

SMART CART WITH AUTOMATED BILLING

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Abstract: Now a days shopping is one of the most fascinating and alluring things. At the very same time, it involves getting tired due to standing in a long queue for the bill and payment process. At billing counter, they get confused while comparing the total price of all the products with the budget in the pocket before billing. To overcome these problems, we have designed a Smart Cart using an Arduino. Each shopping cart is implemented with a Product Identification Device (PID) that contains a microcontroller, an LCD, LDR Module, RFID reader, Bluetooth module and Push buttons. Here each item consists of a RFID tag and each item is scanned with the help of RFID reader before dropping into the cart. There is a chance to revert the product depending on our need and budget. This can be done by using a push button. If the item is not scanned and is dropped into the cart, an alert is given through the buzzer. This is done with the help of LDR module and Laser diode. The total bill and the number of items will be displayed on the LCD once we are done with shopping and the total bill will be sent to the android device with the help of the Bluetooth module.

Keywords: Arduino Uno, Rfid reader, Rfid tags, Bluetooth module, LCD, Laser, Buzzer, pushbutton.

1. INTRODUCTION

In this era of multiplexes and malls, we face huge rush and crowd while we go for shopping. The purpose of this innovation is to improve upon the conventional method of shopping by making it simple and fast. People generally spend most of their time in shopping. So, we need to make this process of shopping simpler and more efficient.

The purpose of supermarket is to provide availability of all products and save the time of the customers who are getting frustrated while waiting in the queue at the billing counter and sometimes they get confused while comparing the total prices of all the products with the budget in the pockets before billing. Sometimes, even the products in the cart or trolley gets misplaced while scanning, the products might get scanned several times at the billing counter. While shopping, cart plays an important role to carry all the items. After selecting all the items, we go to the billing counter and have to wait in long queue for our turn. So, to overcome this problem we designed this product.

This product is based on Embedded System Design. It uses an RFID-RC522 Module to read the products in the supermarket. The module is interfaced with Arduino-UNO. The LCD displays the total amount and total number of products. The receipt of the total bill is directly sent to the Android device through the Bluetooth module HC-05. II.

II. LITERATURE SURVEY

Developing a 'Multitasking Shopping Trolley Based on RFID Technology RFID (radiofrequency identification) International Journal of Soft Computing and Engineering, Vol.3, No.6, pp.179-183.2014[1] technology offers the ability to provide many new services and conveniences in the retail environment. RFID tags, or simply "tags", are small transponders that respond to queries from a reader by wirelessly transmitting a serial number or similar identifier. RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12-digit card number. RFID reader is the circuit which generates 125KHZ magnetic signal. This magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read the RFID card number. RFID reader is interfaced with microcontroller. Here the microcontroller is the flash type reprogrammable microcontroller in which we already programmed with card number. The microcontroller is interfaced with keypad.

S.Sojitral and RG Patel, "A Review of Smart Shopping Systems", International Research Journal of Engineering and Technology, (Vol. 3, No.5, pp. 2561-2563, 2016) [2] The idea is to decode the QR codes, thereby launching a URL in the web browser. This is because in today's retail environment, products come with label tags for unique identification and theft protection. This in turn gives rise to in-store marketing and access to information. The impact of IoT comes in the case of mobile payment where by enabling NFC, one may get access to systems and virtual wallets. Components like microcontroller, an RFID reader, EEPROM, LCD and ZigBee module, is designed with a Product Identification Device (PID). RFID reader enables reading product information associated with the product being purchased. Meanwhile, EEPROM stores the product information attached to it and the data is sent to Central System for billing via ZigBee module. Central system gets access to information like the cart and EEPROM data, thereby allowing easy calculation of payment amount. trolley equipped with NFC reader display is suggested to maintain running total. In addition to this, use of IoT to connect all trolleys with the central server and providing provision of online payment would add more positivity to shopping experience suggested.

Smart trolley billing system using Arduino by Sridhar Mahad International Research Journal of Engineering and Technology, (Vol. 2, No.5, pp. 1562-2583, 2016) [3] the concept is designed into a smaller version of the automated self-checkout system on a shopping trolley with a user interface screen which allows customers to make payment for items scanned and placed

in the trolley before leaving the exit of the store. the ideas demonstrated in this paper RFID (Radio Frequency Identification) Technology is used. Every item or product is attached with a RFID tag and this product is scanned using RFID reader which is attached with a trolley. Customer purchase different items and put them in the trolley. Price of that total items and also names will be displayed on LCD (Liquid Crystal Display) screen which is also attached with a trolley. The proposed model is easily accessible, does not require special training and convenient to use. Smart trolley is equipped with cell which measures the weight of purchased items such that keen observation can be done on customers if any malpractices are performed during billing time. The detailed information of product is stored in microcontroller with series of instructions in programming language. The Arduino Uno is a microcontroller which has fourteen digital input/output pins. It can be externally supplied by power through USB.

