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SMART SHOPPING CART WITH AUTOMATIC BILLING SYSTEM THROUGH RFID AND ZIGBEE

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ABSTRACT:

Now-a-days shopping is increasing rapidly. People take the items and put it into trolley. After shopping they go at the billing counter for billing but there are many people standing in queue for billing purpose. So more time is required for the individuals for billing because of existing barcode technology. To reduce this time we have implemented a system which is based on RFID technology. The system contains the items attached with RFID tags. The cart is interacting with the main server and it will have the facility to generate the bill for all the products added into the cart. The proposed system will be helpful for avoiding queues in shopping malls for billing. The customer can identify the location of product in shopping malls with automatic billing. With the proposed design there is no conventional queue system instead of that automatic billing is generated and hence the shopping becomes easy and enjoyable.

Keywords: *RFID, tags, Zigbee, transmitter, receiver section.*

1. INTRODUCTION

In recent years a deep structural change has occurred, with consequences on economic growth and society, especially in factors such as territorial occupation, urbanization, openness to global markets, demography, family structures and cultural and consuming patterns. Innovation in communication and information technologies have caused a revolution in values, knowledge and perceptions in practically all areas of human understanding, deeply carving the so-called "Age of Information and Knowledge". The grocery industry sector in nowadays extremely

important in worldwide economy, with its recent evolution in technological, political, social and economic terms making it one of the most convenient and diverse businesses across the globe. In their journal "Consumer perception of privacy, security and trust in ubiquitous commerce" mentioned that the proliferation of electronic commerce technologies has utterly transformed the way business is conducted, causes range from the new mobile technologies and ubiquitous computing, to the recognition by business of the strategic benefits offered by the implementation of communication and



ubiquitous computing structures, to the emergence of new business models made possible due to the new technologies and to the development of new economies that can be used to understand and value the ubiquitous commerce activity. The challenges and opportunities created by electronic business in the supply chain have caused the sharing of information between business patterns to improve operational performance, consumer service and solution development. Businesses have evolved from the sharing and co-ordination of information to the sharing of knowledge and advanced co-operation practices. The emergence of new technologies such as radio frequency identification device (RFID) and wireless network makes the traditional retail processes faster, transparent and efficient. The technology represents to retailers and opportunity to reduce costs and to improve services, allowing attaining clients quickly, precisely and supplying personalized services. The advances in manufacturing, distribution and information combined with the urbanization of modern society and social demographical challenges created the so-called new consumer. The consumer has a deeper understanding in comparing product costs; is more versatile in brand preferences; shows little loyalty to retailers; has great expectations in services and client regard; is self-sufficient and is more demanding towards supplied information. There was clear control transference from the manufacturers and retailers to the consumer. Strong competition between larger retail changes caused the

minimization of profit margins as a form of keeping aggressive prices and winning more clients. Today, this is no longer enough. One has to bet on offer differentiation and in the adoption of client retention strategies through the strengthening of the relation with the consumer, allowing adequate answers to the clients' needs through personalized service and promotion plans that augment their satisfaction and, most importantly, their enthusiasm. RFID tag, or simply "tags", is small transponders that respond to queries from a reader by wirelessly transmitting a serial number or similar identifier. They are heavily used to track items in production environments and to label items in supermarkets. They are usually thought of as an advanced barcode. However, their possible area of use is much larger. This paper presents a few new applications that are possible using RFID technology such as locating lost items, tracking moving objects, and others. RFID tags are expected to proliferate into the billions over the next few years and yet, they are simply treated the same way as barcodes without considering the impact that this advanced technology has on privacy. This paper presents possible exploits of RFID systems and some proposed solutions as well. RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit card no.

2. LITERATURE SURVEY

A. Development of Smart Shopping Carts with Customer-Oriented Service The system

specified here is assisted by the functionality of tablet or embedded computer. The functionality of this system is partially implemented in C language and LabVIEW, in order to provide a smart user interface and also to establish connection between embedded computer and other accessories. The user interface here provides with the map information, product searching and also automated billing. To make the flexible designing of user interface easy the buffered state machine based on a queued message handler (QMH) is adopted. The algorithm used here for the purpose of facial recognition is LBPH (local binary patterns histograms) which mostly used to extract the features of human face. The obtained characteristics data is then transformed into LBP data array, which is obtained from trained images. The face recognition here is basically used for the purpose of login, which would be stored in the database during the customer registration. The automated billing system is also provided here, and also the assistive information to the customers are provided.[1]

