An Automated Billing System in Shopping Malls Using Bascart

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Abstract: In modern days, people are getting too busy in their works but still they need to spend time in shopping malls. In Shopping malls, customers face a difficulty to follow a queue for the process of billing, which takes a long time under huge crowd. Customer thought that, to avoid the standing time in the billing section at shopping malls. To overcome the above problems, we emerged the Bascart system. To increase the pace of a billing process, RFID tags in products, then the product is read by the barcode scanner which describes the cost of that product and is displays on the LCD screen attached in our shopping list. As customer buy their exact product its price is add on the previous list. The cost of the product is displayed on the LCD screen by using microcontroller through Zigbee Communication from host PC. Zigbee supports bidirectional communication between microcontroller and host PC. We have proposed the Weighing Sensor for the purpose of checking the weight of the items and it is directly stored in the server database. Customer get direct bill at the billing section which is already stored at host PC which automatically reduces the queue. Then GSM Module in our system is used to detect the Geo-position of the customer's mobile for the process of intimating the shopping details of the customer through messages which is already updated in database.

Keywords: Microcontroller ATmega16, RFID Tags, Barcode Scanner, GLCD, Zigbee, Weighing Sensor, GSM Module.

1. Introduction

In this present years, human lifestyle has moving fast more than the earth. Humans have shaped and extended themselves by virtue of technical tools and artworks. Human beings are always trying to develop technology which will support and fulfill their basic needs in an easier and faster way. Time flies like an arrow". So, people are unable to spend more time in shopping. Due to this reasons people where preferring shopping malls which is used for getting their daily necessities. Even though shopping in mall gives the benefit of saving time, but people have only time during weekends to visit shopping malls. The customers have to stand in the billing lines for a long time in a queue than actual shopping

time. So the people find difficulties at the cash counter.

In extensive, Indian population is increased and everyone moving forward towards smart shopping's. They find difficulties in online shopping and the products may change during their delivery time. In shopping malls, the people want to stand in a queue for billing after the finishing the purchasing. The person in the billing section will scan barcode of each and every product and provide the correct bill to the customer. This process is tedious and it becomes thrash on holidays, great deals or day of rest."Time is Technology". So, we introduced baccarat using different techniques till date to solve the problems. There have been a number of methods to design carts in order to make shopping easier and faster for the customers in malls and save the time of customers by avoiding the requirements to stand in long billing queues. And for the Security purpose we were using GSM Module to send the items details via messages.

2. Literature Review

Dr. Suryaprasad J has introduced a "A Novel Low-Cost Intelligent Shopping Cart" [1] for bargain-priced smart shopping assist to guide customer to select a items in a shopping malls and insist the customer about the great deals available on the products as they move around in the shopping complex.

Udita Gangwal et.al,[2] proposed a concept that is "SMART TROLLEY IN MEGA MALL". In present era, automatism of shopping mall they developed a microcontroller based CART which is totally computerized. Only the billing section person has to hold the barcode detail which present in the product covers and it read by the barcode scanner. Then the data of the product will be displayed. By using that cart, in a very less time customer can buy large number of product. At the billing counter,

computer can be simply affiliated for confirmation and deliver the bill.

J.S.Awati,et.al.[3] described about the, "Intelligent Shopping Cart" which focus to reduce, and perhaps evict the total waiting time of customers, lower the manpower requirement for markets and enlarge the overall efficiency. The Future of the peddle industry also lies on more computerized devices.

Amine Karmouche [4] proposed to develop a novel and cost efficient approach of RFID Technology in wholesale from cart level to aisle-level scanning, at the level of RFID middleware by the method of "Aisle-level Scanning for Pervasive RFID-based Shopping Applications"

Satish Kamble [5] initiated for "Developing a Multitasking Shopping Trolley Based on RFID Technology" the people, in shopping mall need to wait in a queue at billing counter. For decoding this problem RFID tags are used. This paper represents some application using RFID technology such as locating bygone items, tracks the moving objects.

Chandrasekar.P [6] explained "Smart Shopping Cart with Automatic billing System through RFID and ZigBee" has develop a shopping cart contain a microcontroller in Product Identification Device (PID), a LCD, an RFID reader, EEPROM, and ZigBee module were used in this model. Shopping product intimation will be read through a RFID reader on cart, meanwhile product information will be accumulated into Electrically Erasable Programmable Read Only Memory attached to it and the data from this will be generate to Central Billing Section through ZigBee module. Then the separate bill detail of the cart will be calculated by the main billing counter and the customer will receive the correct bill of their respective products.

