Automated Shopping and Billing with product Inventory Management System

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***Abstract*- Purchasing and shopping at big malls is becoming daily activity in metro cities. We can see big rush at these malls on holidays and weekends. People purchase different items and put them in trolley. After completion of purchases, one needs to go to billing counter for payments. At billing counter the cashier prepare the bill using bar code reader which is very time consuming process and results in long queue at billing counter. This proposed model is mainly designed to monitor the business in wide retail shops i. e., shopping malls, supermarkets etc. Here RFID is used for reading the product code and sending the data to ZigBee module interface with RFID module. While a customer puts a product in to that trolley, the RFID reader reads the product code and sends the data to ZigBee module. In the same way another module of ZigBee connects through the standard rs232 interface with a personal computer, which acts as the database. With this, the customers need not wait in long queues till their products are billed. Customer can pay the bill by the database accounts and leave the shopping complex in very short time.**

I. INTRODUCTION

Long checkout lines at the grocery store are one of the biggest complaints about the shopping experience soon these lines could disappear when the ubiquitous Universal Product Code UPC bar code is replaced by smart labels named as radio frequency identification [RFID] tags. RFID tags operated as intelligent bar codes that can talk to a networked system to track every product that user put in user shopping cart. Imagine going to the shopping mall, filling up user cart and walking right out the billing. No longer will customer have to wait till shopping mall employee rings up each item in customer cart one product at a time. Instead of these waiting RFID tags will communicate with an RFID reader that will detect every product in the cart and read each up instantly comparing previous techniques. The RFID reader will be connected to a large server that will send product information on customer products to the retailer and data are stored in database of shopping mall.

. RFID tags are advantages over bar codes because the tags have read and write operation capabilities. Data is stored on RFID tags can be modified, updated and locked for security. Some malls that have begun using RFID tags have found that the technology offers a better way to track merchandise for stocking and marketing purposes. With the help of RFID tags stores can see how quickly the products leave the shelves and who is buying them.

II. PROJECT DESCRIPTION

Problem Statement:
To develop a shopping aid that assists the consumer to locate and select products and inform them on the product/s details in the shopping arena. Additionally, with each product identified uniquely and support billing and inventory updates.

Objectives of the Project:
(a) Complete listings of the products and their information on the cart display.
(b) Automatic billing as and when the
Products are dropped in the cart.
(c) Update inventory in the central system upon each purchase of a product.
(d) Product finding system.
(e) Eliminating the queue system in billing.

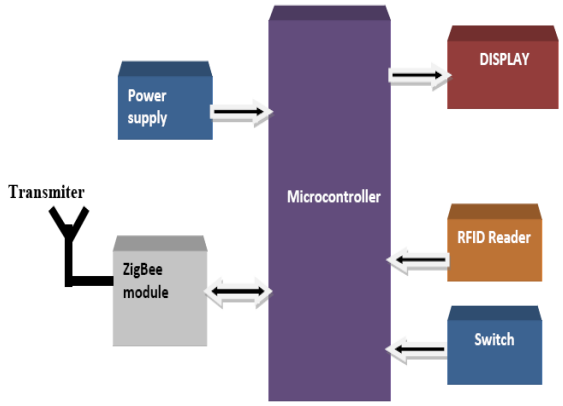
Comparison between existing system & proposed

Existing system	**Proposed system**
a) Manual billing. b) Use barcode for billing c) human staff is needed	a) Automatic billing b) Use RFID TAG for billing c) No need of any staff for

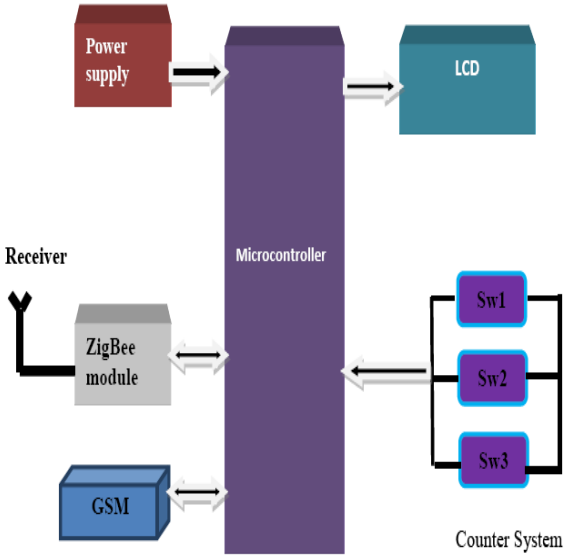
for billing d) Low product cost but overall expenses are much high. E) Difficult to track the product. f) Getting product information is difficult & time consuming. g) It does not disclose any automatic way of indicating to the shopper how the total bill is affected as objects are added or removed from the cart.	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. g) LCD display is present which will show the updated bill every time the shopper add or remove any object from the cart.

Table Comparing Existing and Proposed systems

If compared, RFID technology is found to be more comprehensive than barcode technology. It is possible to read RFID tags from a greater distance. An RFID reader can access the information of the tag from a distance of around 300 feet, whereas barcode technology can't be read from a distance of more than 15 feet. RFID technology also scores over barcode technology in terms of speed. RFID tags can be interpreted much faster than barcode tags. Barcode reading is comparatively slower because it requires a direct line of sight. On an average, a barcode reader takes around one second to successfully interpret two tags, whereas in the same time the RFID reader can interpret around 40 tags. RFID tags are well protected or either implanted inside the product, and hence is not subjected too much wear and tear. Interpreting a barcode requires a direct line of sight to the printed barcode, because of which the barcode is printed on the outer side of the product, and is thus subjected to greater wear and tear. It also limits the re-utilization of barcodes. As barcode lacks read and write facility, it is not possible to add to the information already existing on it. On the other hand rewriting on RFID tags is possible.



