Automated Shopping Cart

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Abstract— **Shopping is one of the most important segment in our day-to-day life. It can be shopping a small pencil to purchasing a whole grocery kit. The people today are so busy with their work that they want everything to be done in fractions of seconds. Millions of people today use large grocery stores for acquirement of products. Barcode scanners are a time consuming process resulting for the customers to stick to the billing section for a longer time period. A product which is accepted socially and that establishes a convenience, comfort and efficiency in day to day life is needed. It uses the RFID based system application in the shopping cart and the RFID card which is used as a security access for the product. The Liquid crystal display (LCD) that is fixed to the trolley displays the product name, expiry date, cost and the total cost of all purchased products. As each product is scanned it sums up the amount and total price will be displayed. It includes additional features such as setting up Budget Limit, elimination of products, detection of any malpractices ,etc making it more efficient. The final bill is transmitted to the server end through the Zig Bee technology. The software simulation is done using Proteus software and the hardware is implemented using LPC2148 microcontroller. It reduces human efforts and efficiency is increased due to minimal errors.**

Index Terms— **RFID Tags, RFID Reader, Zig Bee Technology, LPC2148 Microcontroller.**

I. INTRODUCTION

With changes in factors such as territorial occupation, urbanization, family structures, cultural & consuming patterns, openness to global markets and demography has led to a deep structural change in recent years. Innovation in communication and information technologies has caused a revolution in values, knowledge and perceptions in all areas. The grocery industry sector has become one of the most convenient and diverse business across the globe with its recent evolution in technological, political, social and economic terms. The challenges and opportunities created by electronic business have caused the sharing of information between business partners to improve operational performance, consumer service solution development. The traditional retail processes have become faster, transparent and efficient with the emergence of various new technologies such as RFID and wireless networks. The main objective of proposed system is to provide a technology oriented, low-cost, easily scalable RFID system for shopping. The main objective of this project is to improve the speed and efficiency of purchase by using RFID. Once the product is placed into the cart, then it will display the amount and also the total amount along with other product details. The product can be

accessed using the RFID card. So this project improves the security performance and also the speed.

In retail and logistics, barcodes have been the industry standards for over 25years. The emergence of new technology like RFID have greatly diminished the luster of barcodes in past decade. The implementation RFID is done using radio waves for communication between a unique item and a system for information. A typical RFID system consists of an RFID reader, tags(chips) and at least one antenna. RFID system can be either active or passive.

Active RFID tags contain a battery and the information i.e. transmitted periodically with much greater range than passive tags. Once the passive tags are powered by the electromagnetic induction via the RFID reader, it responds by transmitting its unique information.

- Reader generates RF carrier sine waves
- Once tag receives sufficient energy, tags output transistor shunts the coil corresponding to the data being clocked out of memory array.
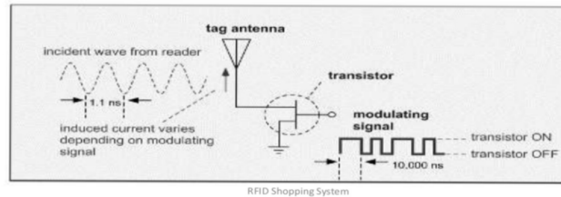- Reader performed digital data encoding.

Fig: 1

RFID has many advantages over barcodes, but barcodes have become a standard in many industries for many worthwhile reasons. We need to keep the initial and recurring costs in mind along with the potential returns on your investments when it comes for you to decide between either systems. Investing in an RFID system may pay for itself over time due to potential increase in efficiency and decrease in errors.

II. ARM VS OTHER MICROCONTROLLERS

The Reduced to instruction set of ARM processors, enables them to be widely used in consumer electronic devicesas they need fewer transistors which leads to smaller size of IC. The ARM processors, smaller size, reduced difficulty and low power consumption makes them suitable for increasingly miniaturized devices.

	8051	PIC	AVR	ARM
Bus width	8bit	8/16/32bit	8/32bit	32/64bit
Speed	12 clock/ Instruction cycle	4clock/ instruction cycle	1clock/ instruction cycle	1clock/ instruction cycle
Memory	ROM,SRAM, FLASH	SRAM,FLASH	FLASH,SRAM, EEPROM	FLASH,SDRAM, EEPROM
Memory Architecture	Von Neumann	Harvard	Modified	Modified Harvard
Power consumption	Average	Low	Low	Low
Other Features	Known for its standards	Cheap	Cheap, Effective	High Speed Operation, Vast

Fig:2

III. PROPOSED WORK

The main aim of this project is to provide a system which is technology oriented, low cost, which can be easily scaled and is durable. The developed system consists of 3 key components/modules (a) Server Communication component (SCC) which establishes and maintains the connection of shopping cart with the main server. (b) User Interface and display component (UIDC) provides the user interface, and (c) Automatic billing and Inventory management component (ABIMC) handles the billing and inventory management in association with the SCC. These 3 modules are integrated into an embedded system and are tested to satisfy the functionality.

