



IJRTSM

INTERNATIONAL JOURNAL OF RECENT TECHNOLOGY SCIENCE & MANAGEMENT

“SMART SHOPPING CART WITH AUTOMATED BILLING SYSTEM”

Sagar Kushwaha¹, Ravi Kumar², Advitiya Goswami³, Devendra Singh Mehra⁴

¹⁴⁶ Department of Electronics & Communication Engineering Sagar Institute of Science, Technology and Research, Bhopal. M.P. (India)

sagarkushamaz@gmail.com , ravikumar124dubey@gmail.com, goswamiaditi397@gmail.com

ABSTRACT

Technology has changed so much, with the rate of people of all age who are attracted to electronic gadgets. In many industries, electronic devices such as smart card readers, barcodes, and RFID scanners are increasingly used. Supermarkets also need these kinds of gadgets. Currently, every person in the mall purchases the product placed in the trolley. Upon purchase, the person will have to stand in a queue for billing. In the billing process, an employee scans each product's barcode and bills it to the final. This process can take a lot of time and it can be even worse on holidays, special offers or weekends. To overcome this, a smart way to shop in malls has been developed. Each product has an RFID tag instead of a barcode. The Smart Trolley features an RFID reader, LCD module. When a person places any product on the trolley, it is scanned and the product's cost, name, and expiration date are displayed. The total cost will be added to the final check out bill. The bill is stored in the microcontroller's memory. Once the purchase is complete, the purchase details are sent to the customer through the GSM module. Arduino IDE software tool is used for programming and Proteus The billing process at the counter is a time consuming and also need more human resource in the billing section. To tackle this problem, we have proposed a solution in which a smart shopping cart is used to overcome these problems. It has Barcode scanner and touchscreen display, which can be used to scan the products and display the product information, cost and total bill. The customer can pay the bill through any one of online payment options such as Paytm, UPI, Phone Pay etc. This solution will increase the consumer experience and reduces the shopping time. View less software is used to check simulation results before hardware implementation.

Key Words: RFID, GSM module, LCD module, Arduino IDE, card readers, Smart Trolley, touchscreen, simulation

I. INTRODUCTION

Shopping is easy, but waiting at the bill counter can be very boring & laborious. Rush plus cashiers who prepare a bill with a barcode scanner take longer & have longer-lasting results. This innovative project includes an automated billing system that can be placed in a shopping trolley. This automated payment system includes an RFID reader controlled by Arduino instead of the traditional barcode readers. A unique membership card is provided to every customer where all the personal details & the account balance details of the customer are stored. The shoppers can deposit cash in counters before shopping, balance & other details will be updated whenever the shopper deposits cash at the billing counter. so, whenever the shopper goes shopping, he/she has to scan the special membership card against the RFID reader attached to the cart. Therefore, all the required personal details will be transferred to the microcontroller's memory. Then a welcome text with account balance details is displayed on the LCD screen. Now the system will be ready to start scanning the products. Any product, he/she has to scan it against the RFID reader & then has to get it into the cart. All the product details are displayed on the LCD along with the price of the product. As the shopper goes on adding

<https://www.ijrtsm.com> © International Journal of Recent Technology Science & Management

products, every product is detected by the module & therefore the price will increase accordingly. In case if the shopper changes his/her mind & doesn't want any product added into the trolley, he/she can remove it by scanning the same product once again against the reader & the price added will be deducted automatically. A buzzer is used to verify whether the membership card/product scanning is successful or not. Buzzer beeps once the product scanning is successful. At the end of shopping, the shopper has to scan the membership card, when done the final bill details will be displayed on the LCD screen. The bill amount will be deducted from the membership card & the remaining balance amount will be displayed. Immediately after the bill is paid an SMS is sent to the prescribed member's Mobile phone via GSM module. Hence this technique is an appropriate method to be used in places like supermarkets. This will help in reducing manpower & helps in making a better shopping experience for customers.

II. LITERATURE REVIEW

Shipra Aggarwal, Himani Pangasa, An analysis of LI-FI based prevalent automated billing systems in shopping malls, International conference of computing methodologies and communication (ICCMC), 2019. In this paper, an attempt has been made to analyse the related works carried out by various researchers in this field based on the main components of smart cart like microcontroller, transmission medium and scanning system.

