RFID based Automatic Billing Trolley

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Abstract— Nowadays RFID is most popular technology used in the world. Radio Frequency Identification (RFID) is one of the automatic identification technologies. In this technology communication is in between the tag and reader. The tag is movable object like a smart card and any type of material object. Each tag have magnetic strip with the specific code and tag is read by RFID reader module. The automatic Billing system based on a passive Radio Frequency Identification (RFID) provides suitable solution to the manual Billing method in Shopping malls. The aim of our system is to provide efficient technology for billing process in shopping malls.

Key words: RFID Reader, RFID Tag, IR Sensor, ZigBee Module

I. INTRODUCTION

The term "RFID" means Radio Frequency Identification .It is wireless use of electromagnetic field to transfer data for the purpose of automatic identification of the tag attached to objects [6]. Radio frequency identification (RFID) is one of the methods for automatic identification and data capture (AIDC) [6]. RFID based technologies are used in Instance or class identification, Location identification, Manufacturing plants for more than a decade, Car parking Payment systems, Security and access control and also used in healthcare technologies. In early days the billing procedure in the mall is implementing in such a way that at the counter the salesman creates a manual billing. This method is time consuming and low efficient. Nowadays, in malls the billing procedure is based on the BARCODE READER. In this method long queue is present at the counter also it is time consuming process. To overcome these drawbacks we are implementing a new method based on RFID. In this method we will develop RFID Based Automatic Billing Trolley. In this, if customer purchases a product then product information and price can be directly displayed on LCD unit and automatic billing procedure takes place.

II. PROPOSED WORK

We can develop a trolley having RFID reader, IR sensor LCD unit, and the whole system is based on ARM processor. Finally, whole the billing data can be transferred wireless to the PC at billing counter through X-bee protocol. Due to this system we will reduce the long queue at the billing counter in shopping mall and save the valuable time of peoples.

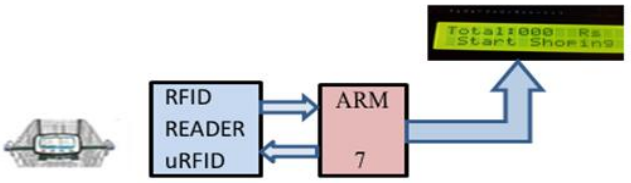


Fig. 1: System Diagram

III. SYSTEM DESIGN

A. Block Diagram:

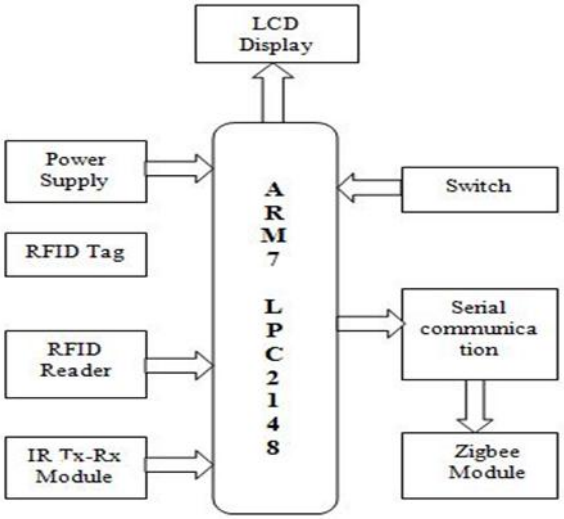


Fig. 2: Block Diagram

The key components of our system are ARM Processor interface with RFID Reader, IR Sensor, LCD Display, X-bee Module etc. Described as follows:-

1) Power Supply:

The AC supply is applied to 12V step down transformer. The transformer output is the 12V AC which is rectified using a diode bridge. The output of Diode Bridge of 12V DC is filtered by capacitors & Regulated 5V by using 7805 IC.

2) RFID Reader:

The "RFID" means Radio Frequency Identification .It is wireless use of electromagnetic field to transfer data for the purpose of automatic identification of tag attached to the objects. Radio frequency identification (RFID) is one of the finest methods employed for automatic identification and data capture. RFID reader consists of an RF module EM18 (125 KHz) that acts as a transmitter and receiver of radio frequency signal.

3) RFID Tags:

RFID tag is an ID system that uses small radio frequency identification devices for identification and tracking purposes. An RFID tag consists of a chip, some memory and an antenna. RFID tags that contain their own power source are known as active tags. Those without a power source are known as passive tags. Active tags have more memory and can be read at greater ranges. A passive tag is activated by the radio frequency (RF) scan of the reader and corresponding ID is transmitted in the form of equivalent electrical current.

