International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE)
ISSN: 0976-1353 Volume 29 Issue 4 – MAY 2022.

IOT BASED SMART SHOPPING CART USING MOBILE APPLICATION

Deepthi, Efcia,Jone Sujitha, Raghavi[1], Dr. Shanthi[2]
Students-Department of CSE-PSNA,Dindigul[1]
Head of Department-Department of CSE-PSNA, Dindigul[2]

Abstract—Metro cities will be bustling with shopping malls during the holidays and weekends. This is even more so when there are large offers and discounts. Nowadays people buy a variety of items and put them in a trolley. After the full purchase, the customer must speak to the counter for payment. By using a barcode reader the cashier adjusts the bill which is a time-consuming process .This results in longer lines at payment counters. This project introduces the idea of building a smart cart in a shopping mall to overcome the above problem. To achieve this, all in-store products must be tagged with RFID and all vehicles must be equipped with an IR sensor, RFID reader, LCD screen and Arduino. , the brand name and costs will be displayed on the LCD, thus costs are added to the total charge. If a customer wishes to remove a product from a smart cart, the product can be removed and the value of that particular product is deducted from the full value and the same composition exceeds the middle payment unit with a zigbee module. Payment can therefore be made to the smart cart itself thus saving a lot of time for customers. IoT is very effective in this process. In line with this the customer needs to log in with a mobile app that will display a list of all purchased products and their price. When you are done, the customer can pay the bill through the mobile app. The smart cart first checks the status of the module whether it is online or offline. Internet connection requires a network connection from the user and the controller will create a bridge between the user. This project introduces the idea of developing a system in the shopping mall so you can have better shopping experience using IoT.

Keywords: Embedded, RFID, Arduino, IR Sensor, Zigbee, ESP8266.

I. INTRODUCTION

RFID is a new system that has recently emerged due to the official concern of the testing team due to the extraordinary benefits it offers in addition to other available physical evidence and ongoing diagnostic information. RFID is a term used for programs that use radio waves to distinguish objects naturally. RFID is a technology that allows the exchange of information between labels and the reader without the need for a visual approach over a break of up to a few 10 meters depending on the type of label used [1]. In this framework information is converted to radio waves and different tags can be processed or collected normally. This section is designed to evaluate existing technical documentation and to investigate problems in an existing RFID organization from its conversion to its recognition stage. From time immemorial the growth of this variation since the 1900s, in addition to the emergence of reliable theories, thus the new establishment also supports a few stories or points. The planned motivation behind the part of the documentation identified with the above-mentioned technology enhances scholarly analysis by providing agreement as part of the outstanding and significant cases that hinder the growth of this transformation. It has to deal with these situations with a certain ultimate goal to provide a brighter visibility and an improved object speed for RFID renaming. Since the 1900s, with the advent of this renaming without the concepts of verification, new inventions have had a number of problems. And the reason for the expected partly is that a text-based review of Radio frequency Identification enhances academic research, as well as providing information on part of the rare and urgent issues that hinder the development of RFID design. There is an urgent need to address these issues with some ultimate goal to provide each of the highlights of each acquisition and the improved object speed of RFID design. The primary use of radio waves to transmit signals goes back to World War II when a transponder (labeled) was fitted to an

aircraft and used to detect drawing a nearby aircraft. Investigators sent a signal to the airplane system and a pre-delivered signal could be used to identify a peaceful and hostile flying machine.

• The main goal involved in this program is to use a smart shopping cart with the help of RFID technology to improve purchases. The plan is to apply the practice of using RFID-related surveillance to a shopping cart.

• In this program the RFID card is used as an entry point to secure the purchase of goods in supermarkets. If the goods are placed in a cart the price of the product appears and accordingly the full price will be displayed and if we wish to remove the product from the trolley, you can take the product and the price of that particular product available deducted from the total amount.

• In this case, the technology used to get the products thus improves the safety and speed of the product while shopping at the mall. The technical purpose of our problem presented in the shopping areas is the practice of RFID technology for the natural recognition of the goods inside the shopping cart thus destroying the consumer interfering in the procurement process and payment.

The key point of the proposed framework is to provide new design that focuses on small, flexible, and potentially effective design to help individual purchases. With this in mind most of the time will be saved in the payment calculators.

