International Journal of Research in Engineering, Science and Management
Volume-2, Issue-3, March-2019
www.ijresm.com | ISSN (Online): 2581-5792

RFID based Intelligent Trolley for Shopping Mall

S. Sumath[1], V. Sarulatha[2], T. Shobika[3]
[1]*Assistant Professor, Department of Computer Science and Engineering, SRIT, Coimbatore, India*
[2,3]*Student, Department of Computer Science and Engineering, SRIT, Coimbatore, India*

Abstract: **A shopping mall is a place where hundreds of customer visits every day to purchase many items. Now a days shopping malls are increasing rapidly due to availability of all the items ranging from grocery, clothes, vegetables, fruits, etc., in the common place. Trolley is required to collect the items in the shopping mall. Trolley has to be pulled forward or backward while collecting the items. After purchasing the product, the customer has to stand in a long queue for billing their products. To overcome this problem we are developing intelligent trolley for shopping mall. Each and every product in the shopping mall contains the RFID tag and the trolley is fitted with RFID reader. When the customer drops the product in the trolley the reader reads the tag and display the item and the amount in LCD which is fitted in the trolley. After the completion of shopping, the customer will press the finish button in the trolley and total bill is displayed in the LCD and the bill is transferred to the main computer. The total bill of the customer will be received as a message through a GSM module.**

Keywords: **RFID tag, Arduino, ZigBee, RFID reader, LCD, GSM module.**

1. Introduction

Due to the improvement in the human lifestyle the people running towards the money and they do not have the enough time to go to various shop to purchase their necessities. Shopping mall is the place where we get the daily necessities ranging from food products, clothing, electrical items etc., therefore the number of shopping malls are increased. After purchasing the stuff the people will have to stand in a long queue to bill their items. It creates the problem among the customer while standing in the queue. In existing system the shopkeeper will scan the barcode of every product which is very time consuming. To avoid this problem we proposed the "Intelligent trolley for shopping mall". This can be done by simply adding the Rfid reader in the trolley and RFID reader in the product. The bill amount is displayed in the LCD. It is very time consuming, cost efficient and reliable method. This system will save the time for the customers and manpower required in the mall.

2. Literature survey

Chandrasekar P Et all (2014) [1] proposed the system to reduce time spent by the customer in the shopping mall. The system consists of a microcontroller, an EEPROM, RFID reader, zigbee transceiver, display unit and a battery power source. The efficiency and dynamicity of the device increases by the battery power. The data transfer between the EEPROM and the microcontroller in this system is carried out through the 12C serial port. The two line serial 12C enabled IC is used in the EEPROM. Every product in the supermarket is provided with a RFID tag, to identify it uniquely. The Product Identification Device (PID) is fitted in the trolley which will contain with LCD, microcontroller, an RFID reader, EEPROM, Zigbee module. when purchasing the product the item details will be read through a RFID reader on the trolley, while the product information will be stored into EEPROM attached do it and the data will be send to the main server through the zigbee module.

Varsha Jalkote Et all [2] proposed a system for smart billing with amalgamation of RFID and zigbee with futuristic trolley. This system uses the microcontroller, zigbee, the RFID reader reads the RFID Tag and compared with the stored tag numbers, and if the product is present then it is added to the total bill amount and the item details are displayed in the LCD. This total bill information is transferred to the personal computer in the shopping mall using the zigbee module. The output of this proposed system will reduce the amount of time the customer spend in the shopping mall.

kalyani dawkhar et all [3] proposed a system for efficient shopping called electronic shopping cart based on RFID technology. In this system the RFID reader and the microcontroller is used to read the RFID tag and compare with database, and it will be displayed in the LCD. And this system helps the customer to easily search the product location in the shelf with help of mobile application.

Hsin-han chiang et all [4] is a specified system assisted by the functionality of tablet or embedded system. This system functionality is implemented partially in C language and Lab VIEW in order to provide the smart user interface and establish connection between embedded computer and other accessories. The user interface provides with the product sharing, map information and also automated billing. To make the flexible designing of user interface easy the buffered state machine based on a queued message handler is adopted. The LBPH (Local Binary Patterns Histograms) used to extract the features of human face. The obtained characteristics data is then

transformed into LBP data array, which is obtained from trained images. The face recognition is used for the purpose of login, which would be stored in the database during the customer registration. The automated billing is also provided.

