Automated Smart Trolley for Supermarkets

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Abstract-**In RFID based system, the details of the products are displayed on the display which is attached to the cart/trolley as the products are dropped in to the trolley and at the end of shopping the customers pays the bill shown on the display screen and confirm their payment. Trolley has done with a prebuilt RFID reader and display. These readers can read RFID tags in which details of the products are present. In the supermarkets each product will have 1 RFID tag that holds whole information about that product i.e., price, quantity, etc. Customer can wave their RFID tag present on product to RFID reader and can add/remove the product to/from the trolley. There is no need to carry the trolley/physical cart at the vendor's end, there would be a system for billing where customer would scan their RFID tag as unique ID attached to trolley/cart and transfer the product particulars for billing. This way the system reduces the physical task of the customer load effectively. RFID is inexpensive, average processing time of RFID is 0.99. The RFID having status updation of complete listings of the products purchased, automatic bill generation, updating stock inventory management to the central system. At end of the day, the most sold products are sent to vendor by GSM technology through message.**

Keyword:- Zigbee, Radio-frequency identification, RFID tags, GSM, UART

1. INTRODUCTION

In the present shopping malls, people want to bring around trolley all over the shopping mall and get the products they need and add it to their trolley. All the products in your trolley are then billed at the exit counter. So there's along queue for checkouts and payments at the exit counter. This additional time consuming at billing section is avoided by Zigbee technology which is a recent wireless technology which creates its own wi-fi network with from the inter section of the RFID and the identification with the help of RFID reader present in trolley, the operation process like retrieving information through RFID tags, which is present on trolley. The RFID tags present on products helps the operation process like retrieving information through is made easy. Shopping takes a lot of time and thus requires additional man power at billing section to handle large crowds. These overhead can be reduced just by introducing a user friendly Zigbee technology.

A. Project Objectives

The goal of our project is to write an smart application using RFID technology. We have set some of the following objectives for our project to achieve the goal:
 This application should be Interactive and robust. The RFID is the connection between virtual world and the reality.
 When products gets added/removed from trolley by customer, automatically amount is calculated and displayed. And complete offers of day are shown on display which is present in the trolley.
 At billing section, RFID tag issued to customer is scanned once shopping is completed by customer as he presses shopping end button/switch, it indicates shopping is ended by customer. Automatically bill is generated and amount is paid.
 It has well and effortless user-experience.

B. Literature views

Here the author explains how aisle based arrangement is used. Different components like Cart Location Detection Unit (CLDU), Server Detection Unit (SDU), User Interface Display Unit (UIDU), Billing and Inventory Management Unit (BIMU) were setup. All these sophisticated microcomputers provide an easy trip through the mall for the consumer [1].
In this paper [2] the customer scans RF tags of products and the price is shown on the led display fitted with the

shopping trolley. The trolley is fitted with ARM7 processor which furthers ends all the data of customers shopping at the billing desk. When customer checks out he is ready to checkout directly without any barcodes scanning at billing desk.

In this paper [3] author discusses the QR code is typically scanned for adding products into the cart with customer friendly. Also the main focus of the project was providing a shopping trolley which would be autonomous in operation. An android application is built in order to connect in real time with the mall center server which receives all the details of the product taken by the customer respectively.

In [4] this system NFC cards are used for tagging products and adding them through a android enabled NFC or another NFC card Using e-wallet and J2ME which are now mostly out dated.

In paper [5] reference it focuses on analysis of all the available ways to use NFC to increase the business process model but not widely spread.

II.EXISTING SYSTEMS

With the increasing of technologies in present days, the demand for applications has grown up rapidly. More apps have found their way into the application based stores. Apart from games, one can also find different professional software for everyday life. The customer shopping processes have many steps like shopping assistance or payment, plays an increasingly improvement role. Especially the inbuilt of RFID in the trolley will have interesting influence in the shopping process.

