

## A Secure & Smart Shopping System: A Review

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**Abstract**—With the recent emergence of social E-commerce the act of shopping is evolving. The physical shopping destination like commercial shopping Center, Wall-Mart's, supermarket also seek smartly and securely in shopping experience. Consumers with QR (Quick Response) code applications, RFID tag, Zig-Bee system, NFC systems can find a modernistic way of buying the products and goods. It collects knowledge about the technical details, working and pros and cons of individual technique as me The paper represent aforementioned techniques that can be deployed for smart shopping experience mentioned previously. The study is carried out to help new user for selecting particular technique in his area of do main.

**Keywords**—QR-code, RFID tag, Zig-Bee system, NFC systems.

### I. INTRODUCTION

Nowadays, wireless networks have taken over the entire world. Business and financial transactions can now be done easily and securely, anywhere and anytime. Using Internet, connections can be established with any devices almost anywhere in the world and can share necessary information amongst them. In recent years, on-line shopping has become a popular trend around the world. People have started to depend on on-line shopping heavily which made it offer all kind of goods and services. Recently, on-line shopping is used by the shoppers to purchase products through their smart phones. The process of on-line shopping happens when a buyer downloads a special application in smart phone, and uses the application to scan the QR code of the product. The QR code Includes all the information related to the product such as brand name, type and price. Further, on-line shopping doesn't require taking a huge space to build a store or hire a lot of employees. Instead, products such as grocery and clothing are presented in the holders attached with a QR code for customers to view [1].

INTERNET of Things (IOT) is the network of physical objects embedded with radio frequency identification (RFID), embedded systems, sensors, network, and software that enable physical objects to collect and exchange data. Smart shopping system based on Radio Frequency Identification (RFID) technology, which has not been well-studied in the past. In such a system all items for sale are attached with an RFID tag, so that they can be tracked by any device equipped with an RFID reader in the store [2].

Near Field Communication (NFC) is a new short range wireless communication technology with security support. It is combination of contact less identification (Radio Frequency Identification -RFID), interconnection technologies and mobile phone devices. Near Field Communication can be used in various fields and its application in medical field is more considerable now a days. When we go for shopping in malls there is a long queue for payment, we need to wait for a long time to pay bill which is very boring and time consuming. To overcome these constraints, existing systems need to be changed, so that payment process will become easy [3].

The remainder of this paper is organized as follows.

Section I contains the introduction of smart shopping system. Section II describes the literature survey of this technique which are used before QR code technique. Finally, Section III concludes the work.

### II. L ITERATURE SURVEY

Manoj Dhande et al. in "QR-code Based Effective Time and Space Management in Shopping Malls" proposed an architecture for smart shopping experience in shopping malls.

Figure 1 shows the proposed architecture [1].It consists of firstly user login module to login the system then enter in the mall and scan the product by using QR code. After that he/she add the product in the cart as well as delete the product.

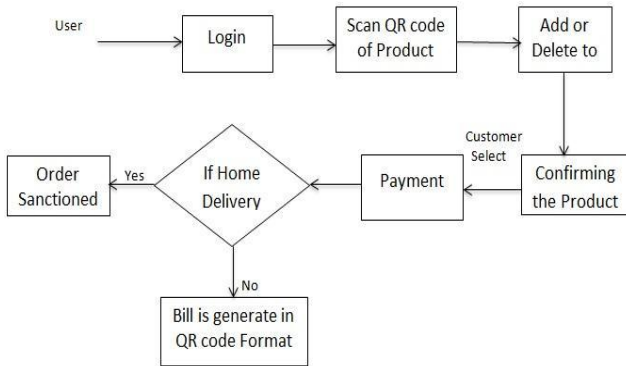


Figure 1: Time and Space Management in Shopping Malls

Purchaser confirming the product and select the payment mode for bill. If home delivery is accepted then customer's order is sanctioned. If it is no then bill is generate in QR code format[1].