J.Thangakumar et.al,[11] introduced "Automated Shopping Trolley for Super

Market Billing System" it aims to reduce the time of the working peoples time. This model is secure to the user because of the usage of GSM Module. This review exploits the use of barcode technology which was used for identifying the product. We have already enlightened about the system which is smart and easy for shopping in the malls to reduce time, strength and earnings of the customers. There are a few provocation/disadvantages that can be solved to make the system more strudy. This is specifically promoted for browse about offers, about the products and it provides a better customer ex*perience.*

3. Proposed System

In order to save customers precious time in the billing section, we propose a Smart Trolley System (STM). The system implementation will use Wireless Access Network and Radio Frequency Identification (RFID) technologies.
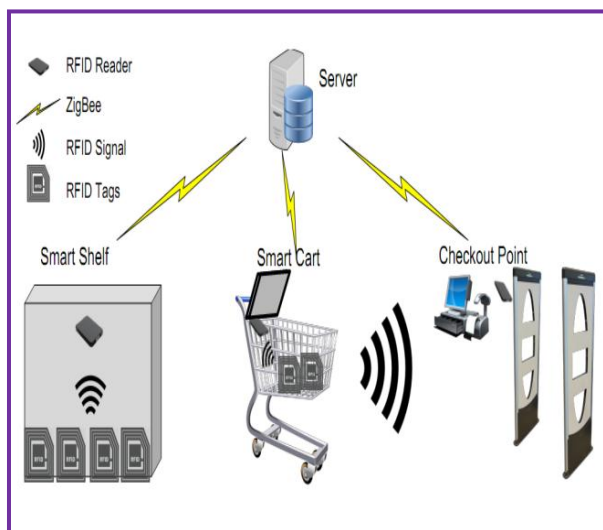

Fig 1. Block Diagram

The Smart Trolley is connected to the router of the store. Customer needs to login to store's website where he will be able to see the list of items purchased. The Smart Trolley is equipped with an RFID scanner along with the other hardware components all the items in the store will have RFID tag fitted to them. All the data such as cost total quantity etc. with respect to the item is stored in the system's

database. When the item is kept in front of the RFID scanner present in the Smart Trolley the item RFID is scanned one (Quantity of items added) and "Total Amount" gets updated. The "Total number of items in trolley" and "Total Amount" is displayed on LCD screen attached to the trolley handle. It also has provisions of removing the purchased item from the trolley, the "Total number of items in trolley" and "Total Amount" gets decremented, when the customer has finished shopping he simply has to pay the Total Amount" displayed by LCD and LOGOUT from the stores' website.

4. Scanning Technologies

RFID Tag Scanning:- To identify and. Once activated, the tag sends a wave back to the antenna, where it is translated into data. The RFID consists of two types: Active RFID, Passive RFID. They consist of a microchip and an antenna which transmit a locate items using radio signals the Radio-Frequency Identification tags were used. An RFID tag consists of a microchip, memory and antenna. RFID tags typically hold less than 2,000 KB of data, including a unique identifier/serial number. Tags can be read-only or read-write, where data can be added by the reader or existing data overwritten. There are three main types of RFID systems: low frequency (LF), high frequency (HF) and ultra-high frequency (UHF). Microwave RFID is also available. Frequencies vary greatly by country and region. Low-frequency RFID systems range from 30 KHz to 500 KHz, though the typical frequency is 125 KHz. LF RFID has short transmission ranges, generally anywhere from a few inches to less than six feet. High-frequency RFID systems range from 3 MHz to 30MHz, with the typical HF frequency being 13.56MHz. The standard range is anywhere from a few inches to several feet.UHF RFID systems range from 300 MHz to 960 MHz, with the typical frequency of 433 MHz and can generally be read from 25-plus feet away. Microwave RFID systems run at 2.45 GHz and

can be read from more than 30-plus feet away. RFID tags can be 'read' out of the line of sight and at distances ranging from a few centimeters to over 100 meters. They also enable ***individual items to be given a unique identification number, rather than just a product code. The retailers and wholesalers are expected to use these RFID tags to track the package of goods between stores and warehouses.***

Fig.2 RFID Scanner

In this Pioneering Billing Cart System, each product will contain the passive Radio Frequency ID tag which is bearing a unique Electronic Product Code (EPC). This EPC provides the statistics of the product for Ex: its name, price and other details. Instantly the buyer puts the product in the Trolley, Radio Frequency ID reader scans the tag thereby generating the EPC number. The summoned data is passed to the microcontroller where further processing takes place.
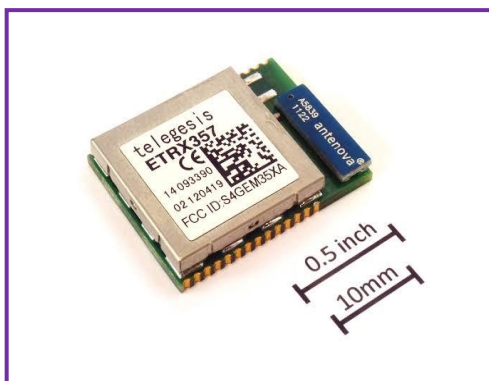

Fig 3. Zigbee

Zigbee:-Zigbee is for low-data rate, low-power applications and is an open standard. This, theoretically, enables the mixing of implementations from different manufacturers, but in practice, Zigbee products have been extended and customized by vendors and, thus, plagued by interoperability issues.

