RADIO FREQUENCY IDENTIFICATION (RFID) BASED SMART TROLLEY FOR SUPERMARKET

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ABSTRACT - *Nowadays purchasing and shopping at big malls is becoming a daily activity in metro cities. We can see huge rush at malls on holidays and weekends. The rush is even more when there are special offers and discount. People purchase different items and put them in trolley. After total purchase one needs to go to billing counter for payments. At the billing counter the cashier prepare the bill using bar code reader which is a time consuming process and results in long queues at billing counters. however, the advancement of technology has changed how people do shopping over the last decade Our aim is to develop a system that can be used in shopping malls to solve the above mentioned challenge .In this study, we propose a low-cost, robust, passive UHF RFID based shopping trolley system which allows tracing and processing shopping data in real time. The UHF antenna mounted shopping trolleys are defined "Smart Trolleys" while shopping items are tagged using UHF RFID(Ultra high frequency radio frequency identification readers) tags with unique identification codes.*

Keywords: Smart Shopping Trolley, UHF RFID, IR Sensor.

1. INTRODUCTION

There have been disparate attempts which were carried out in the past to knock out longish shopping lines in retail stores. One of the famous approaches is the introduction of self- checkouts where customer amenity has been improved drastically . Self-check outs have been trendy since then due to low overhead cost; however, the shoplifting and lower operating efficiencies are considered as major drawbacks in the retail element. This

system provides on spot scanning of the product and frame-up its price details on LCD. This grant customers to compare the total price with the budget in the pocket before billing. Whenever a customer is done with his/her shopping and near to the billing counter, the data from the LCD is going to transfer to the billing counter computer through IoT device. By this way, it will save the time of the customers and simplify the administration of stores as well.

2. SYSTEM DESCRIPTION

There are assorted UHF RFID based smart container applications have emerged in contemporary times [1] [2] [3]. Most of these applications review the amassment of RFID with zig bee system to establish the wireless communication between main server and each smart container.

Farther, precise analysis has not been conducted in the accuracy of readings / miss counts when the smart container is full with items and there is also shortfall of study in cost comparison. In some other systems, additional components were added like camera and anti-collision sensors to ensure the veracity of the readings . The outlined smart trolley in this paper evaluates the ability to integrate all components (reader + antennas + user interface) to the shopping cart itself at a lower cost and communicate through low-power bluetooth (only uses one fourth of power in contrast to Zig bee , hence added on battery life for the same cost) with kiosk. The outlined system also provides evident of high accuracy when the cart has multiple products personate the real life scenario .It is clearly visible from the above explanations that shopping trolley is considered preferable over self-checkout systems. It also wrap up that there is a clear need for a low cost and powerful technology implementation which is efficient and highly accurate when dealing with shopping information. Therefore, this effort aims to design and implement UHF RFID based smart trolley which can track products and lend item level information to consumers in real time.

3 SYSTEM DESIGN

3.1 Block diagram

The block diagram of the proposed model is shown in the below fig.1.

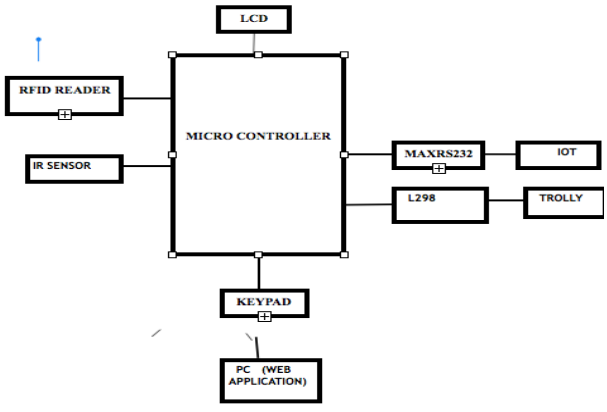

Fig-1 Block diagram

3.2 Hardware Design

This can be brought about simply by annexing RFID tags to the products and a RFID reader with a LCD display on the shopping trolley. With this system consumer will have the data about price of every item that are scanned in, total price of the item and also concise about the product. This setup will save time of customers and manpower required in mart and cost concorded with the product.

In this unit the controller is attached to a RFID reader and barcode reader. The reader on the trolley reads the tag whenever the customer puts things in and sends a signal to the controller. The controller then stock it in the memory and compares it with the lookup table.

If it matches then it shows the name of item on LCD &also the total amount of items acquired or purchased.Trolly is followed by the person by Rf remote and getting billing information by Pc via Max rs 232.As the latter step, fabricated CP antenna and coupler was seated to the shopping trolley.

The positioning of antennas has been done in a way that, it widen the area of coverage considering the gain and directivity of the CP antenna. Using E field and directivity configurations the effectiveness of such placements in both near field and far field can be elaborated.