III. PROBLEM STATEMENT

The proto system aim is to eliminate all the inconveniences as possible from the systems and to make a system, which is consumer kindly, customer-friendly and high performing. The system's aim would be consumer convenience and an overall time efficiency and high performance. This goal could be achieved by using the Zigbee system implemented using RFID technology. Present scenario in shopping supermarkets are, time consumption is big problem at billing section. Consumers have no idea about the present day offers in supermarkets. Sometimes, shopping is done beyond the budget of the customer. So keeping all these in mind the system needs to be developed which provides customer an easy to use interface and also a way for the vendors to endorse more products alongside and achieve high profit. This could be achieved through the RFID technology, which is currently in its preliminary stages. At vendor side, GSM technology is implemented to know about the overall products/ high sold products in supermarkets at the end of day. By this vendor can stock the products early to supermarkets.

IV. PROPOSED SYSTEM

The proposed system aim in the shopping centre, is to issue a RFID tag to all trolley present as ID. Similarly all products will have a RFID tag associated along with, which would

contain all the information about the products like price, quantity, etc.. Customer can scan the product tags to RFID reader and add the products to the cart by switch present in the trolley for adding and removing of products. They can edit the basket anytime during shopping. The total products in trolley amount is calculated automatically and displayed on display. There would be a system for billing where customer would scan their tag ID and transfer the product details for billing. When customer finishes up shopping, shopping end button is pressed. When it is pressed, through Zigbee details of the customer purchased is displayed. Payment is also made by paying total amount.
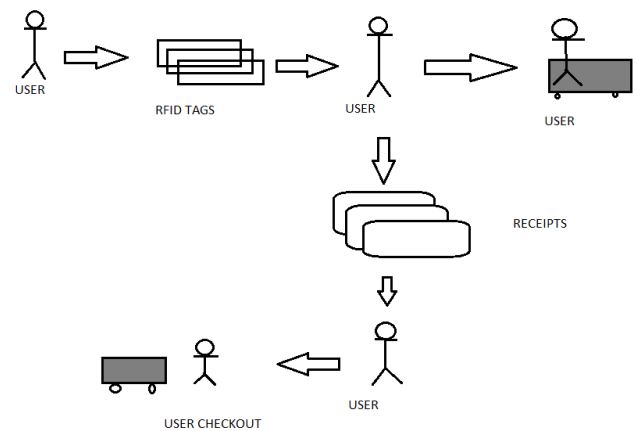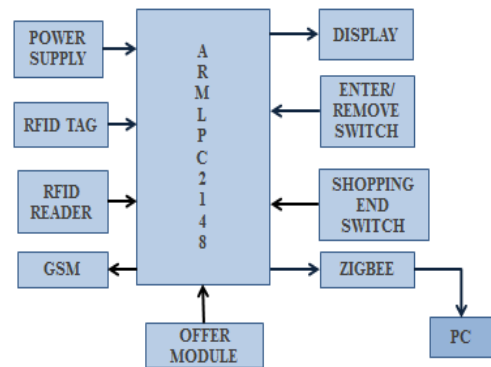

Fig 1: *Proposed system*

The System Requirements to develop such a system could be classify as follows:

A. Experimentation:

-We have taken 30 inputs for experimentation and compared with RFID shopping system.
-Customer needs to register themselves for first time and Database contain product name, product ID, stock, quantity, unit price, total price which is used to store unique customer's details to buy products during shopping.
-Calculate processing time of RFID is 0.99.

1.1.ARMLPC2148:

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time immune and embedded system support, and microcontroller with embedded high speed flash memory ranging from 32KB to 512KB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate is present. It has 64-pin configuration. For critical code applications, the alternative 16-bit thumb mode reduces code by more than 0.3 with minimal performance.

Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization such as access control and point-of-sale. The serial communications interfaces which ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8KB up to 40KB are present, that make these devices very well matched for communication gateways and protocol converters. The soft modems, voice recognition and low end imaging, provides both large buffer size and high processing power. Various 32-bit timers/counters are present, a single or dual 10-bit. ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems. This microcontroller have very advanced features.

