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Smart Cart Using Arduino and RFID

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Abstract - *As the world is technologically advancing, the desire to reduce human efforts is at its peak. Same is the case with the field of shopping. Earlier, shopkeepers used to manually arrange the products chosen by customers and would do the bill calculation manually, too. But with the birth of huge supermarkets and shopping malls, manually arranging and handing of products to customers as well as manual bill calculation seemed impractical and impossible. Thus, Barcode based shopping came into existence. But it too, has its own limitations and there is scope for development. In the era of "smart", we need to up the game for shopp ing as well and switch to smart shopping. This project shall result into a new shopping experience and shall reduce the efforts made and the time spent by an average shopper to a considerable extent. This project might also felicitate the emergence of an automated shopping system.*

***Key Words*: Shopping, Smart Cart, Arduino, RFID, Visual Basics, Billing System**

1. INTRODUCTION

Presently, the shopping system used in the shopping malls is the Barcode System. This system has replaced the previous manual system but has limitations. To begin with, barcode system requires the barcode on the products to be in the line of site of the barcode scanner. Its scanning range is just from a few inches to a few feet. A barcode scanner can read products only one at a time. Barcodes define the type of every product but can't do it uniquely. Barcodes are read only type and can't be overwritten. The barcode system runs on optical (laser) technology. Barcodes also require a considerable amount of man power and human effort. Barcodes can get damaged easily. Not only this, the current Barcode system requires the customer to stand in long queues in order to get their products scanned and their bills generated. This process can prove to be tiresome and it also consumes a lot of time of the customers, thereby adding to their frustration. With so many disadvantages to it, Barcode system is still in use. It is obvious that there is a need to bring on a smarter and a more efficient system

Smart cart using Arduino and RFID is a new advancement in the field of Supply Chain Optimization. This system shall not only eradicate the long queues in supermarkets and malls but also save a lot of time for the customers. The system also helps the customer in money management. The system uses RFID tags in the place of Barcode tags which are much more efficient and powerful when it comes to scanning of products. The device developed using Arduino and RFID shall be installed on the shopping cart or shopping basket and the customer shall scan their products themselves and the total generation shall happen on the cart itself. This shall also give an idea to the customers on how much their particular shopping session shall cost them. Hence, time management and money management, both shall be taken care of.

The paper is ordered into five segments. The first segment gives a quick introduction about the system. The second segment is about shopping systems and the study of related existing systems. The third segment details out the implementation of the system. The fourth segment presents the results obtained using the Arduino and RFID containing device. Finally, the conclusion provides the summary and future scope about the system.

2. LITERATURE REVIEW

In the Literature review, we shall be discussing about the different characteristics of the project by taking reference of the existing projects that are resemble the working of the current project.

Iswarya.C, Josuva.D, Vasanthakumar.R [1] have stated that even though substantial research has been carried out on applications related to Supply Chain Optimization, yet there is insufficiency of understanding of essentials and the advantage of further organizing and managing the data within business intelligence infrastructures that allow distributing, integrating and inspecting RFID data.
Although the system has been proposed by them and explained well but they have not implemented the system and therefore, the results coming out of their proposed system is unknown and cannot be compared.

The usage of RFID tags and reader makes the system pretty efficient when it comes to the scanning of products. According to Ashmeet Kaur, Avni Garg, Abhishek Verma, Akshay Bansal, Arvinder Singh [2], if you are to scan 10,000 items, the time taken by a barcode system shall be 53 hours but the time taken for the same number of items by a RFID system is just 2 hours. This goes to explain how productive RFID systems are as compared to the existing barcode system.

If you have a look at the research work and proposal paper of Tanushree, Siddharth Yadav, Saksham Aggarwal, Sagar , Mohit Yadav , Neeraj Gupta , Shruti Karkra[3], you shall find that the usage of a RFID based system shall not only reduce

the hassle that we get to see in supermarkets but it shall also eliminate the wastage of paper making the system economical as well as environment friendly.