Transmitter Section



Receiver Section

III. REQUIREMENTS

Microcontroller: The microcontroller used is 89C52 has 256 bytes of RAM and 8 Kbytes of ROM having 4 ports which can be used as the interface between the input/output devices and the microcontroller. All the I/O devices can be connected to any port. Microcontroller is used as database storage of the products and product details like price, weight etc.

GSM modem: GSM modem [sim300] connected to the receiver section of Module. The microcontroller baud rate is set based on the baud rate of GSM modem. If at any pin any change in the state of particular signal leads to relay activation.

This GSM model is used to communicate customer with the server station without any interference to check the product location and availability.

Zigbee Module: One of the emerging standards in the move toward a wireless world is an approach called ZigBee. Pioneered by Phillips, it has since formed into an alliance of companies working together to create a wireless communication protocol. The ZigBee stack unlike Bluetooth is relatively straightforward, The XBee/XBee-PRO OEM RF Modules interface to a host device through a logic-level asynchronous serial port. Through its serial port, the module can communicate with any logic and voltage compatible

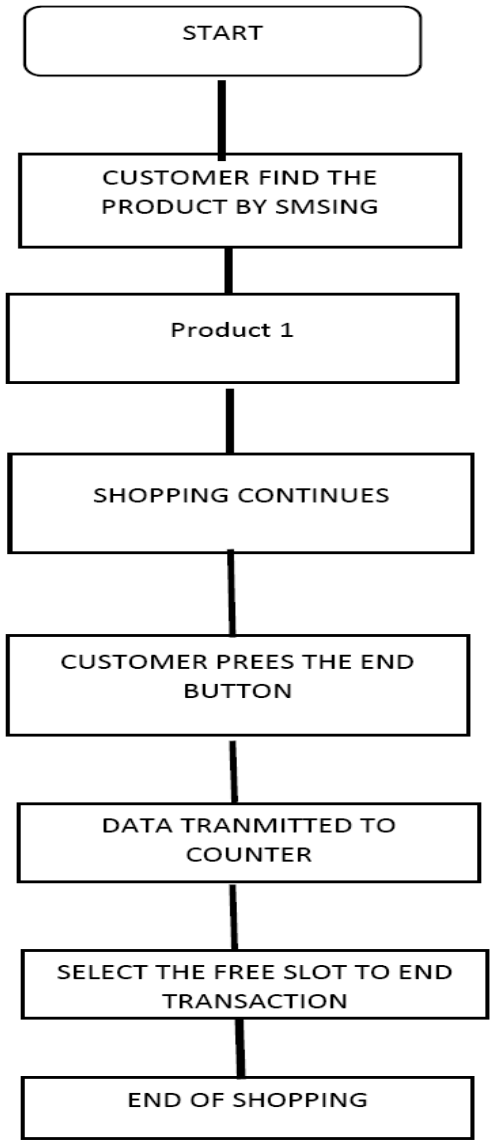
RFID Module: RFID Reader Module are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz.

The reader has been designed as a Plug & Play Module and can be plugged on a Standard 300 MIL-28 Pin IC socket form factor.

IV. IMPLEMENTATION

Methodology of the System

1. 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 which is interfaced with processor.
2. Reader send this code to ARM processor, after matching code with codes stored memory, processor reads item's name, cost &other details. Then it displays on LCD. The item details like name, cost & total bill of items inserted in trolley are displayed on LCD.
3. As we put the items, the costs will get added to total. Thus the billing is done at the trolley itself. Simultaneously all details are displayed on LCD. LCD used is 16X2 character alphanumeric type display. And also if we want to remove some inserted item then we press the delete key and remove a particular item. That item's cost gets subtracted from total bill and item removal message is displayed on LCD.
4. LCD is interfaced with microcontroller in 4bit mode. 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.



5 At the billing Counter the total bill data will be transferred to PC by wireless ZigBee transmitter interfaced with processor. It is 2.4 GHz RF module which works in free ISM band so does not require licensing.
6. The ZigBee receiver is connected to billing RS3232 protocol, it receives billing data & gives it to the PC for printing. This data contains all details of purchased items with total bill of items.
7. The data send by ZigBee contains all details of the items purchased i.e. name of the item, it's price etc.
8. RFID tags we are going to use are 125 KHz passive type tags. Transponder (tag) that is attached

to the object. An RFID tag is composed of a miniscule microchip and antenna. RFID tags can come in a wide variety of sizes, shapes, and forms. Communication between the RFID Reader and tags occurs wirelessly and generally does not require a line of sight between the devices. An RFID Reader can read through most anything.

9. We are going to use ZigBee modules (transmitter & receiver) to transmit the billing details from trolley unit to the billing PC at counter wirelessly when customer completes putting the items in trolley and reaches at counter for billing. The person at counter clicks the GET DATA option and hence data is transmitted from trolley to the PC using ZigBee.

10. LCD is used as main output device for the customers; it displays the details of items, price and total bill etc. to indicate the activity made by customer.

V. CONCLUSION

The intended objectives were successfully achieved in the prototype model developed. The developed product is easy to use, low-cost and does not need any special training. This project report reviews and exploits the existing developments and Different types of radio frequency identification technologies which are used for product identification, billing, etc. 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.

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