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. Vertically, the products down to the floor should be able to be read by the reader as there are shopping carts where the products can be placed 30cms above the ground and to about 2m higher than the handle bar since there are both tall products and excessively filled carts. All the tags of the materials such as paper, plastic, metal, etc (no matter the material) should be read by the RFID reader. By suggesting a single RFID reader per cart, in order to decrease the complexity level we are thinking not only in terms of costs, battery duration and data quantity and also the prevention of collision of readings when more than one reader is used. In the proposed system, if the object is dropped into or removed from the trolley, the RFID tag identifies the product and updates the bill. After shopping, if we press the "End Shopping" button and the details are sent to the main server and the customer has just to pay the amount and leave the mall, which saves the precious time of the consumers. The block diagram of proposed system is shown in figure 1.
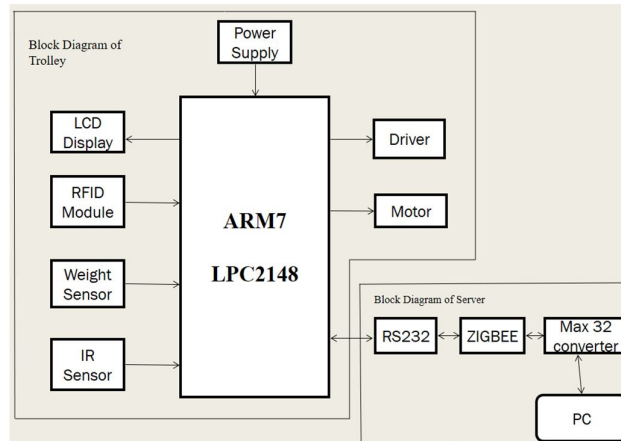
IV.BLOCK DIAGRAM

Fig:3

The integrated system is built around LPC2148 Microcontroller and has 20X4 LCD display, ZigBee module, RFID module & miscellaneous circuit including power supply. The operation of RFID reader & ZigBee is performed via UART, the proposed system components and system model is shown in figure 4.

V. ADVANTAGES

Reduces manpower required in billing section. The expenses incurred by the management can be reduced.
☐The total bill amount will be updated time to time to the users at the time of purchase.
☐ The queue at the billing counter reduces which in turn makes the purchase faster increasing the customer satisfaction.

VI. DISADVANTAGES

Expensive to implement on large scale. Henceforth, difficult for small scale vendors to implement.
☐ Requires constant battery backup. The customers tend to get upset when their shopping cart run out of

power during the middle of their shopping routine, hence it requires constant care.
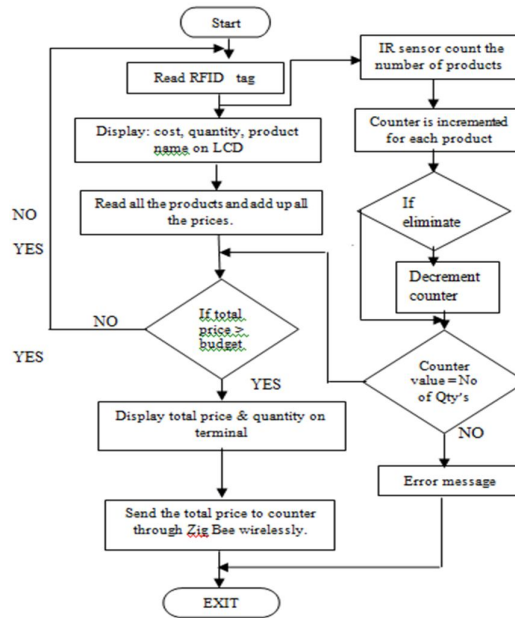

Fig: 4

A. Comparison between existing system & proposed system

Existing system	Proposed system	BARCODE (existing technology)	RFID (proposed technology)
a) Manual billing. b) Use barcode for billing c) Human staff is needed for billing d) Low product cost but overall expenses are much high. e) Difficult to track the product. f) Getting product information is difficult & time consuming.	a) Automatic billing b) Use RFID TAG for billing c) No need of any staff for billing d) Product is little expensive but overall expenses is much low e) Easy to locate/track the product f) Getting product information is easy and no extra time needed.	a) Effort is required to read barcode on product. b) Line of sight is required to read a barcode. c) The readability of barcodes can be impaired by dirt, moisture, abrasion, or packaging contours d) Short reading distance. e) Barcode does not have READ & WRITE capability.	a) Automatic reading of RFID tag from product. b) No line of sight required to read RFID. c) RFID tags are not affected by such conditions. d) Long reading distance. e) RFID tag having READ & WRITE capability.

FIG: 5

VII. CONCLUSION

The proposed model is easy to use, low in cost and do not require any special training. We have also learned the architecture of the system that can be used in the shopping systems for intelligent and easy shopping in the malls to save time, energy and money of the consumers. Present trends are pointing towards the faster growth of RFID in the next coming decades. With around 9.1 billion RFID tags sold in the year 2015 alone, value of market including systems, services and hardware is likely to grow by factor of 10 between years 2016 -2026. The total number of RFID tags expected to be delivered in the year 2026 will be around 500 times as compared to the ones delivered in the year 2016.There are a few challenges/drawbacks that can be

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resolved to make proposed system more robust. The billing issues have to be resolved to promote consumer confidence. Further, a more sophisticated microcontroller, larger display system, GPS to track the product, internet facility inside the card to browse the offers, deals and facility of payment within the cart by using swapping card can be used to make cart more advance provide better consumer experience.

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