III. IMPLEMENTATION

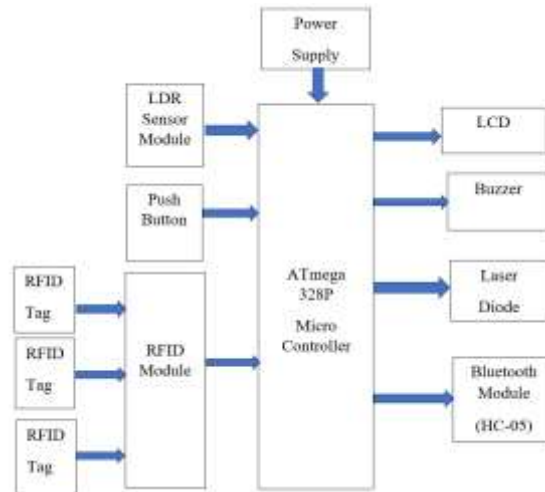


Figure 1. Block Diagram

The inputs and outputs are given to the AT mega 328P microcontroller of Arduino Uno. Coming to the operation, the power supply is given to the circuit with the help of the adapter. The switch needs to be turned ON before adding items to the cart. The items need to be scanned before adding to the cart or subtracting from the cart.

This scanning is done with the help of RFID Module which consists of the RFID tag and the RFID reader. The tag of the respective product should be brought near to the MFRC522 RFID reader for scanning to add the items to the cart, we need to scan the RFID tag of the product and the total price and the number of products will be displayed on the 2x16 LCD, after scanning all the items we need to turn OFF the switch and press the Push button which is placed to the second right of the switch.

After pressing this Push button, a Green coloured LED will emit. There is a chance to revert or deduct the product from the cart depending on our need and budget. This can be done by simultaneously pressing the Push button which is placed to the first right of the switch and scanning the RFID tag of the product which we want to remove. While we are pressing the Push button, a red coloured LED will emit until we stop pressing the Push Button.

After deducting the products, the total price and the number of products will be displayed on the LED in the same manner as above i.e., turning OFF the switch and pressing the Push button which is placed to the second right of the switch. A laser placed at one end of the cart is made to fall on the LDR which is placed at another end of the cart.

This Laser light falls on LED with the help of mirrors placed at some points of the cart which carries the light until it falls on LDR. Thus, the entire area of the cart is covered with the zig zag path of laser. The laser light must continuously fall on the LDR. If there is any interruption in the Laser i.e., if the Laser light does not fall on LDR, then this leads to the generation of Buzzer. When the item is scanned, then the interruption of Laser will not lead to the generation of Buzzer.

This can happen only for 2-3 seconds after scanning. Whereas, If the item is not scanned, then the interruption of Laser gives an alert by generating a Buzzer and displaying on the LCD screen that the item is not scanned. Each and every step of addition & subtraction of items and the total bill in the form of a receipt will be displayed in the Android device to which the Bluetooth module HC-05 is paired with. If we want to deduct the item that does not exist in the cart, then it will be displayed as the respective item is not in cart.

IV. RESULTS



Figure 2. Smart cart

The design of hardware components is done and processed by Arduino UNO. The software implementation is by Arduino IDE tool. Here are the figures of the results.



Figure 3. Bill Generation in Android Device

V. CONCLUSION & FUTURE SCOPE

5.1 Conclusion

In this thesis the project Smart Cart with Automated Billing has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. The smart trolley system is very efficient for both customers as well as the shop owners. This system is robust and consistent. People always wanted to buy new stuffs to satisfy their needs; however, some people hate it mainly because of the crowd, long queues in the shop, billing, etc. In a big shopping mall, it is very difficult to search for a particular product. In light of these, the smart trolley seems to be a better alternative for all these woos. This is mainly to ease the shopping, to invite more customers, to make shopping a fun and mainly to save time. Moreover, customers manage their shopping details online and remain connected with the shop owners for any queries or suggestions and also make the billing perfectly online. This is to ease the shopping for customers and to reduce the number of workers in the shop to save money to the shop keeper.

5.2 Future Scope

In future, this system can be improved further by providing face recognition instead of smart cards. By this, all are stored in RFID tags to store data. This makes the customer come to the shop and take a trolley and do all purchasing and can walk out of the door. There is no need of customer's smart card. The bill will be sent to his mail id, and money can be deducted directly from the customer's bank account by paying it with the help of the QR code attached to the cart. However, smart trolley can be improved in security aspect also by providing consumers privacy and it must guarantee secure online transaction

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