The proposed [1] architecture is certainly cutting down time requirement but as a particular product will always occupy the same amount of volume, the space cutting is possible only in multiple trolleys occupying maximum space if number of customers are more at a given point of time. Again there is no guarantee whether the same product is being delivered to the customer as at the end, someone like a packing boy is physically choosing the products & packing the bag for the customer.

Devi Ramakrishna et al. in "IoT APPLICATION ON SECURE SMART SHOPPING SYSTEM" proposed a system for providing security to the shopping through IoT based application [2].

proposed system [2] that can be used in shopping malls to solve challenge of security threat. The system will be placed in all the trolleys. It consists RFID reader, Zig-Bee, display. All the products in the mall will be implemented with RFID tags. When a person places any product in the trolley, the respective tag of the product is detected and the price of that product is stored in the memory. Item name and its cost will be displayed on LCD. As a person places more products, the cost of the products is added to the total bill. Thus the billing is done in the trolley itself. At the billing Counter the total bill data will be transferred to PC by wireless RF modules.

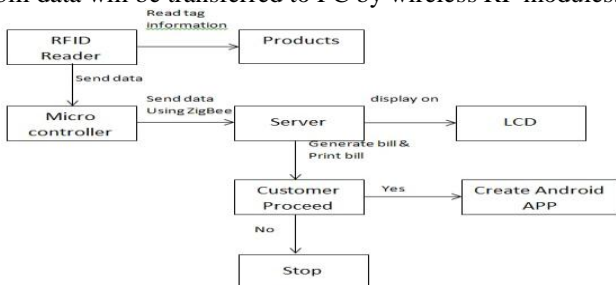


Figure 2 : Secure Shopping System Fig 2 shows a

P. Sathishkumar et al. proposed "SMART SHOPPING USING QR CODE" [3] with use of QR Code somewhat differently

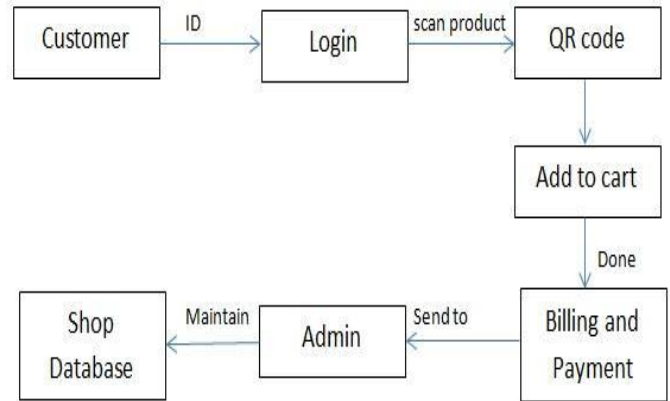


Figure 3: QR Code based Smart Shopping System

Bar-codes are often intended for consumer use where using a bar-code device, a consumer can take an image of a bar-code on a product. The bar-code must be read using computer vision techniques and bar-code can hold information, it makes their vision task in consumer scenarios unusually challenging. Bar-code decoder can give the vision algorithm feedback, and develop a progressive strategy of the product. Figure 3 shows the system using QR code [3]. Customer register the account then login customer id after that he scan the product using QR code. Customer adds the product in his cart that he want to update the product and delete the product. After customer done the shopping then he go for billing purpose at billing counter. He paid the bill either cash or on-line payment and send the customer data to ad-min for authentication. The shop authority can add or update the products details to server. The QR code image automatically generate for all products. Each Query given by the user will be processed by the server and update the changes in the database. The results produced by the database will be displayed to the user with an help of user interface.