Muhib A. Lambay [5] When we go for the shopping we select the required products and drops them into the shopping trolley. When it comes to the final bill amount for payment there are no adequate counters in the mall to handle all the customers. The scanning of the each and every product becomes a huge task. We have modified a trolley with a barcode scanner by which the customer can scan the product. The items added to the trolley will keep track by the scanner. Each trolley has some unique id. This id is used by an android application so that the database can be accessed by the user through wi-fi module.

Ashmeet Kaur [6] there has been great emerging demand for quick and easy payment of bill in shopping mall. We developed a smart cart that will be capable of generating a bill from the cart itself. The customer will make the payment using a rechargeable credit cart which help to introduce the schemes and offers in stores accordingly and help to maintain the database. The smart uses the RFID technology for shopping and payment.

Amine Karmouche [7] in Aisle level Scanning for pervasive RFID-based shopping applications proposed a system that is able scan static and dynamic products in the shopping mall using RFID reader antennas. The aisle level scanning performed instead of conducting the RFID observations at the level of the individual carts.

Satish Kamble [8] in developing a multitasking shopping trolley based on RFID technology proposed to develop a product to assist a person in everyday shopping in terms to reduce the amount of time spent in the shopping mall. The aim is to develop easily scalable, low cost, technology oriented shopping trolley.

3. Problem statement

Currently we are using the barcode scanner to scan the product and calculate the total bill amount of the purchased items. It consumes the more time of the customers. The customer has to wait in queue for billing their items. To overcome this problem we introduced the trolley with new type of technologies called “Intelligent trolley for shopping mall”. The customer has to drop a product in the trolley which is fitted with RFID reader which read the product amount, quantity and generate the bill and it will be displayed in the trolley through LCD. The bill amount is transferred to the customer through GSM. This new technology will save time for the customers. It is very time consuming, cost efficient method.

4. Proposed system

The proposed system is a solution to reduce the time spent by a customer in the shopping mall. Radio Frequency Identification (RFID) is an alternate to barcode system. It is a preferable technology. RFID provides an automatic identification method for storing remotely, retrieving the data using RFID tags. RFID tag is attached to every product in the shopping mall for the purpose of identification using radio waves. The RFID reader will reads the product in the trolley with the help of RFID tag fitted in the product. The total amount is generated on clicking the finish button in the trolley. It display the amount in the LCD. At the same time the total bill amount is transferred to the main computer and the customer will get the message ion their mobile phone by using the GSM technology.

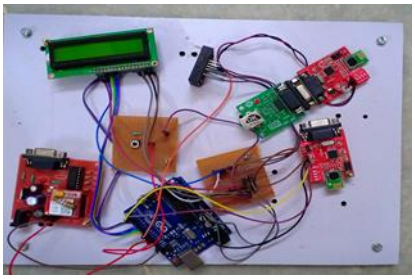

Fig. 1. RFID

5. Block diagram

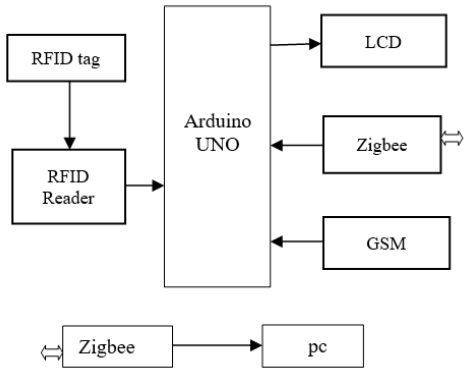

Fig. 2. Block diagram

6. Hardware components

A. Trolley unit

In this unit RFID reader is placed in the trolley and RFID tag is placed in the product. When the customer drops the item in the trolley then RFID reader reads the tag and send a signal to the processor. If it matches with the database then it shows the name of the product and its amount in the LCD which is fitted in the trolley.

Fig. 3. Trolley unit

B. Billing unit:

With the completion of shopping, customer comes near the billing counter. The total bill amount from the trolley is transferred to the main computer through the zigbee module. The customer will pay the bill through online payment or cash.

Fig. 4. Billing Section

C. Power supply

The AC supply is applied to 12V step down transformer. The output of transformer is 12V AC is rectified using a diode bridge. The output of Diode Bridge of 12VDC is filtered by capacitors.

D. RFID Tags

RFID Tags is of two types namely passive tags which are without any battery and active tags which are with battery. We mainly use the passive tags RFID tags released for automatically identifying a person, a package or a product. These are transponders that transmit information. It contains the two parts. One is an antenna for receiving and transmitting signal. The second is integrated circuit for modulating, storing and processing information and demodulating radio frequency signal.