B Vishwas, Apoorva, Swathi V Raidurg, IOT application on secure smart shopping system, International journal of advanced research in computer science , vol 9, 2018. This paper shows how RFID technology makes life easier and secure and thus helpful in the future. This system describes about IoT, concentrating its use in improving and securing the future shopping.

Pravina B. Chikankar, Deepak Mehetre, Soumitra Das, An Automatic Irrigation System using ZigBee in Wireless Sensor Network, 2016 International Conference on Pervasive Computing (ICPC). The main idea of this is to understand how data travels through a wireless medium transmission using wireless sensor network and monitoring system.

III. PROBLEM IDENTIFICATION

Shopping is simple but waiting on a bill counter makes shopping too boring and a tedious task. Huge amount of rush plus cashier preparing the bill with barcode scanner is too time consuming and results in long ques. This innovative project consists of an automated billing system which can be placed within the shopping trolley.

Problem identification in mall shopping and billing reveals significant inefficiencies, primarily driven by manual processes, high customer density, and outdated technology. The core issues center on time-consuming checkout queues, inaccuracies in pricing, and poor user experience, which often lead to customer frustration and lost.

IV. SOLUTION

This automated payment system consists of a RFID reader which is controlled by Arduino. So, whenever the shopper puts any product in trolley it is detected by the RFID module and is displayed on LCD along with the price of the product. As the on adding products, all products are detected by the module and therefore the price will increase accordingly. In case if customer changes his/her mind and doesn't want any product added in the trolley he/she can remove it and the price added will be deducted automatically. At the end of shopping the shopper will press the button which when pressed adds all the product along with their price and gives the total amount to be paid. At exit for verification the shopkeeper can verify the products purchased with the help of master card. Hence this technique is an appropriate method to be used in places like supermarkets, this will help in reducing manpower and helps in making a better shopping experience for customers.

V. PROPOSED METHODOLOGY

The block diagram consists of 8 components in total where 6 of them will be embedded-attached to the shopping cart. Arduino Nano ATmega328 microcontroller is interfaced with various modules i.e. RFID reader-RC522 SPI, LCD

panel20x4, buzzer, 9V battery, RFID card, GSM module-GSM SIM 900 and a mobile phone is required for receiving SMS.

Block Diagram:

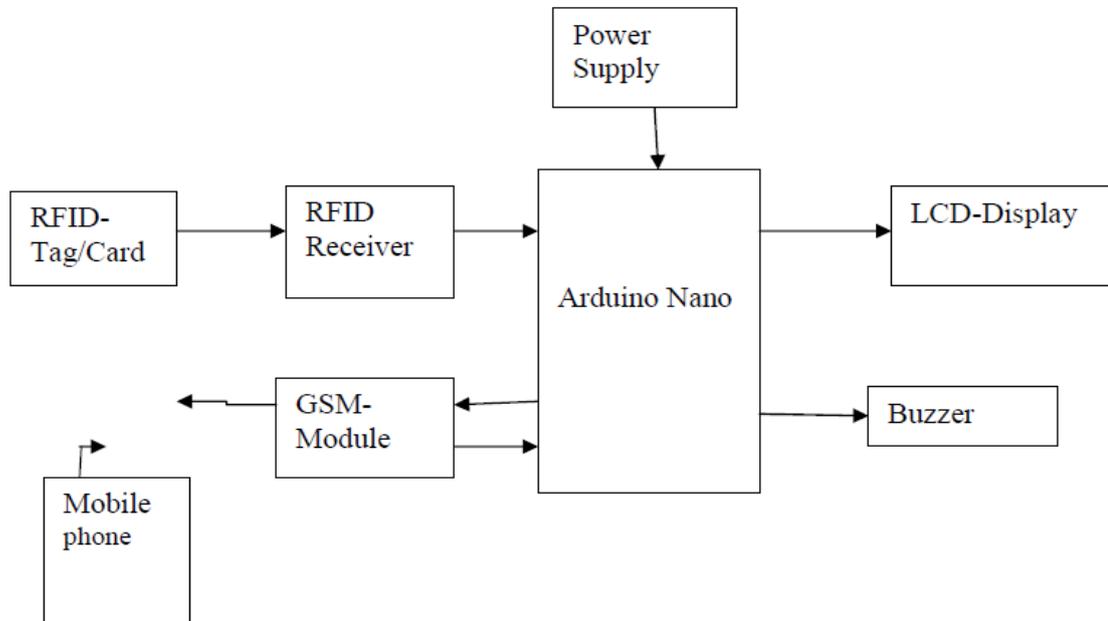


Fig (1).