Monika S. Broker et al proposed "A Secure Application For Shopping in Mall using NFC" [4] using Near Field Communication technology along with QR code Scanners. The working of the proposed system [4] can be elaborated through Figure 4. Money transaction between mobile devices is a difficult operation to perform since there is not a simple and safe way to do it. Near Field Communication (NFC) is a new short range wireless communication technology with security support. In Figure 3 firstly user login android application, then he/she scan a particular product using QR code. Products are add/delete into a cart automatically. After scanning QR code bill will get generated and for paying payment NFC terminal will be used. Finally, payment will be done and database store into a bank server.

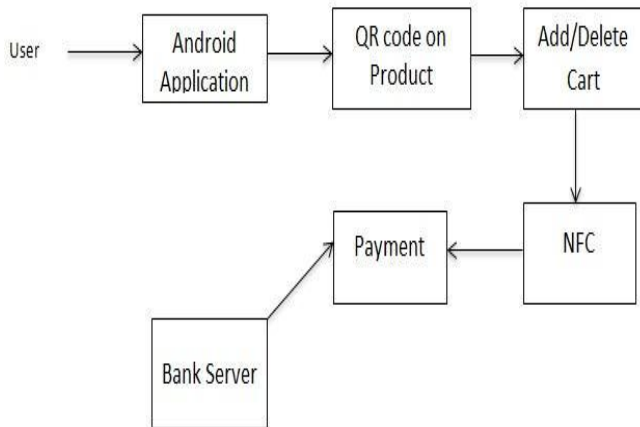


Figure 4: NFC (Near Field Communication)

Mr. Rhythm Mehta et al. proposed in “Smart Shopping using QR codes for Bill Calculation and RFID system” that QR code can be deployed along with RFID for effective shopping experience [5].

Figure 5 explains the system [5]. Long lines at the counters can cause people to wait for a more amount of time, before they can pay for their products, and leave, items being purchased. We feel that there can be changed, and our idea is to automate the check-out process, automatic payment. In Figure 5, we propose to do that by using a smart phone application that allows the user to scan the products he or she wants to purchase, generate the bill for all the products scanned, then customer view cart and he/she add or delete from cart as well as generate the bill and make the payment. This application will help avoid long queues. It will not only reduce the amount of waiting time, but it will also reduce or eliminate the need for a cashier.

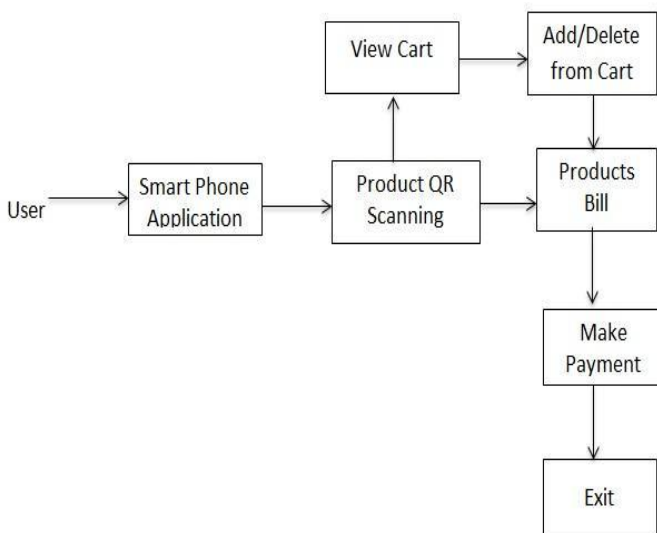


Figure 5: RFID System

Purva S. Puranik et al. in “IoT Application on smart and secure shopping system using RFID, Zig-Bee and Gossamer Protocol” proposes a system with RFID and few protocols [6].

The proposed system [6] consists of IoT system that can be changing a human lives by connecting every day as shown in Fig. 6. In this, all the system control is on the Zig-Bee Signal and the RFID System. In this system customer can be need to login the system, then the customer can easily scan the product on RFID tag, every product have the own RFID tag, just because can be easy to RFID reader check the product prize.