B. Smart Trolley: A Fast and Smart Shopping Experience Using Android and Cloud In this paper, the system database is created on the cloud which holds all the information about all the products. When the product is purchased, since it contains RFID tag and the trolley contains RFID reader which is connected to the android display through Bluetooth, its information gets stored in the database of the particular trolley for which trolley id is assigned by the server. Bill payment can be done through an

android application or desktop application. Products purchased are cross-checked at the exit gate and RFID tags of the products get removed there.[2]

C. RFID based smart shopping: an overview In this paper, RFID based smart shopping and billing concept is used. The system integrates Cart location detection unit (CLDU) which is used to detect the location of the shopping cart inside the mall or supermarket, Server communication unit (SCU) which will help in establishing and maintaining the connection of shopping cart with the central or the main server, User interface and display unit (UIDU) which will provide the customers with the user interface, and billing and inventory management unit (BIMU) which will handle and deal with all the shopping bill and inventory management. Shopping area is divided into multiple aisles. Also the IR transmitters are used at both ends of the aisle, to obtain information regarding the entry and exit of the shopping cart in the shopping malls. Including the location of the shopping cart as an attribute, database is maintained at the central server.[3]

3. RELATED STUDY

Frequently people encounter a problem of spending too much of their time waiting in queues for billings their purchases in different shopping centers, malls and supermarkets. Waiting in-queues negatively affects human morale and may cause misunderstandings or conflict amongst people for instants, when someone breaks the line and stands in front of other people[2].

The proposed system aims to eliminate this problem by introducing a novel alternative to traditional billing methods, speeding up the payment process. The Arduino UNO is a microcontroller board. It has an Atmega328 M.C. It contains 14 digital input and output pins. So our aim is to design an automatic billing system which is based on RFID (Radio Frequency Identification) technology. The smart card uses a serial interface and receives its power from sources like a card reader. A smart card is like a chip card. It is a plastic card that contains an embedded computer chip—either a memory or microcontroller type that stores and transacts data. This data is usually associated with either value, processed within the card's chip. The card data is transacted via a reader that is part of the computing system. Smart shopping systems usually require other auxiliary wireless communication systems, but the proposed system we are using is called as ZIGBEE wireless communication (especially low-cost) to perform indoor positioning and product information broadcasting. Thus, the dual-antenna RFID reader is adopted in the developed SSC to identify the items in the cart (internal antenna) and out of the cart (external antenna). A customer when purchases an item after swiping the card, the price and number of items are read by the RFID reader, and the number of items purchased are already entered into the cart before reaching up to the counter. There will be elimination of queue. After the card is swiped, the number of items are read by the RFID Reader and they are entered into the cart

before one reaches the counter, queues would be eliminated. Another important technology used in a Smart Cart system is called ZIGBEE wireless communication, which is one measure to reduce the waiting time of a customer's. It is to introduce an intelligent billing system using electronic Smart Cart as an alternative to an existing barcode system. Smart cart allows a customer to manually perform billing without relying on a cashier by means of swiping the RFID tags over an RFID reader. Unlike a barcode system, smart cart does not need any visual contact with barcodes which may get distorted in real life situations. All data about purchased products and user account data are stored in a cloud database on the Internet. Then, smart cart shows this information to customers on its display. A customer can delete an item from the list whenever he or she wishes by selecting a subtraction button. If the customer decides to finish purchasing, there's a total button press is required to upload all purchased product data and their total cost to the billing counter PC through ZIGBEE. Once all payment data is sent to the PC, total cost is withdrawn from the registered account cash of the customer and the customer can freely pass the anti-theft gate with the purchased products.

4. PROPOSED SYSTEM

The technology currently used in checkouts at a supermarket is barcodes, which were developed in the 1970s. Today barcodes are found on almost every item. Barcodes are a universal technology in that they are the



norm for retail products; stores that own a barcode reader can process barcodes and imprint it on the products. The most important factor that is involved in barcode scanning is that the product should be in the Line of Sight (LOS) of the reader in order to get the barcode imprinted on the product scanned. Thus Shopping in the present day usually involves waiting online to get your items scanned for checkout. During a shopping excursion to a shopping mall, you would have noticed the cashier scanning your products using some Laser device to produce a bill. What actually he is doing that he is reading the product barcodes using a Laser/Barcode scanner. Barcode scanner reads the code, data is sent to the computer, and computer looks up into the database for the price and description of the item[4]. Barcodes are structured to contain specific product related information. It basically encodes alphanumeric characters and symbols using black and white stripes, also called bars. Bar-coding is one of the AIDC (Automatic Identification and Data Collection) technologies. Some major drawbacks of existing systems are barcode scanners need a direct line of sight to the barcode to be able to read, and in order to read barcodes the scanner needs to be quite closer, Barcodes have no read or write capabilities; they do not contain any information such as expiry date etc. They are very labour intensive, Barcode have less security than RFID, and Barcodes are more easily prone to damages, Waiting in a line to get your items scanned from barcodes in supermarket for checkout is the major