Areeb Asif, Bhavana Singh, Ayush Kr. Sonkar, Hardik Dua, Preeti Dhiman[4] say that one of the many problems faced by supply chains is the maintenance of dealing records and the lack of live inventory lead to problems such as products being unavailable for sale, and gradual but painful loss of customers.

According to Muhib A. Lambay, Abhishek Shinde, Anupam Tiwari, Vicky Sharma[5], the RFID system enables the retailers to get several additional details about the product as compared to the Barcode system.

Therefore, when it comes to efficiency and accuracy, RFID systems prove to be a better option compared to the existing Barcode System.

3. HARDWARE AND TECHNOLOGIES USED

Arduino and RFID are two of the major components of the system. Let us study each of them in detail.

1. ARDUINO

Arduino is basically a software as well as a hardware project that doesn't just design but also manufactures single-board microcontrollers as well as microcontroller kits for building digital and interactive projects and systems.

There is a vast variety of Arduino available. Depending upon the requirement of the system or the project, a suitable Arduino is chosen.

Following are few of the different kinds of Arduino boards available in the market:

-Arduino Uno
-Arduino Mega
-Lilypad Arduino
-Arduino Leonard
-Arduino Due, etc.

Fig -1: Types of Arduino

The coding of these microcontrollers are done in a software environment which is again known as Arduino. It basically uses C/C++ as the coding language and has a vast library of functions and prototypes that are helpful while writing an Arduino code.

2. RFID

RFID or Radio Frequency Identification is nothing but the use of radio waves to read or save information/data in a RFID based tag. The RFID tags consist of two major components, that are, a microchip for processing and storing information, and an antenna for transmitting as well as receiving the radio frequency signals.

There are two kinds of tags: battery powered RFID tags and passive RFID tags. The battery powered tag has a small battery embedded inside it that gives the tag power to receive or transmit the information stored. In case of the passive tags, the interrogator uses its own power to read the information present in the tags.

RFID readers are used to retrieve the information that is stored inside the RFID tags. The reader consists of a transmitter that transmits the signal to tag, asking for information and the receiver retrieves the information present in the tags.

Fig -2: RFID representation

4. SYSTEM ARCHITECTURE

Smart Cart using Arduino and RFID is an efficient system when it comes to scanning of products, bill generation and payment. It uses an Arduino chip, a RFID reader, an LCD, buzzers, capacitors, buttons, etc. and also RFID tags to be attached on the products.

The RFID reader shall be used to scan the RFID tags present on the product and all the information received from the tags shall be stored in the Arduino chip. The system shall have 3 buttons- total, delete and bill button. The product can be directly scanned by the reader and if the customer wishes to remove any product, they just have to press the delete button and scan the product again. The product shall be

deleted. If the customers wish to see the total, they can press the total button and the total shall be displayed. While making the payment of the bill, the customers just has to press the bill button after connecting the USB to the billing section and their bill shall be automatically generated in the admin's system.

The following block diagrams give a brief idea about the connections and the working at the trolley side as well as the billing side.

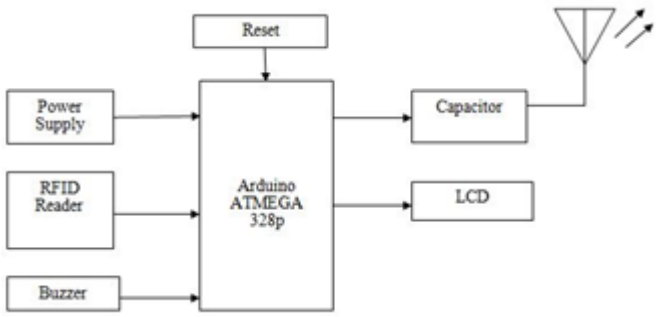

Fig -3: Proposed System (Trolley section)