Barcode Scanner:-A barcode is an optical device which shows data on certain products like unique ID. Purpose of using barcode scanner is to automatically identify the product from its unique barcode label printed on it .This barcode reader is combination of hand held unit (LED array type source & CCD capture) and decoder circuit which receives raw data of Barcode and outputs serial data at 9600 bps with RS 232 level output suitable for interfacing with microcontrollers or host PC serial port.

Fig 4. Barcode Scanner

Weighing Sensor:

Weighing Sensor or Load Cell Module is based on HX711, which is a precision 24bit analog to digital convertor designed for weigh scale and industrial control applications to interface directly with a bridge sensor.
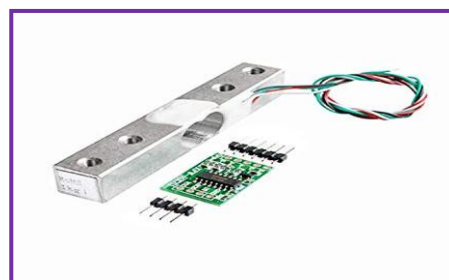

Fig 5. Weighing Sensor

Compared with other chips, HX711 not only has a few basic functions, also contains high integration, fast response, immunity and other features. The chip lowers the cost of the electronic scale, at the same time, improving the performance and reliability. The input interface of this weight sensor module is used sensor interface, which is compatible with Arduino I/O port. The output adopts compact terminal that makes weight sensor module easier to connect the weight sensor. It is the best choose for electronic enthusiast to do some tiny home scale. The weight sensor module can be combined with weight sensor on the market. We also help you to pick a small range of weight sensor.

Algorithm:

1. The first step is starts with the scanning of the barcode of the product.
2. Then system need to check for the switch condition is there Add SW. is pressed or the Sub SW. is pressed.
3. If any switch is pressed then it need to compare for the load cell weight with the Database updated product weight.
4. If the load cell weight is matching with cart's product weight then it need to allow customer to proceed with purchase.
5. If there is mismatch in the compared weight then it will generate the error message.
6. It will generate bill, and will send the message to customer about the shopping purchased number of products and total bill of products

Advantages

- It becomes easy for the store to do inventory management as all items can be automatically read and easily logged.
- As an IoT application, the power consumption must be low.
- Computational overhead at the smart cart side for higher efficiency.
- Many security and privacy issues have emerged and lightweight cryptographic methods are in high demand to fit in with IoT applications.

Table 1. Comparison of Scanning Techniques

Features	Barcode	RFID Scanner	Zigbee	GSM Module	Weighing Sensor
Read method	Optical scanner	Radio signal	Wi-fi	Wireless Module	Sensor Detection
Line of sign	Required	Not required	Required	Required	Required
Read range	0-10inch	0-50feet	10-100mtrs	880-915MHz	1 Kg
Read rate	One at a time	Many at once	Not required	All time	Many time
Tag durability	Not usually durable	Very durable	Not required	durable	durable
Cost	Less expensive	Expensive	Less expensive	Less expensive	Expensive
Security	Less secure	More secure	Less secure	end-to-end security	Highly Secure

5. Result and Discussion

The utility of trolley will be first of its kind for commercial use. This device records the data of the different products with help of the suitable sensors like RFID Tags. This recorded data helps the shop owner with detailed analysis of shopping by the customer & their preferences through the computer; printout of the same can be obtained. In Automatic trolley, there is no need to pull heavy trolley, no need to wait in billing queue and no need of thinking about budget. The microcontroller based trolley automatically follows the customer. Also it maintains safe distance between customer and itself. It gives number of products in trolley and total cost of the products on the spot.

6. Conclusion

In this project, we propose a secure smart shopping system utilizing RFID technology. This is the first time that LF RFID is employed in enhancing shopping experiences and security issues are discussed in the context of a smart shopping system. We detail the design of a complete system and build a prototype to test its functions. We also design a secure communication protocol and present security analysis and performance evaluations. We believe that future stores will be covered with RFID technology and our idea is a pioneering one in the development of a smart shopping system. Our future work will focus on improving the current system, for example, by reducing the computational overhead at the smart cart side for higher efficiency, and how to improve the communication efficiency while preserving security properties.

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