Automated Goods Management System For Shop Using RFID

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ABSTRACT - The modern technology has increased the standard of living for the humans. There has been an emerging demand for quick and easy payment of bills in supermarkets. Everyone in their life have craves for a quality in everything they use daily lives. This project describes how to build an automated and time saving system for the world of retail which will make shopping experience impetuous, customer friendly and secure. So, this has resulted in large crowds at shopping malls which have led to long lines at the billing counter because the cashier has to scan every product item and then enter it into the billing record. The prevailing billing system is a bit time consuming. So by thinking of inventing a remedial electronic product to catch-up with this problem. "Automated shopping trolley for billing system" is better approach for the above said problem. This is based on ATmega328 Controller fitted with a LCD and RFID reader and a wireless technology called Zigbee. The LCD and Zigbee modules make the wireless network to work easily between a certain ranges. An innovative product with social acceptance is the one that aids the comfort, convenience and efficiency in everyday life. The brief description of its operation is, when you pick a product and drop it into the trolley, the RFID reader scans the product's unique ID and its price. And it gets displayed on the LCD screen. So after customer has finished with the shopping he/she has to visit the counter and pay the bill as displayed on the LCD screen fitted on the trolley. This will save the time that was earlier being consumed to scan each item.

Keywords— RFID, Arduino Uno Microcontroller, Zigbee and IOT.

I. INTRODUCTION

In the era of the Internet of Things (IoT), interactions among physical objects have become a reality. Everyday objects can now be equipped with computing power and communication functionalities, allowing objects everywhere to be connected. This has brought a new revolution in industrial, financial and environmental systems and triggered great challenges in data management, wireless communications, and real-time decision making. Additionally, many security and privacy issues have emerged and lightweight cryptographic methods are in high demand to fit in with IoT applications. There has been a great deal of IoT research on different applications, such as smart homes, e-health systems, wearable devices, etc. In this paper, we focus on a 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 - for example, a smart shelf.

Intuitively this brings the following benefits:

1. Items put into a smart shopping cart (with RFID reading capability) can be automatically read and the billing information can also be generated on the smart cart. As a result, customers do not need to wait in long queues at checkout.

2. Smart shelves that are also equipped with RFID readers are able to monitor all stocked items and send item status updates to the server when item become sold out the server cannot notify employee store stock.

3. It becomes easy for the store to do inventory management as all items can be automatically read and easily logged.

We have built a prototype to test the functions of the smart cart. We have also closely monitored the reading range to guarantee only the items put into a smart cart can be read. We test the placement of the RFID reader in the smart cart and of the reader at the checkout point. We also give a security analysis and performance evaluation to prove this system is practical. Finally, we take into consideration the cost of the required components and we find the cheapest RFID reader are at 150 USD and UHF passive tags are at 2 cents in the current market. We believe in the future, grocery stores will be IoT-based with RFID technology.

II. LITERATURE SURVEY

Ever since the debut of wireless technology, electronic commerce has developed to such an extent to provide convenience, comfort and efficiency in day-to-day life. In this paper, we discuss a ground-breaking concept ofRFID based smart shopping cart in the field of retail merchandise. Our whole shopping experience is often marred by the long checkout lines. Soon we can end this problem by replacing the ubiquitous Universal ProductCode (UPC) bar code by smart labels, known as radio frequency identification (RFID) tag. The key idea here is to provide assistance in everyday shopping in terms of reduction in time spent, eliminating the daily hassle of locating the right product and standing in long lines. The primary goal is to provide a technology oriented, reduced cost, time saving, hassle free, commercially oriented system for an enhanced shopping experience. The growingeconomy, urbanization, industrial growth in recent years, there has been a significant change in the global market. With the grocery sector playing an important part in the worldwide economy, it has become one of the mostConvenient and diverse business across the globe. The emergence of RFID makes the traditional retail process faster, transparent and efficient. With the proposed system,soon, when the UPC codes would be replaced by RFID tags these tags would communicate with an electronic reader (through an infrared sensor) that will detect every item in the cart and this reader would be connected to a large network that will send information of the products to the retailer and product manufacturers (through Zig Bee). The bank will be notified and the amount of the bill would be deducted from one's account.no lines. No waiting. This smart shopping cart secures mobility of consumers and accelerates their purchasing thereby enhancing their shopping experience along with making the inventory control easier for the store management.

A supermarket is a place where customers come to purchase their daily using products and pay for that. So there is a need to calculate how many products sold and generate the bill for the customer. When we go to shoppingmart for shopping, we have to work for selecting the right product. Also, after that, it is hectic to stand in line for billing all the goods. Hence, we are proposing to develop asmart shopping cart system that will keep the track of purchased products and also online transaction for billing using RFID and Zig Bee. The system will also give suggestions for products to buy based on user purchase history from a centralized system. In this system, every product in Mart will have RFID tag, and every cart will be having RFID Reader and Zig Bee attached to it. There will be a centralized system for the recommendation and onlinetransaction. Moreover, also there will be RFID reader at theexit door for anti- theft.