4) IR Sensor:

IR sensor is used for detecting a specific light wavelength in the infra-red (IR) spectrum. The basic idea is to use IR LEDs sending the infrared waves to the object & another IR

diode of the same type is used to detect the reflected wave from the object. When an object is brought close to the sensor, the light from the LED reflects from the object and bounces into the light sensor.

5) LCD Display:

LCD has the ability to display numbers, characters & graphics. The display is interfaced to I/O port of ARM7 (P0.0-P0.7). Display of the product name, cost and total cost is carried out with the aid of LCD unit.

6) X-Bee Module:

X-Bee is a mesh network specification for low-power wireless local area networks (WLANs) that cover a large area (100 meter). The modules require minimal power and provide reliable delivery of data between devices. The modules operate within the ISM 2.4 GHz frequency band.

IV. WORKING

Each trolley is associated with a RFID reader. When the customer purchases a product, and put product in to the trolley then RFID reader automatically scans the RFID Tag. The price of the product is taken and Information stored in system's memory is compared with the lookup table. If matches are found then cost, name of respective product gets displayed on the LCD.

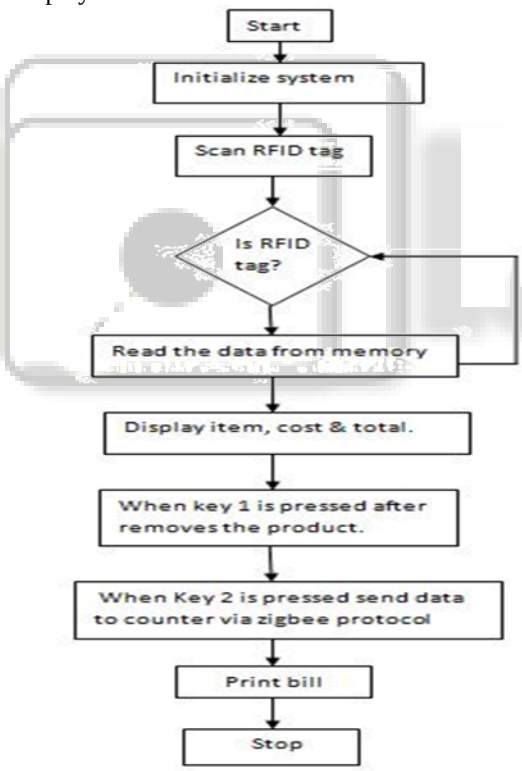


Fig. 4: Flowchart of system

Here we have used IR sensor for counting purpose. If any customer someone removes the RFID tag and puts the product in trolley then counting the number of items helps to get information of items purchased. Thus counting is done but there is no addition of cost respective product in bill. This shows the increase in number of products but not increase in bill. If customer wanted to remove any product from trolley then customer press key1 and scan the product an unwanted product is removed from trolley then it decreases the number of products as well as bill. After completion of shopping, a key2 is pressed indicating final billing of all the products. Thus the final information of all products is transmitted to a computer with the help of X-bee protocol & the final billing is done by MATLAB Software on computer.

V. EXPERIMENTAL RESULT

RFID based automatic billing trolley system is shown in figure 5. The RFID reader and passive tag are the main components used and each passive tag has different serial number stored in microchip inside the tag. We have stored serial number information in programming. When press the enter switch, LCD display "WELCOME TO RFID BASED AUTOMATIC BILLING TROLLEY. customers have scan the product using RFID Reader after then put in the trolley then display the product name, item cost and total cost are displayed on LCD unit show in figure 6. And end of shopping then key is pressed then total bill data are transmit to the wireless by X-bee module to the billing counter.

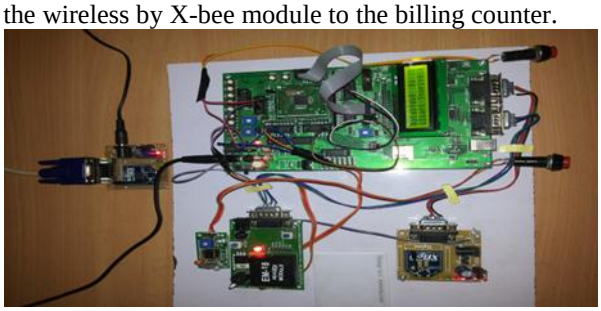
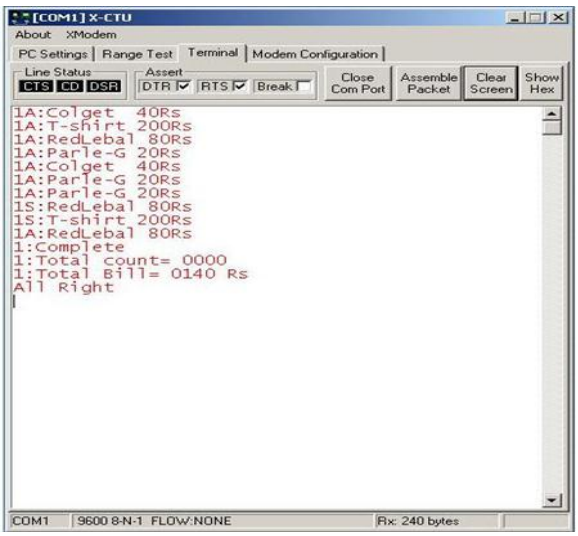


