LABVIEW Based Automated Shopping System Using Conveyor

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***Abstract* - Automated shopping system using Radio Frequency Identification system emerges as a converging technology where, time and efficiency are the major issues in shopping system nowadays. In order to overcome the above challenges, we can use intelligent cart. Another benefit of this kind of system is that inventory management becomes much easier, as all items can be automatically read by an RFID reader instead of manually scanned by a laborer.**

RFID reader [1] sense the particular product, it will send the signal to the PIC microcontroller, which is to process the product information and send those information to billing counter for billing process using zigbee communication [2]. The IR sensor is used to avoid theft. The robotic trolley is controlled with help of RF transmitter and receiver. Finally the sale details of each trolley at every time in the supermarket will be sent to the owner through GSM module. If the products in the rack is to be get emptied then intimation will be shown in the stock page with blinking LED.

Keywords – RFID, IR Sensor, GSM module, RF Tx, Rx

I. INTRODUCTION

In the modern world, every supermarket and hypermarkets employ shopping baskets and shopping trolleys in order to aid customers to select and store the products which they intend to purchase. The customers have to drop every product which they wish to purchase into the shopping cart and then proceed to checkout at the billing counter. The billing process is quite tedious and highly time consuming and has created the need for shops to employ more and more human resource in the billing section, and

yet waiting time remains considerably high. In this paper, we seem it fit to propose the "Automated Shopping trolley" which aims to reduce ,and possibly eliminate the total waiting time of customers, lower the total manpower requirement and expenses for markets and increase efficiency overall. In a world where technology is replacing the ways we pursue everyday activity, the future of the retail industry also lies in more and more automated devices.

II. EXISTING SYSTEM

The Existing system block diagram is shown in fig 1.

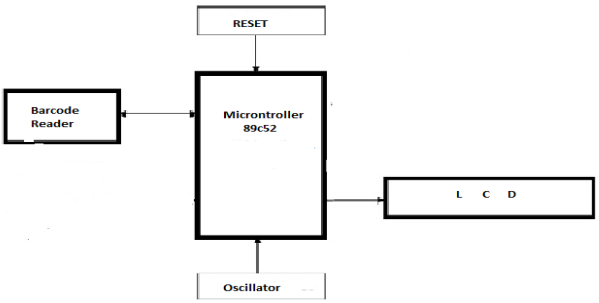

Fig 1.Existing system

Currently available method in shopping malls is barcode method. In this method there are barcode labels on each product which can be read through specially designed barcode readers. A barcode reader (or barcode scanner) [3] is an electronic device for reading printed barcodes. Like a flatbed scanner, [4] it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port. When we select any product for buying we put it in the trolley and take it to the billing counter. The cashier scans the product through the barcode scanner and gives us the bill. But this becomes a slow process when lot of products is to be scanned, thus making the billing process slow. This eventually results in long queues.

Problem Identified:

- Can't be read from a distance of more than15 feet.
- Less speed
- Barcode lacks read and write facility

III. PROPOSED FRAMEWORK

Our proposed system mainly aims at providing better service to the consumers. The traditional method is very time consuming .The robot trolley consists of RFID tag and RFID reader. The RFID tag is placed on each product .It has unique identification code for each product. The RFID reader is placed on the trolley that

to sense the product put up in the trolley [5]. When the RFID reader senses the product, it sends the signal to the microcontroller thereby counting the product and adds to the billing system thereby reducing the time consumed in the billing queue. The trolley moves in the particular direction using RF transmitter and RF receiver.

IV. BLOCK DIAGRAM

- Its total operation is controlled by the PIC Microcontroller. It has three units as trolley unit, trolley control unit, server unit
- The Trolley unit shown in fig2 can contain the process of scan the product that put up in the trolley and that be displayed in the LCD
    - This section also contain the motor for the movement of trolley is controlled by RF transceiver [6] is shown in fig3
    - The Buzzer is to avoid theft and to intimate the expire product

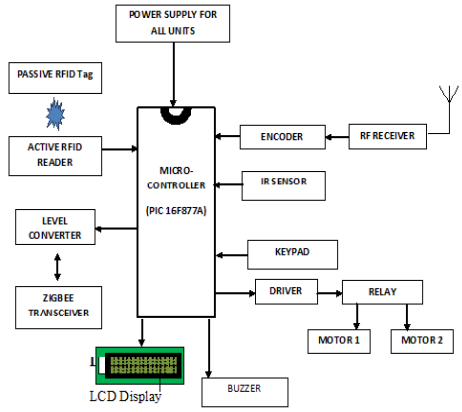

Fig 2.Trolley unit

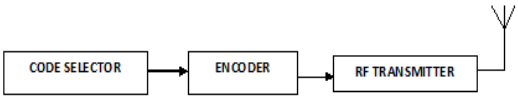

Fig 3.Trolley control unit

- The server unit is to receive the product details from the trolley using ZIGBEE [7]
- And after completion the billing section the total bill amount to be send to the owner using GSM module is shown in fig4

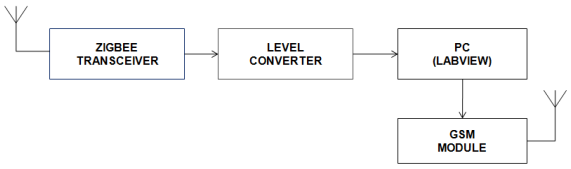

Fig 4. Server Unit

Working principle:

- All the items in the mall will be equipped with RFID tags. When person puts an item in the trolley, its code will be detected by RFID reader [8] which is interfaced with microcontroller. It requires 5V supply for operation & after receiving the tag code it gives interrupt to the controller.
- Reader send this code to PIC microcontroller, after matching code with codes stored in SPI memory, processor reads item's name, cost & other details. Then it displays on LCD.[9] The item details like name, cost & total bill of items inserted in trolley are displayed on LCD.
- And also if we want to remove some inserted item then we press the ash key and remove a particular item. That item's cost gets subtracted from total bill and item removal message is displayed on LCD.
- LCD is interfaced with microcontroller in 4bit mode.[10] It is used to indicate the customers the action taken by customer that is inserting of an item, removal of item, item's price and total billing cost of items in the trolley.
- An IR sensor is used to avoid theft in supermarket
- At the billing Counter the total product data will be transferred to PC by wireless ZigBee transmitter interfaced with microcontroller. It is ZIGBEE RF4CE. ZigBee RF4CE is designed to be deployed in a wide range of remotely-controlled audio/visual consumer electronics products, such as TVs and set-top boxes.
- The RF transmitter and receiver are used to control the movement of the trolley with a small distance.
- A GSM module which is used to intimate the product empty in the rack to the store room and also to send each total bill amount of each trolley to the owner. . It is a compact and portable terminal that can satisfy various data communication needs over GSM.[11] It can be connected to a computer with the help of standard serial port.

Advantages:

- Users can be aware of the total bill amount during the time of purchase.
- Reduces time spent at billing counter and Increases customer satisfaction
- It operates on less power &requires less space
- More efficient because use of RFID

Disadvantages:

- Expensive to implement on large scale. Henceforth, difficult for small scale vendors to implement.
- Requires constant battery backup. This requires constant care as customers tend to get upset when the find their trolley runs out of power during the middle of their shopping routine.

V. HARDWARE REQIREMENTS

- RFID Tag(passive tag)
- RFID Reader(Active)
- Microcontroller(PIC16F877A)
- Zigbee Tx,Rx(RF4CE)
- RS 232
- PC
- IR Sensor
- Key Pad
- LCD Display
- GSM module
- RF Tx,Rx

- Relay Driver
- Buzzer

VI. SOFTWARE TOOLS

- MP LAB IDE(Integrated Development Environment) Version 8.6
- Labview software for amount calculating & transfer to GSM module
- EMBEDDED C Programming for programming microcontroller

VII. FUTURE ENHANCEMENT

- With the advent of conveyor systems, trolleys will eventually replace salesmen, hence helping in reducing final product of goods. As a result, better and more profit margin.
- Global sales monitoring and inventory control from a geographically far off site.
- All the cases mentioned below are detected by the system in future

a. Attempt to take away products by keeping them into the cart without scanning their barcodes.
b. When the customer scans a product, but forgets to keep it in the cart.
c. Attempt to scan one product, but place multiple products in the cart.
d. Attempt to take away one product of higher price by scanning the barcode of another product of lesser price.
e. Since consumers are likely to change their mind, our implementation allows for removing any item already placed in the cart, without help from attendant.

VIII. RESULTS AND DISCUSSION

- After the completion of purchase we have to press a # key to transfer the product items details to the billing section for calculating total amount which is shown in fig5.
- After the completion of the process the bill amount will also send to the owner.

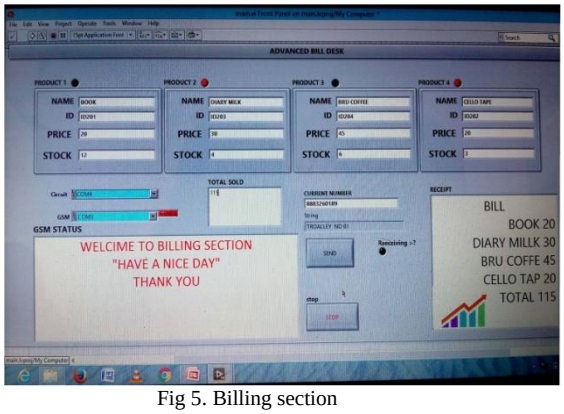

Fig 5. Billing section

- The stocks that to be get emptied in the rack then it shows an indication in this stock page with blinking LED is shown in fig 6.

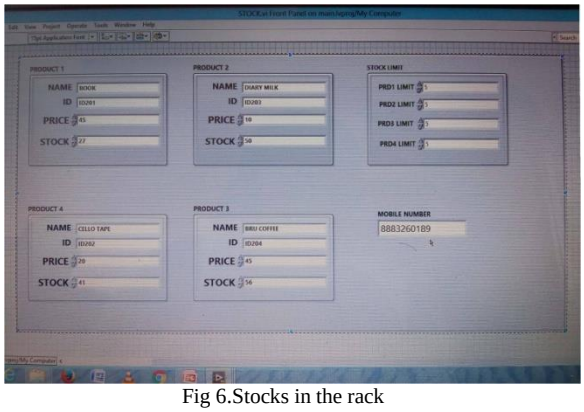
Fig 6.Stocks in the rack

IX. CONCLUSION

Concluding this paper, we would like to highlight that we drew the inspiration and idea of this paper after observing large queues at the sales and billing counters at the Retail bazaars. While working on this paper we learnt substantially about RFID technology, embedded systems and wireless systems, especially ZigBee modules alike.
This system would help in cost saving at the supply chain level. At the same time it would also reduce the required no of salesmen. Thus it is truly time saving method and guarantees the less time consumption out of all present billing methods.

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