III.EXISTING SYSTEM

Currently available method in shopping malls is thebarcode method explains the Existing system. The cashier scans the product through the barcode scanner and gives us the total bill. But this becomes a slow process when lots of products are to be scanned which eventually results in longqueues, making the billing process slow. While doing survey we found that most of the people prefer to leave the shopping mall instead of waiting in long queues to buy a few products. To try to solve the problems previously identified, recent years have seen the appearance of severaltechnological solutions for hypermarket assistance. All suchsolutions share the same objectives: save consumers time and money and help the retailers to win loyal clients.

RFID and barcodes are similar in that they are both data collection technologies, meaning they automate the processof collecting data. However, they also differ significantly inmany areas. If compared, RFID technology is found to be more comprehensive than barcode technology. Barcodescanner requires line of sight whereas RFID can be read without the line of sight. It is possible to read RFID tags from a greater distance.

3.1 *DISADVANTAGES***:**

1. Expensive:
It is comparatively more expensive than the regularshopping cart. The startup capital will be high that is the

Initial installation cost of the cart and the products that needto be bought and installed are very expensive.

2. Damaging:
The system has LCD and other hardware which can be damaged easily. It will be hard to predict the person who has damaged the cart or misused it since tracking the persondown will be difficult.

IV.PROPOSED SYSTEM

In our Futuristic Billing Trolley System environment each product will have the passive Radio Frequency ID tagwhich is bearing a unique Electronic Product Code. This Electronic Product Code provides the information about the product i.e. its name and price. When the customer puts the product in the Smart

Trolley, the Radio Frequency ID scans the tag and the Electronic Product Code number is generated that is previously known by Radio Frequency IDreader.

V.BLOCK DIAGRAM

Figure 1 shows the block diagram of automated goods management system for shop using RFID.
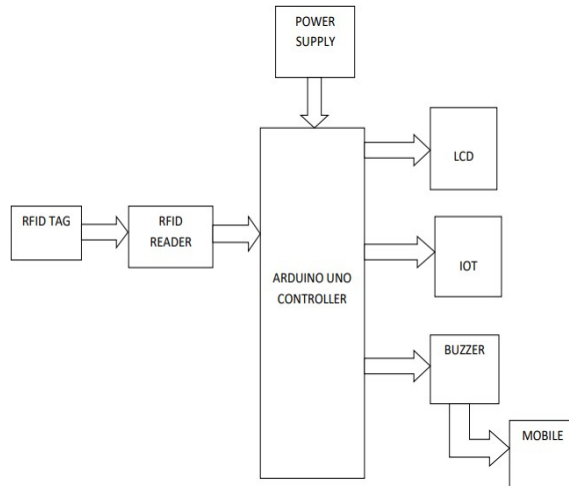
Figure 1: Block diagram of RFID goods management system

COMPONENTS USED

- Rid tag
- Rid reader
- Power supply
- Arduino uno controller
- Lcd
- Iot
- Buzzer
- Mobile

VI.MODULE DESCRIPTION

RFID MODULE:

Radio-Frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. Figure 2 shows the RFID Solutions. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader.
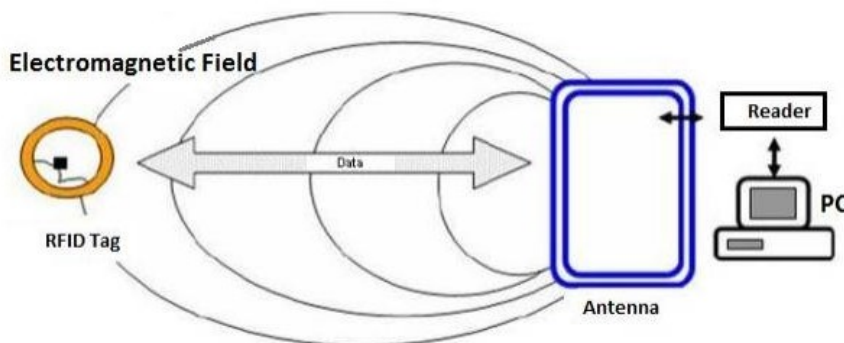
Figure 2: RFID Solutions

RFID TAG:

An RFID tag is comprised of an integrated circuit (called an IC or chip) attached to an antenna that has been printed, etched, stamped or vapor-deposited onto a mount which is often a paper substrate or Poly-Ethylene There phtalate (PET). Figure 3 shows the RFID Tag .The chip and antenna combo, called an inlay, is then converted or sandwiched between a printed label and its adhesive backing or inserted into a more durable structure.

Figure 3: RFID Tag

5.3. *RFID CARD AND READER*:

An RFID card and reader, also known as an interrogator, is a device that provides the connection between the tag data and the enterprise system software that needs the information. Figure 4 shows the RFID Card and Reader. The reader communicates with tags that are within its field of operation, performing any number of tasks including simple continuous inventorying, filtering (searching for tags that meet certain criteria), writing (or encoding) to select tags, etc.