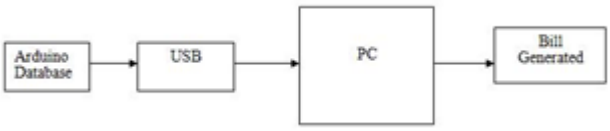

Fig -4: Proposed System (Billing Section)

5. IMPLEMENTATION OF THE SYSTEM

Here we shall discuss, step by step, about how we implemented our system

5.1 Designing the Circuit

For designing the circuit, we used a circuit a circuit-designing software known as DipTrace. DipTrace is an open source software that enables us quick and easy designing of circuits.

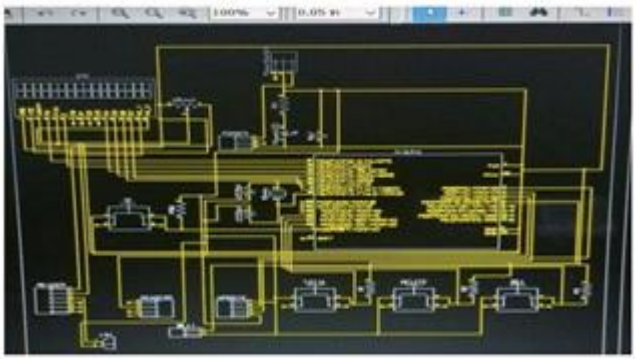

Fig -5: Circuit Designing in DipTrace

5.2 Building the Trolley Section

Here, we used the different necessary components such as the LCD, Arduino, RFID reader, capacitors, buzzers, etc.

The design obtained from DipTrace shall be converted into a physical circuit. This trolley section shall be installed on the shopping cart or basket and shall be operated by the customer.

Fig -6: Implementation of the circuit

5.3 Billing Section

The billing section shall be operated by the admin. It is developed using Visual Basics.

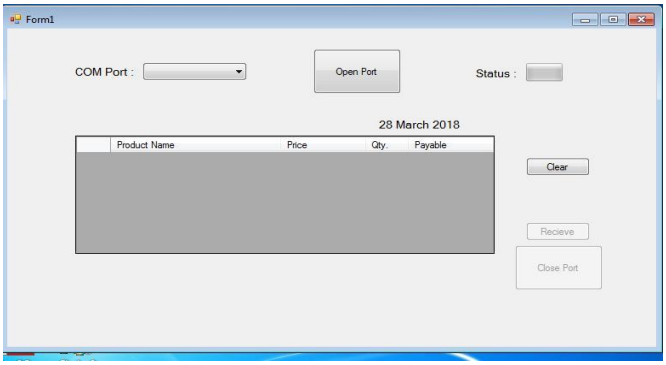

Fig -7: The billing screen at the admin section

6. RESULTS

The results of the project 'Smart Cart Using Arduino and RFID" is as follows:

Scanning a Product

Fig -8: Before Adding Item

Fig -9: After Adding Item

II. Viewing the total

The total can be viewed by pressing the total button.

Fig -10: Viewing the Total

III. Deleting a Product

A product can be deleted by simply pressing the delete button and scanning the item you wish to delete.

Fig -11: Before pressing the delete button

Fig -12: After pressing the delete button

Fig -13: After scanning the Product to be deleted.

Here, the minus sign (-) indicates that the scanned product (Samsung J7 worth Rs. 20) has been deleted.

IV. Sending the bill.

The bill can be sent to the admin's system for payment procedures by pressing the bill button.