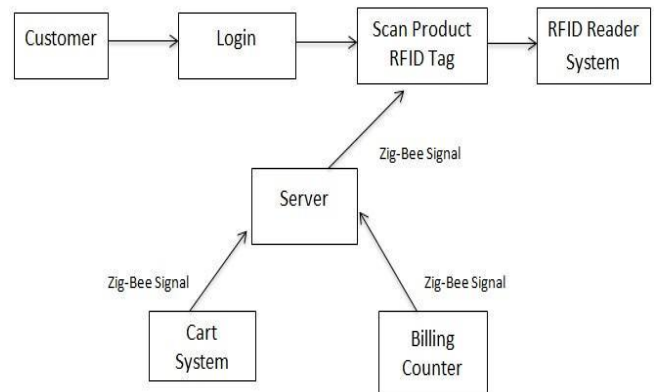


Figure 6: Shopping System using RFID, Zig-Bee, Gossamer Protocol

A smart and secure shopping system mainly dependent on RFID technology, Zig-Bee, and micro-controller. In this server are stored the all information. The cart system, billing counter are connected to the server from Zig-Bee signal.

Jason Couture et. al proposed “IoT applications on Secure Smart Shopping System” [7] which uses IoT technology for shopping system.

Figure 7 explains the proposed system utilizing RFID technology [7]. The system is all modules can be control the server system. In figure 6 the server send the zig-bee signal to the smart shell process. When an item is put into a smart cart, the RFID reader on the smart cart should read the tag and then send the tag information to the micro-controller that will then communicate with the server via Zig-Bee to request product information. The communication between the checkout point and the server are the same. The smart shell process is combining the RFID Reader, RFID Signal, and RFID Tag. Smart Cart work is main aim of this figure 7, the smart cart in touch screen (LCD Display to connect with trolley.) Then the sensor work on the arduino micro controller take input or output and then the process going to the Raspberry Pi sensor then go to the RFID Reader then go to RFID Antenna. We also design a secure communication protocol and present security analysis and performance evaluations.

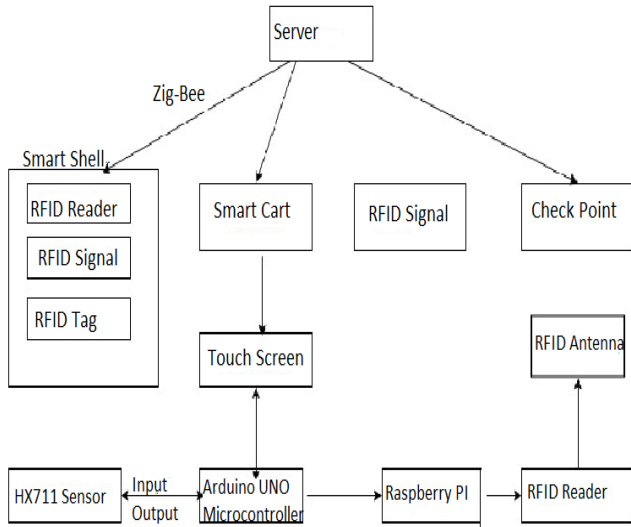


Figure 7: IoT Application based Shopping System Meenakshi Jangid et al. in “Smart Shopping using QR Code” proposed a new shopping architecture using QR Code [8].