Figure1:Block diagram of 8 components

ALGORITHM

Step 1: Start

Step 2: When the system is powered up, display the initial data.

Step 3: Scanning of the RFID membership card.

Step 4: If the membership card scan is successful fetch all the personal details & display it on the LCD. If not, scan the membership card once again. Loop repeats until the scanning process is successful.

Step 5: Now the product scanning process is ready. If the scanned product code is detected, display all the product details on the LCD screen. If not, the product has to be scanned until it gets detected. This process applies to each & every product.

Step 6: If a scanned product is scanned once again then that product is removed from the microcontroller's memory & in the ongoing bill.

Step 7: Finally, to end the shopping, the shopper has to scan the Membership card. If the card is successfully scanned, then the complete is displayed on the LCD.

Step 8: Immediately after the bill amount is deducted from the card, an SMS is sent to the prescribed shopper's mobile phone via a GSM module regarding the shopping details.

Step 9: Stop.

Step 10: Repeat the entire process if another membership card is scanned & detected.

Hardware Design & Circuit

Hardware Design & Circuit-

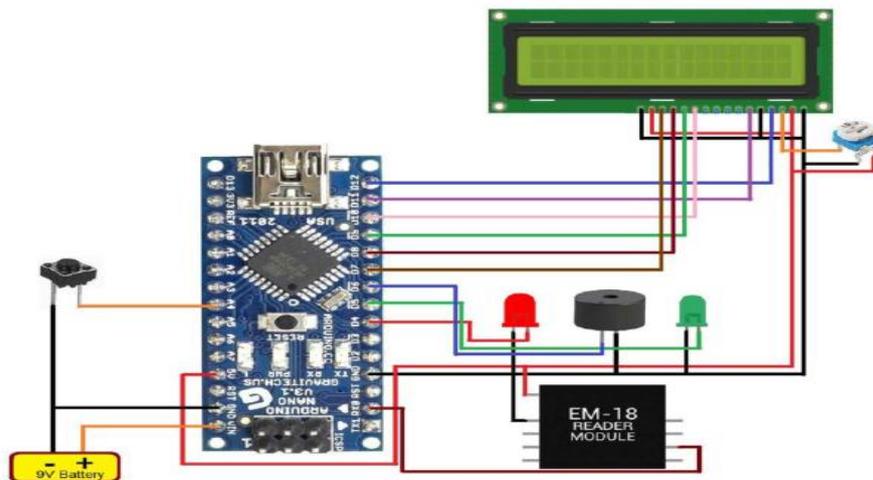


Figure2:Hardware design and circuit

The main controller of this project is Arduino Nano Board where the project code is stored. The Arduino operates all the processes from reading RFID Cards info to storing and calculating prices. The RFID Module that we are using here is the EM-18 Module which operates at a frequency of 125KHz. Apart from the RFID Cards, we need 5-10 RFID cards. These RFID cards are named as different items name like tea, milk, biscuits, oil, etc. The system has a buzzer that turns on when RFID is scanned. There are two LEDs Red and Green LED. These LEDs turn on and off based on items added or removed. The most important part of the project is the LCD Display. We are using a 16x2 LCD display for this project. The 10K potentiometer is used with LCD Display for adjusting LCD contrast. When you press hold the reset button and scan the RFID, the items can be removed. To power the entire circuit, we will use a pair of Lithium-Ion Batteries. Each 3.7V Samsung 18650 connects in series to give a 7.4V Supply. Then the 7.4V is a 5V pin of Arduino Nano. Text displaying once the system is powered up and initialized. Once the system is powered up & initialized a text is displayed saying Automated Shopping trolley. This means the system is ready for scanning products. Now the shopper has to scan the membership card. Personal details being displayed on LCD. Once the membership card is scanned by the shopper all the personal details will be transferred & displayed on the LCD for the shoppers verification. Item details being displayed if the scanning is successful. Now after the membership card is scanned successfully the system is ready to scan products. When a product is scanned all its details will be fetched by MC & displayed on the LCD screen including name, quantity, price as well as the manufacturing & expiry dates. Final bill summary being displayed When the shopping is completed if the shopper scans the membership card, shopping ends & all the bill details will be shown on the LCD screen. It displays the final bill amount: the amount balance which was present before shopping & balance amount remaining after the shopping bill is paid.