drawback. The range of the RIFD reader must not extend beyond the horizontal shopping cart limits so that reading products inside other shopping carts or on shelves does not happen. Nevertheless, range cannot be less than the cart's limits with consequence of not identifying products that are inside the shopping cart but out of the reader's range. The RFID reader should be able to read all the tags no matter the material (paper, plastic, metal, etc)they are inserted into. The usage of RFIDs in this solution comprehend benefits such as increasing safety and the consequent reduction in product loss, reduced human intervention and error, increased speed in involved processes, unique identification of products with additional information and availability of real-time information, amongst others. By using RFID technology there are many advantages like RFID tags can be read from a greater distance than barcodes, RFID tags don't need to be positioned in line of sight with the scanner, RFID tags can be read at faster rate than barcodes, RFID tags are read/write devices, RFID contains high level of security, RFID tags are more reusable, RFID tags carry large data capabilities such as product maintained, shipping history and expiry date etc, and by using this technology bills can be paid very easily and quickly And it also removes the waiting in a line to get the item scanned for checkout.

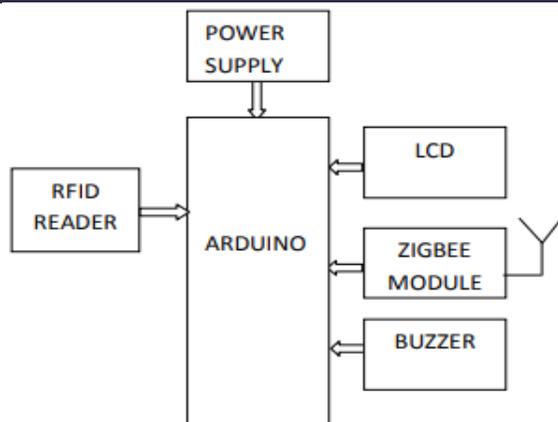


Fig.4.1. Block diagram of Transmitter.

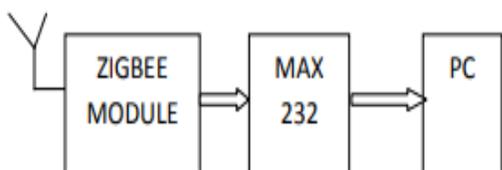


Fig.4.2. Block diagram of receiver.

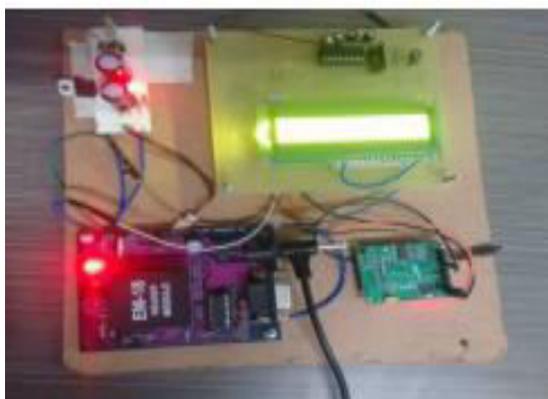


Fig.4.3. Hardware kit image.

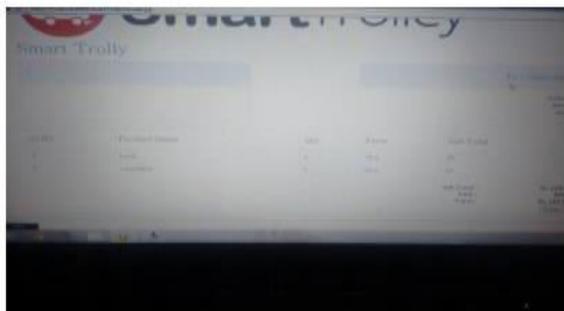


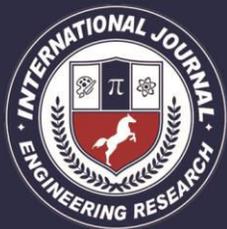
Fig.4.4. shows the reward points on Android Application.

5. CONCLUSION

Thus the proposed system created bill of the purchased items. This process saved the time of customer and also reduced the manpower in the malls. So ultimately it becomes a easiest way of the shopping. Also with this system we have implemented the reward point system using Android application. The objective behind the application is to replace the existing card based system by android application. So the intended objective is successfully achieved in given system.

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