II.FUNCTIONAL ARCHITECTURE

- The prototype involved in this program is to use a smart shopping cart with the help of RFID technology to improve purchases. The plan is to apply the practice of using RFID-related surveillance to a shopping cart. In this program the RFID card is used as a security check in supermarkets. If the goods are placed in a cart the price of the product appears and accordingly the full price will be displayed and if we wish to remove the product from the trolley, you can take the product and the price of that particular product available. Deducted from the total amount .In this case, the technology used to obtain the products thus improves the performance of security and speed while purchasing from shopping malls. The technical purpose of our problem presented in the shopping areas is the practice of RFID technology for the natural recognition of the goods inside the shopping cart thus destroying the consumer interfering in the procurement process and payment. The key point of the proposed framework is to provide new design that focuses on small, flexible, and potentially effective design to help individual purchases. With this in mind most of the time will be saved in the payment calculators
- In the development and negotiation of the proposed smartshopping cart.
- • Microcontroller is the main unit of this process; only the device can monitor and control all the processes we have proposed in this program. The system has features when compared to the base commonly known as 8051. The arduino module has an internal analog to digital communication, systematic memory transmission and pulse generation registers. The easy-to-use module is easy to develop pre-coded codes due to its pro-gram able memory.
- • Here, our project operates in both online and offline modes. When the user picks up the cart, the controller checks the state of the Internet connection. When the controller fails to communicate with the user, it opens an offline connection. The Internet connection contains the RFID Reader and ESP Module while offline requires Zigbee to contact the payment section. [2]
- • At the end of the selected communication mode, the controller asks the purchase price for the user. The user needs to keep the purchase price in the controller. In this process a five-channel keypad is used to make successive changes such as increasing and decreasing. Once the price is set to the controller in your area keep the price variable and proceeds with the next purchase process.
- • Here, we use ten RFID card numbers in this process. RFID card data is organized in the controller. Product data is read via RFID Reader. When a user buys any goods he needs to show the card to the reader. The product has a RFID Tag with different digits to be passed when the reader tries to read the data. The controller analyzes the data and displays the product details such as name, weight and price on the LCD display [3].

In this process, we develop an existing system consisting of two RFID readers to find the inside and outside object. Here, the controller stores RFID data. When the controller receives multiple inputs for a single product we consider exiting and exiting.

At the end of the purchase the user needs to press the charge button. Total cost sent to a web page if the controller works in Internet mode. Otherwise the data is sent to the payment section via zigbee connection.

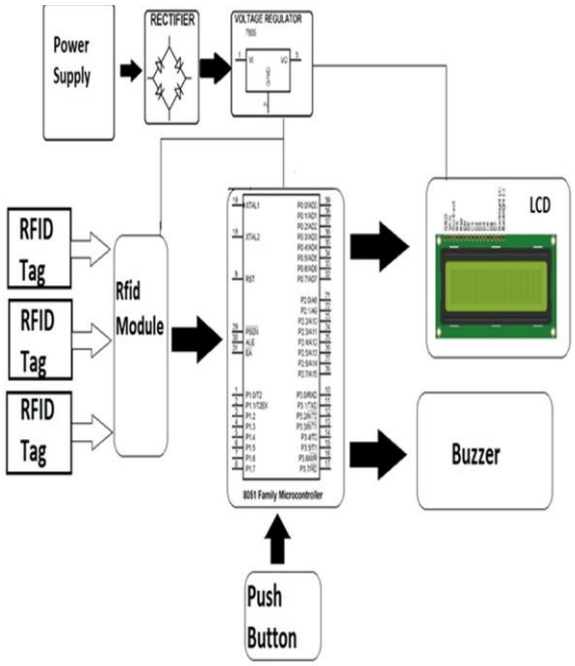


Figure 1. System Architecture

. The customer goes to the mall and starts picking up the cart. Every last trolley is integrated with the RFID reader per user. Content function is the point at which the buyer purchases the item; the buyer must first check the item with the help of the same tag found on each item using RFID per buyer. At that point the gains can be repaired in the cart. Arduino initially checks the status of the device whether it is connected to the internet or offline. While the customer checks the RF item of the item, the purchase cost is taken and secured to the frame memory. When a customer dials an RFID card to an RFID reader, the RFID reader will assign the same RFID card number to Arduino via a serial connection. Arduino will receive ID details on the website, to be displayed on the LCD. The LCD will display the latest product details and total cart value. It will help the customer not to exceed the budget limit. As long as we press the key you set, it will send data to the automatic payment counter on the offline connection. When the controller connects to the Internet it will update the last value on the appropriate web page. The user needs to clear the storage amount before packing the goods. Ultrasonic sensor keeps track of the object from the start, when there are attackers detecting with a sequence control we turn on the alarm module to get closer to the user about keeping the public distance.