Fig -14: Before pressing the bill button

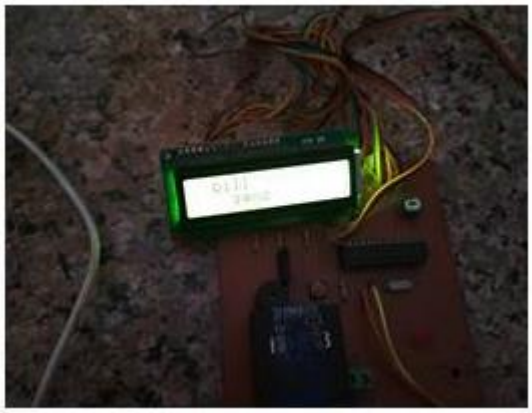

Fig -15: After pressing the bill button

V. Bill Generation at the Admin's section

The Admin clicks on the Receive button on his screen to receive the total bill to be paid from the customer.

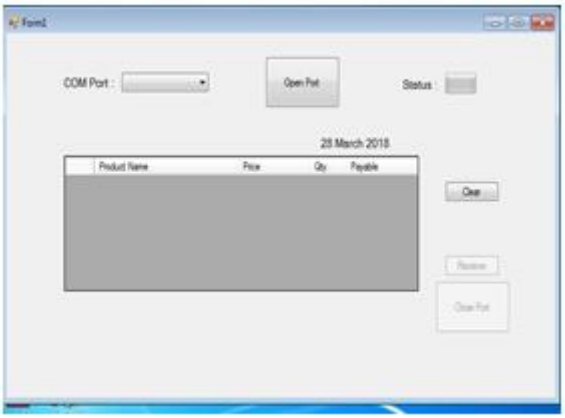

Fig -16: Before admin clicks on Receive

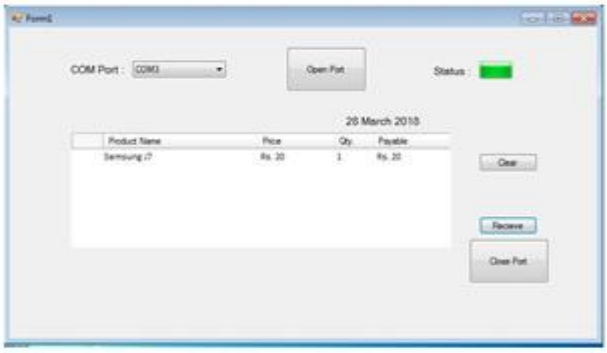

Fig -17: After admin clicks on Receive

7. CONCLUSION

"Smart Cart using Arduino and RFID" has been successfully implemented. This system is not only effective in eradicating the long queues but also manages the budget of the customer. This system is automated and far better than the existing Barcode system. With new technologies rapidly making every walk of life smart, shopping should be made smarter too. The system also has a very quick and easy billing option.

8. FUTURE SCOPE

The transferring of information from the trolley/basket to the Admin's system can be made wireless instead of using a USB. Also, with emerging technologies, the movement of the cart can be automated, too. Hence, this system has a number of future applications and can be the basis of some advanced inventions in the future.

REFERENCES

[1] Iswarya.C, Josuva.D, Vasanthakumar.R "Arduino Based Smart Billing System Using RFID", Int. Journal of Engineering Research and Application.

[2] Ashmeet Kaur, Avni Garg, Abhishek Verma, Akshay Bansal, Arvinder Singh, "ARDUINO BASED SMART CART." I International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume 2, Issue 12, December 2013.

[3] Tanushree, Siddharth Yadav, Saksham Aggarwal, Sagar, Mohit Yadav, Neeraj Gupta, Shruti Karkra. "Ingenious Shopping Cart: RFID Enabled for Automated Billing." IJCSMC, Vol. 5, Issue. 5, May 2016, pg.209 – 214.

[4] Areeb Asif, Bhavana Singh, Ayush Kr. Sonkar, Hardik Dua, Preeti Dhiman. " Intelligent Trolley System." JETIR (ISSN-2349-5162), May 2016, Volume 3, Issue 5.

[5] Muhib A. Lambay, Abhishek Shinde, Anupam Tiwari, Vicky Sharma. " Automated Billing Cart." International Journal of Computer Science Trends and Technology (IJCST) – Volume 5 Issue 2, Mar – Apr 2017