Saves time: the plus point of skipping the cash counter queue makes it a major advantage over traditional shopping methods existing.
3. Home delivery: the products could possibly be delivered at your door steps.

E. Disadvantages

To implement this system to all mobile devices must have NFC portability, at present scenario the percentage using NFC tech are about 63% and in latest launches of mobile devices nearly a margin of 89+ % have NFC inbuilt.

This issue could be possible overcome by adding other scanning techniques like QR code scanner, etc.

IV. CONCLUSION

The Project uses, contact less NFC Tag technology for purchasing of products at Mall Centre's. Thus the time required to purchase and billing will be reduced as the user can purchase the products directly from his Android NFC enabled Mobile. This project aims at user who frequently visits the Mall to buy products on weekly or monthly basis. This application is for mobile users who do not want to carry cash everywhere and don't want to stand in queue. The project is feasible when measured in accordance with time and money. The system covers various domains, namely android, electronic, database and E- wallet payment and a measure of management within implemented supermarkets. Digital billing can keep track of all transactions and corresponding items purchased. The limitation of this project is, very few mobile phones have NFC technology installed. In case of loosely packed food products like rice, wheat, etc. and perishable food like fruits, vegetables, etc prices cannot be updated on the system server, but it can be handled by an internal management system of that particular shop. NFC technology overcomes the issues related to barcode, QR code scanning and consumes lesser power considered to RFID tech. The additional features of this android application make it more attractive in shopper's sight. From above details it is clear how NFC turns out to be the best possible technology for the system to be more functional appropriate.

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