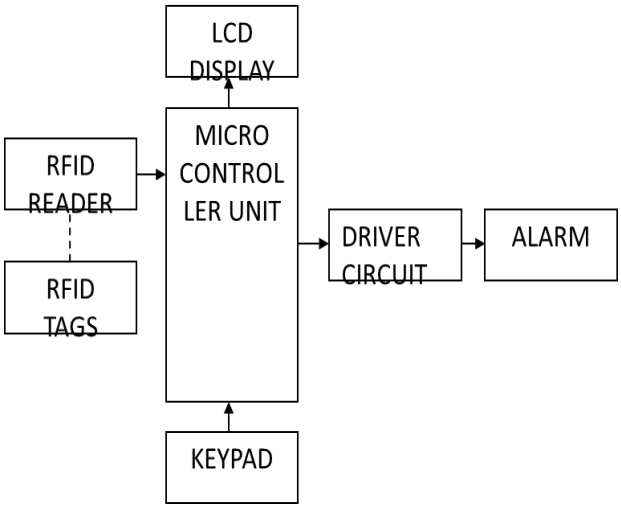


Figure 2. Block Diagram of smart shopping cart

III. RELATED WORK

1."RFID Based Smart Shopping and Billing -

- The currently available method at the mall is a barcode mode. In this process there are barcode labels for every product that you can browse for specially designed barcode readers - Barcode reader is associated with an electronic barcode reading device. Like a flatbed scanner, it consists of a lightweight object, a lens, and a light sensor that converts optical impulses into electricity. [4]

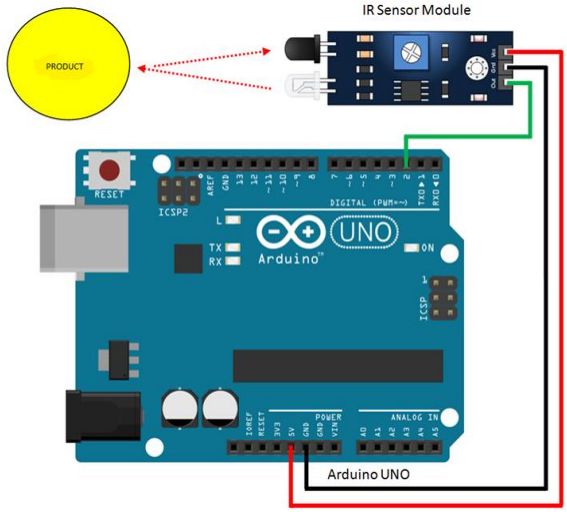
2. If we have a tendency to choose any product we will buy we put it in the trolley and deliver it to the cashier. The cashier scans the product with a barcode scanner and gives the North American country a bill - But this becomes a slower way when a ton of sales have to be scanned, so creating a payment system is slower. This eventually results in longer lines. [5]

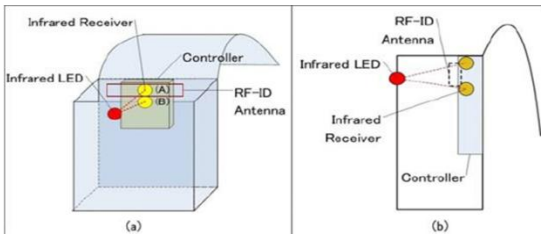
3. Smart ShoppingTechnologies for home markets

One of the methods used to find a buyer related to speech and writing technology so that the client does not have to spend a lot of time writing full sentences, product reviews, terrible "but also analyze whether the sentence is positive or negative, and if the sentence has a negative note be careful when the customer says" wrong "," not bad "and so on [6].

IV. WORKING AND IMPLEMENTATION

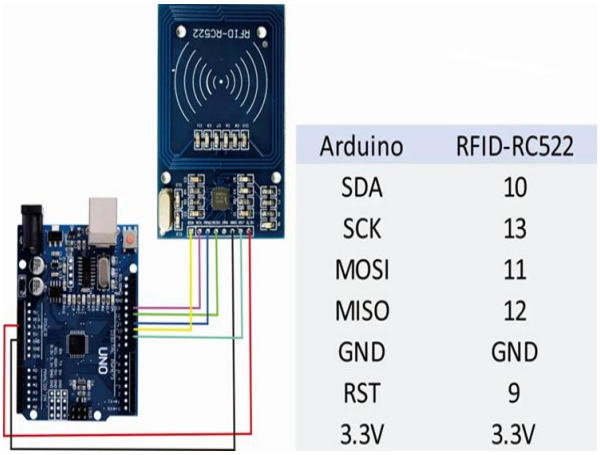
- When a product is placed in the smart cart, the IR sensor senses the product and activates the RFID READER.[7]





• Once RFID READER is activated, read the product RFID Tag. Product name and price displayed on LCD.

• The product has a RFID Tag with different digits to be passed when the reader tries to read the data. The controller processes data and displays product details such as name, weight and price on the LCD display.

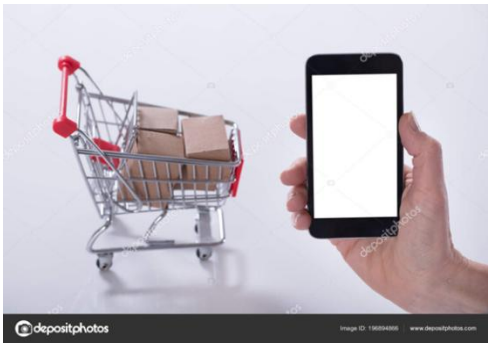


Arduino	RFID-RC522
SDA	10
SCK	13
MOSI	11
MISO	12
GND	GND
RST	9
3.3V	3.3V

• If the customer wishes to remove the product from the smart cart, there is a product removal option.