3.3 Software Design

Here the coding is done using Embedded C. The flow chart of the program is shown in fig.2

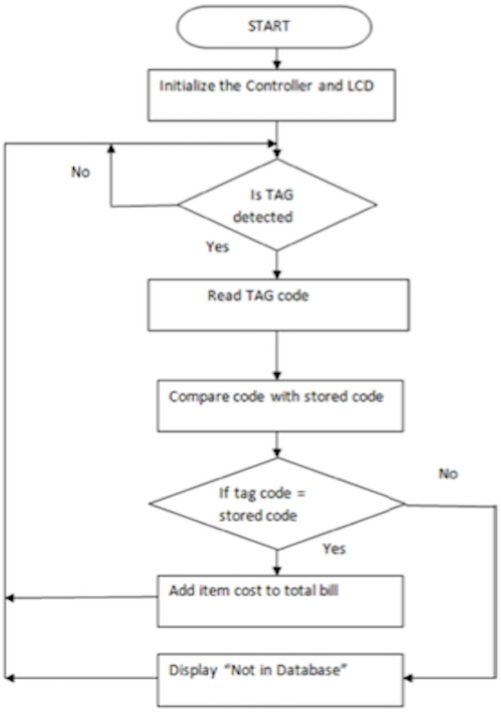

Fig-2 Flow chart of the Program

4. RFID VS BARCODE SCANNER

If correlated, RFID technology is found to be more inclusive than barcode technology. RFID tags can be read from a greater distance. The information of the tag can be accessed from RFID reader from a distance of around 300 feet, while barcode technology can't be read from a distance of more than 15 feet.

RFID technology also performs better over barcode technology in terms of speed. RFID tags can be elucidated much faster than barcode tags. Barcode reading is relatively slower because it requires a direct line of sight. On an average, a barcode reader takes around one second **to** successfully interpret two tags, while the RFID reader can interpret around 40 tags.

RFID tags are well secured or implanted either inside the product, and therefore is not subjected too much wear and tear. Interpreting a barcode needs a direct line of sight to the printed barcode, and so the barcode is printed on the outer side of the product, and is therefore subjected to greater wear and tear. It also restraints the re-usage of barcodes.

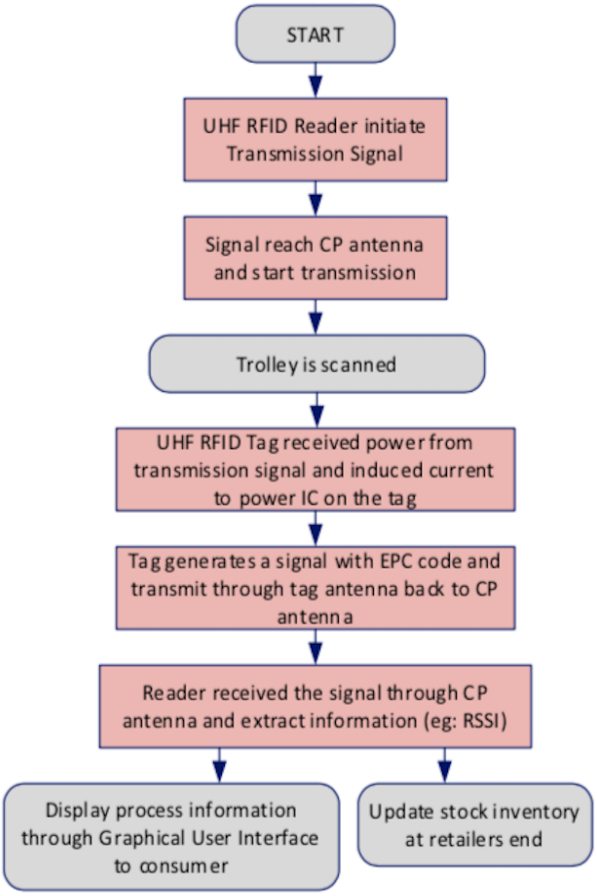

Fig- 3. System flow

5. SYSTEM FLOW

The system flow diagram of the RFID based smart trolley for supermarkets is shown in fig.3

6. CONCLUSION

In this paper, fruitful use of UHF RFID system for the smart shopping trolley has been elucidated. The items can be detected heedless of its tag orientation, size and shape. These were the drawbacks postmarked in former shopping trolley applications which were overcome in this application. The development of antenna and hybrid coupler is based on the original work which has been carried out by laboratories. Decisively, this particular application may bring novel facility for shoppers when they perk from coordinated joint effort among scientific techie knowledge.

7. FUTURE WORKS

Rationally it can be admissible that this application can further be refined in desperate aspects. The veracity of items in the trolley can be intensified and enhanced by scanning the items multiple times (eg: every 1second) which also provide more solid real time information to the shopper. It is not guaranteed that the antenna reads only the tags inside the trolley. The Geiger count is calculated based on the distance between tag and antenna and the extrinsic circumstances may also have an bounce over the readings. Representing Geiger count % threshold will be very useful as it defines for this prototype avoid reading tags far away from the shopping trolley boundaries. In addition, a RF insulation for the shopping trolley can be suggested in order to avert reading tags outside of the trolley. Alternatively, the user interface can be further improved by providing shopping history which may aid the shopper to make purchase decisions. Instead, the facility to download a shopping list as per customers interest also be useful for consumers.

This amassment can help the reading in latency of metal where Tag ID is difficult to read due to the interference generated from the radio frequency (RF) reflection from metal planes.in case go liquid products the RF energy gets absorbed due to unceasing reorientation of polar molecules. Data mining techniques can be used in future to develop the scanning system by gathering item data at multiple points.

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