Fig. 5. RFID Tag

E. ZigBee

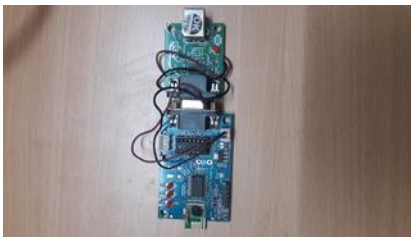

Fig. 6. Zigbee

The zigbee devices communicate with each other wirelessly over the air. They can simply transfer the information what they receive. But they can be interfaced with other microcontrollers and processors like Arduino, via serial Interface. After clicking the finish button the total generated and displayed in the LCD which is fitted in the trolley. with the help of zigbee module the total bill amount is transferred to the main computer.

F. RFID Reader

RFID Reader EM-18 RFID reader is one of the commonly used RFID reader to read 125 KHz tags. It consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consist of an oscillator to create the carrier frequency. It can be directly interfaced with microcontrollers using UART and with PC using an RS232 converter.

Fig. 7. RFID Reader

G. LCD Display

LCD screen is an electronic display Module and is very commonly used in various devices and circuits. It consists of an array of tiny segments called pixels that can be manipulated to present information. A 16x2 LCD display is the very commonly used basic module.

Fig. 8. LCD Display

H. GSM Module

GSM is used for mobile communication in most of the country. The total bill amount is send to the customer via message by using the GSM module. It can operate in four bands of frequency (850/900/1800/1900 MHz). GSM mostly utilizes 850 and 900 MHz frequency. It has the ability to transmit information in the form of voice (call), message.

Fig. 9. GSM module

7. Implementation

A customer enters into the shopping mall for purchasing the products. On entering the shopping mall the customer picks up a Trolley. Each trolley in the mall is fitted with RFID receiver and RFID tag in the product. When the customer purchase the product she/he first scan the product using the RFID reader and place the product in the trolley. While scanning the product the details of the item is fetched into memory. Information stored in the memory is compared with the lookup table. If the product matches with the table then the respective product gets displayed on the LCD. The customer after finishing the shopping, they press the button in the shopping trolley and it will display the bill amount in the main computer. At the same time the message is transferred to your mobile number through GSM module.

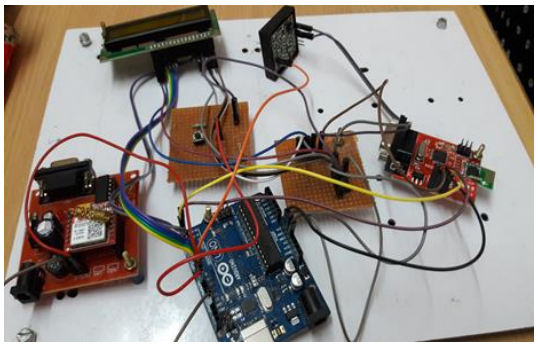

Fig. 10. Circuit

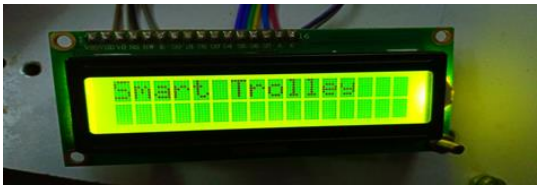

Fig. 11. The LCD Screen on the trolley

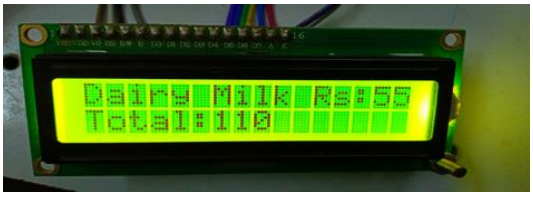

Fig. 11. After adding the product into the trolley

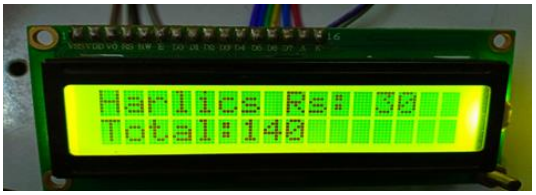

Fig. 12. After adding the another product

Total amount Displaying in the main computer:

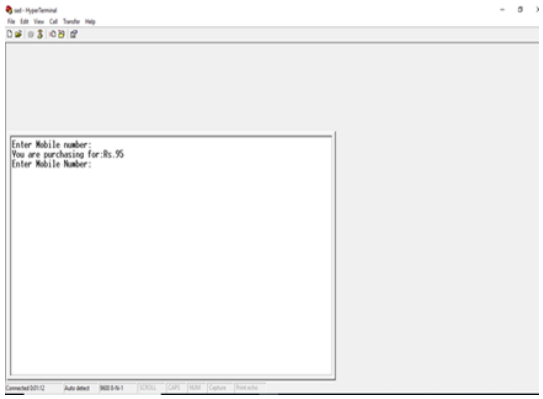

Fig. 13. Bill amount displays in main computer

8. Conclusion

The progress in technology and science is a non-stop process. This project is used in the shopping mall for purchasing the items. In this project the trolley is used for automatic billing. If the item is put into the trolley it will shows the amount in the LCD. The RFID card is used for accessing the product. By means of this project we intent to simplify the billing process and saves the time for the customer. Different parameters such as product name, product cost will be displayed in the LCD. Thus with the help of the conclusion we can say that: Automatic billing of the product will be a more viable option in the future. The system based on RFID technique is compact, efficient and shows promising performance.

9. Future scope

Future work encompasses a swiping card facility at the trolley. The card may be any credit or debit card of the respective customer. After the billing amount has been displayed on the trolley, the customer can directly swipe the card containing the credit, which is sent directly to the shop's account. Thus there is no need of the queue and average time spent in the shopping mall will be reduced. Other technologies may as well be incorporated into this domain to take shopping author dimension where real time shopping becomes as painless as virtual, online shopping.

Acknowledgement

We take immense pleasure in expressing my humble note of thankfulness to my project guide Ms. S. Sumathi, Assistant Professor (Sr.Grade), Department of Computer Science and Engineering, for his exemplary guidance and valuable suggestions, which helped us in effectively developing our project. We also extend our thanks to our faculty members, family members and friends for their motivation and moral support towards successfully accomplish this project.

References

[1] Fabian B, Ermakova T, Muller C. Shardis, "Privacy- enhanced discovery service for RFID-based product information," IEEE Transactions on Industrial Informatics. 2012Aug; 8(3).

[2] Suryaprasad J, Praveen Kumar B O, Roopa D Arjun A K, “A Novel Low-Cost Intelligent Shopping Cart,” Proceedings of the 2nd IEEE International Conference on Networked Embedded Systems for Enterprise Applications, NESEA 2011, Perth, Australia, December 8-9, 2011
[3] Swati Zope, Maruti Limkar, “RFID based Bill Generation and Payment through Mobile”, International Journal of Computer Science and Network (IJCSN), Volume 1, Issue 3, June 2012
[4] Amine Karmouche, Yassine Salih-Alj, "Aisle-level Scanning for Pervasive RFID-based Shopping Applications", 2013 IEEE.
[5] Martin Mayer, Nobert Gortz and Jelena Kaitovic, "RFID Tag Acquisition via Compressed Sensing", 2014 IEEE.
[6] Satish Kamble, Sachin Meshram, Rahul Thokal & Roshan Gakre, "Developing a Multitasking Shopping Trolley based on RFID Technology", January 2014 International Journal of Soft Computing and Engineering (IJSCE).
[7] P.Chandrasekar, T.Sangeetha, "Smart Shopping Cart with Automatic Central Billing System through RFID and ZigBee", 2014 IEEE
[8] Zeeshan Ali, Reena Sonkusare, "RFID Based Smart Shopping and Billing", International Journal of Advanced Research in Computer and Communication Engineering Vol.2, Issue 12, December 2013.
[9] D.Hahnel, W.Burgard, D.Fox K.Fishkin and M.Philipose, "Mapping and localization with RFID technology", Proc.IEEE Int.Conf Robot.Autom, pp.1015 -1020 2004.
[10] H.H.Bi and D.K.Lin, "RFID-enabled discovery of supply networks", IEEE Trans.Eng.Manag., vol.56, no.1, pp.129 -141 2009.
[11] Y.J.Zuo, "Survivable RFID systems: Issues, challenges, and techniques", IEEE Trans.Syst., Man, Cybern.C, Appl.Rev., vol.40, no.4, pp.406 -418 2010.
[12] S.S.Saad and Z.S.Nakad, "A standalone RFID indoor positioning system using passive tags", IEEE Trans.Ind.Electron., vol.58, no.5, pp.1961-1970 2011.