VI. RESULT

Initially, the LCD display will show the message "Welcome To Super Market". The LCD will display the message to Add the item. You can add any item simply by scanning the item with an RFID tag. For example, the RFID Card marked as Tea is scanned in our project. The LCD will display "Tea is Added" along with the price value of the tea. You can scan other cards with different item names like Milk, Butter, or whatever you have assigned in your code. Every time you add any item, the price is added to the previous value with a total cost. In case you want to remove any item from the list, then press and hold the reset button and scan the item. The item will be removed from the system and the price will be updated automatically. At the end of shopping the shopper can show the total price value of the products and pay the final price. This is how you can build your own Smart Shopping Cart with an Automatic Billing System using RFID and Arduino This system can be also implemented using LI-FI, NFC & other communication systems.

VII. CONCLUSION

Smart shopping cart help customers skip the long queues at the cash counter. Smart shopping cart is designed and developed to help customers skip the cash counter and check out by themselves, this is also the most distinct advantage. All customers hate waiting in lines , in an ordinary shopping scene ,customers have to wait in line for some minutes or even an hour . Smart shopping cart is likely a moving check-out machine ,customers could check out via the smart shopping cart at anywhere in the supermarket ,so queueing can be avoided completely . Smart shopping cart advantage : smart shopping cart provide a total contactless shopping trip. Covid-19 has emerged for nearly 2 years . Customers are asked to keep safe distance in public places. In an ordinary shopping scene , customers need to contact with the supermarket staff or cashiers to finish their shopping process . With a smart shopping cart , customers could purchase items by themselves and check out by themselves .Besides , customers even could weigh fruits and vegetables via the smart shopping cart .That is to say , customers could enjoy a contactless shopping trip ,a safe shopping trip . Smart shopping cart advantage : smart shopping cart provides more functions than customers can imagine . Smart shopping cart could push ready- to- use coupons and related items information to customers which could greatly help customers make purchase decisions .Ready –to -use coupons could also bring benefits to customers . The smart shopping cart also has mobile phone charging port which could support customers charge for their mobile phones while they are shopping

REFERENCES

- [1] Shipra Aggarwal, Himani Pangasa, An analysis of LI-FI based prevalent automated billing systems in shopping malls, International conference of computing methodologies and communication (ICCMC), 2019.
- [2] Muhib A Lambay, Abhishek Shinde, Anupam Tiwari, Automated billingcart, International journal of computer science trends and technology, volume 5, 2017.
- [3] Sudipta Ranjan Subudhi, RN Ponnalagu, An intelligent shopping cart with automatic product detection and secure payment system, IEEE 16th India council international conference, 2019.
- [4] B Vishwas, Apoorva, Swathi V Raidurg, IOT application on secure smart shopping system, International journal of advanced research in computer science , vol 9, 2018.
- [5] Pravina B. Chikankar, Deepak Mehetre, Soumitra Das, An Automatic Irrigation System using ZigBee in Wireless Sensor Network, 2016 International Conference on Pervasive Computing (ICPC).
- [6] Sneha Angal RFID & Arduino Based Automated shopping cart System International Journal of Science & Research (IJSR)
- [7] Bhagyashree K.Chate , Prof.J.G.Rana , Smart trolley system using Raspberry pi and Beacon Module. International Research Journal of Engineering & Technology (IRJET), 2016,
- [8] Suprabha Jadhav1, ShaileshHambarde, android based Automated cart System using Raspberry Pi and GSM, International Journal of Science & Research (IJSR), Volume 5 Issue 6, June 2016.
- [9] Nikhil Agrawal , SmitaSinghal Intelligent shopping cart using NFC, Arduino, Volume 9 Issue 3, December 2018.
- [10] Himani Pangasa, Nathi Ram Chauhan, A study on automatic shopping