Figure 4: RFID Card and Reader

5.4...*LCD MODULE*:

LCD is used to display the results of the system operation such as sensed values, motor status etc.. A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. Figure 5 shows the LCD Display. The LCD standard requires 3 control lines and 8 I/O lines for the data bus. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. In this tutorial, we will discuss about character based LCDs, their interfacing with various microcontrollers, various interfaces (8-bit/4- bit), programming, special stuff and tricks you can do with these simple looking LCDs which can give a new look to your application.
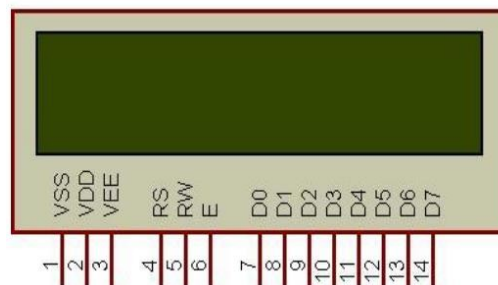

Figure 5: LCD Display

5.5. *ARDUINO UNO CONTROLLER:*

The Arduino Uno is a microcontroller board based on the ATmega328.Figure 6 shows the Arduino Uno Controller. It has 14 digital input/output pins (of which six can be used as PWM outputs), six analog inputs, a

16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to DC adapter or battery to get started. The Arduino Uno differs from all preceding boards because it does not use the FTDI USB-to-serial driver chip. Instead, it featurete

ATmega8U2 programmed as a USB-to-serial converter. Revision 2 of the Arduino Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. The Arduino Uno is a microcontroller board based on the ATmega328. Arduino is an open-source, prototyping platform and its simplicity makes it ideal for hobbyists to use as well as professionals. The Arduino Uno has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button

5.7. *GSM MODULE:*
Digital cellular technologies such as GSM (Global System for Mobile Communications) are used to transmit mobile data and voice services. In 1970, Bell Labs realized this concept through a mobile radio system. As the name suggests, this is the name of the standardization organization, which was established in 1982 to create a common European standard for mobile phones. This technology accounts for more than 70% of the global mobile digital subscriber market. The technology was developed using digital technology. Today, GSM technology supports 1 billion mobile phone users in the above 210 countries/regions. This technology can provide simple to complex voice and data services. Figure 8 shows the GSM Modem. This article provides an overview of GSM technology.
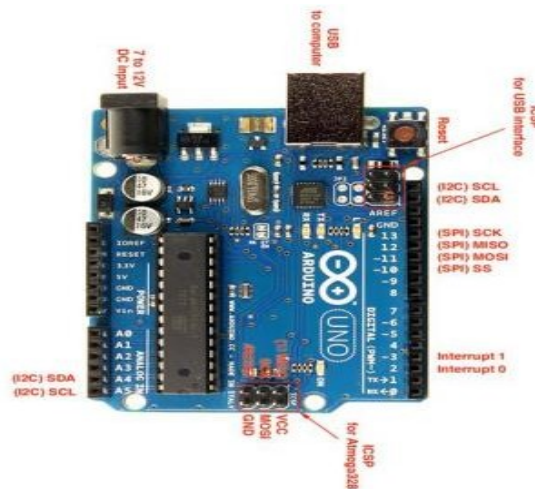

Figure 6: Arduino Uno Controller

5.6 *BUZZER MODULE***:**
A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and

VII.RESULTS:

Which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of acontinuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).Figure 7shows the Buzzer module. In game shows it is also known as a "lockout system," because when one person signals("buzzes in"), all others are locked out from
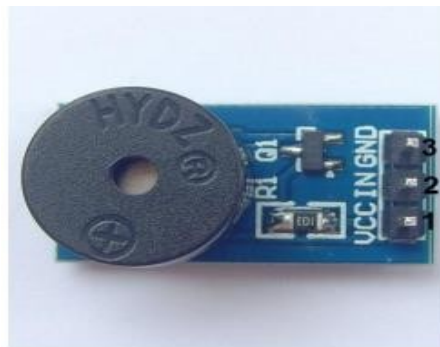
signaling. Several game shows have large buzzer buttons which are identified as "plungers".

Figure 7: Buzzer

Working Condition module:
In Figure 9 shows the working condition of Automatedgoods management systems for shopping.

Figure 9: Hardware results of automated goodsmanagement system for shopping.

Item Details being displayed:

In Figure 10 shows the Items details being displayed onLCD.

Figure 10: Item details

VIII.CONCLUSION

The smart shopping trolley application creates an automated central billing system (acbs) for supermarkets and malls. Using arduino (product identification),customers will not have to wait near cash counters for their bill payment. Since their purchased product information is transferred to central billing system. Customers can pay their bill through credit/debit cards as well.

The system proposed is highly dependable, authentic, trustworthy and time- effective. There will be reduction in salary amount given to employees, reduction in theft also, the system is very time-efficient.

The proposed Smart Shopping Trolley System intends to assist shopping in- person which will minimize the considerable amount of time spent in shopping as well as totime required in locating the desired product with ease. Thecustomer just needs to type the name of the product he wants to search on the Android device, and the cart will automatically guide him/her to the product/s locations.

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