• The value of the product released is deducted from the total amount.

• At the end of the store the user needs to press the bill button. Total cost sent to mobile when the controller operates in Internet mode. Otherwise the data is sent to the payment section via zigbee connection.



Sr.#	Functionality	RFID System [65], [66]	ZigBee [27], [49], [67], [68]	Barcode System [29], [30], [43]	Purposed System
1	Based on Arduino	YES	YES	NO	YES
2	Based on Android Mobile Application	NO	NO	NO	YES
3	RFID sensors	YES	YES	NO	YES
4	Bluetooth	NO	NO	NO	YES
5	IoT based Wireless Communication	YES	YES	NO	YES
6	Barcode scanner	NO	NO	YES	NO
7	Android based Mobile display	YES	NO	NO	YES
8	Location based searching module	NO	NO	NO	YES
9	Automation of bill generation	NO	YES	NO	YES
10	Promotion module	NO	NO	NO	YES
11	Previous shopping history module	NO	NO	NO	YES
12	Shopping list management	NO	YES	NO	YES
13	Supermarket management application	YES	YES	NO	YES

V.TESTING

Testing was a very important part of this project [8].
Performance Testing - Checking the Black Box Functional testing checks an application, website, or system to make sure it is doing what it is supposed to do.

Unit testing of various modules was performed Independently integrated integrated system testing. Unit test conditions included:
(a) Flexible location
(b) Condition of entry and exit of cart from Aisle
(c) Shopping Cart and server communication using ZigBee wireless unit.

(d) Acquisition of relevant information based on Shopping Cart location from server and display unit display

Product Name	Product Id	Bay No.	Stock	Unit Price	Cart 1 Total Price	Cart 2 Total Price	Grand Total
Mobile	19008	B1	100	6000	1800	6045	7845
Shirt	48CD3	B2	200	800			
Watch	D9EFA	B1	75	500			
Lays	B9F1D	B3	ρ0	20			
Soap	7708E	B2	100	25			
Perfume	830F3	B3	150	500			

and no special training is required to use the cart.
(e) Identification of objects based on RFID tags and alignment with the central website
(f) Automatic payments
(g) Review of purchased and paid products
Table 1 provides a sample of the database that was used to evaluate the smart shopping cart. The passage number was transferred to the ZigBee module from the shopping cart that connects to the server [9]. Based on the obtained TABLE 1 number, all items in the path number are transferred back to the shopping cart. The findings were checked in person with product details on the server and found to match the content on the server. Finally, to mimic the purchase, different RFID cards were used to show the different products being purchased. As the RFID card reader read the product, details were displayed in the display unit [10] .The product details of the purchased items were temporarily stored in the local memory. When the "Finish" purchase button is pressed, the contents of the memory are read and a charge is made.
The following test scenarios were used in integrated system testing to verify improved system performance.
(a) Complete the product list and its information on the trailer mirror when entering each location.
(b) Automatic billing when and where products are released to the cart.
(c) Review the inventory in the central order when purchasing each product. All test cases were successfully tested. The upgraded system is easy to use.

VI. CONCLUSION

The intended objectives were successfully achieved in the built-in prototype model. The enhanced product is easy to use, economical and does not require special training. While the project shows evidence of concept, there are a few factors that can be added to make a smart shopping cart very strong. First, in this project the time delay for wireless communication with the server may need to be considered. Second, communication is not very secure. Another ZigBee module that works on the same frequency can easily block transmitted data. This issue will need to be addressed directly in relation to payment in order to improve consumer confidence. In addition, a highly developed small controller and a large display system used to provide better consumer information.

VII. REFERENCES

[1] Satish Kamble, Sachin Meshram, Rahul Thokal & Roshan Gakre, "Developing a Multitasking Shopping Trolley based on RFID Technology", January 2019 International Journal of Soft Computing and Engineering (IJSCE).

[2] Mr. P. Chandrasekar, Ms. T. Sangeetha, "Smart Shopping Cart with Automatic Central Billing System through RFID and ZigBee", 2019 IEEE.

[3] 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 2019.

[4] International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2019

[5]Aisle-level Scanning for Pervasive RFID-based Shopping ApplicationsInternational Journal of Soft Computing and Engineering (IJSCE), 2019 –

[6] IEEE International Conference on Computational Science and Engineering (CSE), pp. 99-103. IEEE, (2018)

[7] https://solarduino.com/infrared-ir-sensor-module-with-arduino/

[8] Dr.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

[9] http://en.wikipedia.org/wiki/zigbee

[10] 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