1.2.RFID reader:

Radio frequency identification (RFID) technology is a wireless communication technology that enables users to uniquely identify tagged objects or people. RFID is rapidly becoming a cost-effective technology. The Department of Defence (DoD) to incorporate RFID technology into their supply chains. Although the foundation of the Radio Frequency Identification (RFID) technology was laid by past generations, only recent advances opened an expanding application range to its practical implementation in all perspectives.

RFID is only one of numerous technologies grouped under the term Automatic Identification (Auto ID), such as bar code, magnetic inks, optical character recognition, voice recognition, touch memory, smart cards, biometrics etc. Auto ID technologies are a new way of controlling information and material flow, especially suitable for large production networks.

The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier, through the use of inductive coupling or electromagnetic waves is done. The data carrier is a microchip attached to an antenna (together called transponder or tag), the latter enabling the chip to transmit information to a reader (or transceiver) within a given range, which can forward the information to a host computer. The middleware (software for reading and writing tags) and the tag can be enhanced by data encryption for security-critical application at an extra cost, and anti-collision algorithms may be implemented for the tags if several of them are to be read simultaneously. One important feature enabling RFID for tracking objects is its capability to provide unique identification.
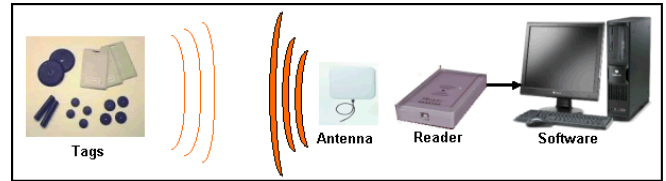

Fig.1.2.1:Basic block diagram of RFID

Software Requirements:
-MATLAB
-Keil u vision(version4)
-Embedded C

Hardware Requirements:
-RFID reader
-RFID tags
-Zigbee
-MicrocontrollerARMLPC2148
-Display
-Add/remove switches
-Shopping end switches
-GSM technology

B. Enhance User Interface

In future, we can add set of characters for selected products. Also, we can add motion gesture to do some critical action, such as like and dislike. For instance, User can give like.

V. FUTURE SCOPE

-Stock inventory management can also be done without using GSM by IOT.
-At shopping process all details of products purchased is directly stored in a cloud by which direct billing can be done.
-Enchancement can be done to increase wide range in supermarkets by using LAURA technology.

VI. RESULT

In result the representation of purchased products and payment process is done. Customer first takes trolley as enters into mall, individual trolley tag is assigned as ID. And products purchased are monitored and amount is displayed in trolley itself which is fixed in trolley.

Result parameter
☐ Range
The range of a system is the distance between the tag and the system to read.
☐ Total cost.
The cost is display on display. Which in turn helps customer to shop according to their budget and preferences.
☐ Processing time
Scanned products are processed fast without any delay.

Special Issue - 2018

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
NCESC - 2018 Conference Proceedings

Comparing existing system with the current technology, based on different parameters RFID is better. (Range, Total cost, Processing time and Status Scenario) where RFID having 1.5 cm, as well RFID cost is also cheaper. By the help of RFID the complete list of the products and their information in the cart are displayed. Automatic billing is done without wasting time at billing section and avoids standing in a long queue., Updates stock inventory in the central system, by examining about the products most sold at the end of day.

ADVANTAGES:

- This system helps in achieving a faster billing system.
- It helps buyer to know the bill details in advance so that they can plan accordingly in affordable prices.
- Intimates about the current offers present by showing a pop-up in trolley screen.
- Helps in business promotions for the supermarkets by gaining more customers providing quick service.
- Easy to use and does not need any special training. Introduction of artificial intelligence increases profit for sellers

APPLICATIONS:

- The application is used at Jewellers shop with some
  modifications.
- Student attendance system.
- Library management system.

VII.CONCLUSION

Applications formed with ease of accepting and the design can be formed and custom-made to the shopping process to make it more active and user friendly. Thus making it easier & appropriate for the users to do the whole shopping process with the use of this application, as compared to the existing systems. By result our RFID system is better.

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