Fig. 5: hardware of system

Fig. 6: Result of System

VI. SOFTWARE IMPLEMENTATION



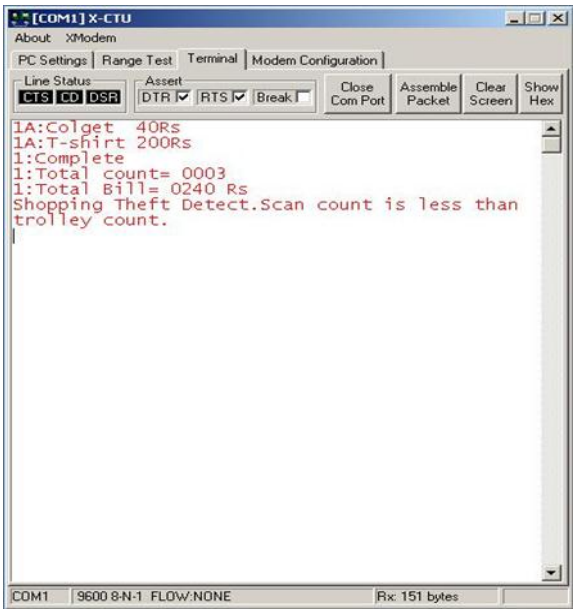


Fig. 7: Software billing of system

Fig-7 shows 1A is indicating the added product in Trolley and 1S is indicating the removes the any product. The total count is same that of put product in trolley then Shopping is All Right. Otherwise No matching or same product and count value. Then shopping theft detect the count is less than trolley unit. This indicating the customer unwanted product put in trolley unit and without scanning product put in trolley then check the extra product in trolley.

VII. Conclusion

We have designed RFID BASED AUTOMATIC BILLING TROLLEY. This can be done by simply Attaching RFID tags to the products and a RFID reader with a LCD display on the shopping trolley. With this system customer will have the information about price of every item that are scanned in, total price of the item and also brief about the product. This system will save time of Customers and manpower required in mall and cost associated with the product.

A. Futures Scope:

1) Products name and its cost can be announced using headset.
2) Traking of any product.
3) Product Security purpose.

References

[1] J.S.Awati RIT, RajaramNagar, Sangli, S.B.Awati DKTE, Ichalkaranji, Kolhapur has been given by "Smart Trolley in Mega Mall"
[2] Zeeshan Ali Student-ME, Department of EXTC, SPIT, Mumbai, India, Reena Sonkusare Associate Professor, Department of EXTC, SPIT, and Mumbai, India. Has been given by "RFID based Smart Shopping and Billing"
[3] Ankit Agarwal Computer Engineering, D.Y.P.C.O.E.,Akurdi, Pune, India, sourabh sultania Computer Engineering, D.Y.P.C.O.E.,Akurdi, Pune, India. has been given by "RFID based shopping cart" for grocery stores
[4] Satish Kamble, Sachin Meshram, Rahul Thokal, Roshan Gakre. Has been given"Developing a Multitasking Shopping Trolley" Based on RFID Technology
[5] G.CERDA VILLAFANA & Y.S.SHMALIY. Threshold-Based Identification Of Wireless Saw RFID Tags With Pulse Position Encoding. MEASURMENT, VOL.44, NO.4, PP.730-737, APRIL 2011
[6] RFID JOURNAL, 2002-2007, REFFERD 6.8.2007, AVAILABLE http://www.rfidjournal.com
[7] HAYASAKA, T, RFID tags their Applications. IPSJ MAGAZINE, VOL.40, NO.8, PP.846-859, AUGUST 1999.
[8] Swati Zope, Prof. .Maruti Limkar, "RFID based Bill Generation and Payment through Mobile", International Journal of Computer Science and Network (IJCSN), Volume 1, Issue 3, June 2012