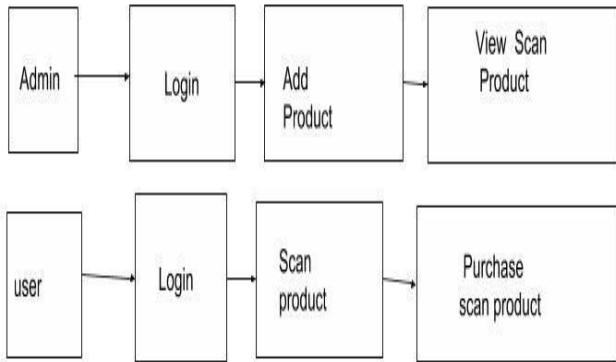


Figure 8: QR based Smart Shopping

In Figure 8, in the system’s [8] working is shown. A server stores, return and transfer the files and data to other devices on a network. It provides the need able data of the product scanned by the user. After user easily purchase the product whatever they want can choose the product and the price of that product to be get added directly to customer for him or her able to see the price or offer for shopping. Customer has done after purchasing each and every product. After customer done shopping provides easily billing. In above process customer don’t carry trolley. So in these system basically use router. Router is network infrastructure device which connect separate network allowing information to route from one to another. These paper system use PHP which only server side language. Scan the product via mobile and using the Wi-Fi, router data store on server or database. M.Keerthiga<sup>3</sup> and T.Prema<sup>4</sup> et al proposed “QR Code Generation for Mall Shopping Guide System with

Security”[9] which mainly focuses on providing guidance to the customer.

In Figure: 9 the working of the system [9] is explained. The system firstly user login and add product. Then user log in scan product which they want to purchase and add to cart. After that ad min view whatever the customer scanning product for the purchase .Then ad-min give the bill to customer for paying bill. In this paper use bar-code for scanning the product bar-code ID type or information density is also low bar-code information capacity is small as well as information type is number, character but as compare QR code information type is number Greek character and other binary information. Bar-code data dependence on database or communication on network.

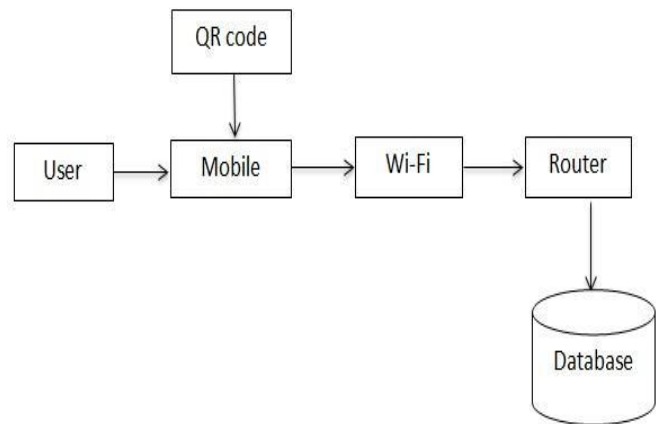


Figure 9: Mall Shopping Guide System with Security

Different Product Scanning Techniques have been studied and are summarized in table 1.

Table 1: Review Summary

Sr No.	Techniques	Pros	Cons
1	QR code	1. Ease of use 2. Less Storage is required 3. QR codes are traceable 4. Easy way to send mobile users to on-line content	1. Users need to download a QR code reader. 2. Scanning can be a long process. 3. Lack of awareness.
2	RFID	1. It is extremely convenient. 2. It is incredibly small. 3. It provides easy inventory management solutions.	1. It is easy to intercept the data on the RFID chip. 2. The range of scanning can be quite small.

3	NFC	1.Better User Experience 2.More Secure 3.Open and standards-based 4.Technology-enabling	1.Risk of Fraud 2.Lack of Availability 3.Expensive 4.Lack of Security
4	Zig-Bee	1. Network is very simple and easy. 2. It is easy to monitor and control home appliances from remote. 3. It is easy to add/remote zig-bee end device to the network.	1.It requires knowledge of the system 2. It is not secure like Wi-Fi based secured system. 3. Replacement cost will be high when any problem occurs in zig-bee.

### III. CONCLUSION

QR code needs less storage space, thus overcoming the disadvantage of bar-codes. Secure smart shopping system utilizes RFID technology, Zig-Bee technology as well as the Gossamer protocol which is employed in improvising shopping experiences by making it smart and at the same time incorporating security aspects in the system. NFC based application used for paying payments in shopping malls. Through this review it can be stated that QR codes can replace the existing systems with bar-code, NFC, Zig-Bee, RFID, etc. for its less complex nature and less storage requirements.

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