“Smart Shopping Cart using RFID and NodeMCU”

Mini Project Report submitted in partial fulfillment.

of the requirement for the degree of

B. E. (Information Technology)

Submitted By
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Under the Guidance of

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University of Mumbai

2022-23

CERTIFICATE OF APPROVAL

For

Mini Project Report

This is to Certify that
Rohini Malladi
Anushree Dandekar
and Sanika Chavan

Have successfully carried out Mini Project entitled

"**Smart Shopping Cart using RFID and NodeMCU**"

In partial fulfillment of degree course in

Information Technology

As laid down by University of Mumbai during the academic year 2022-23

Under the Guidance of
"Prof. Vinita Bhandiwad"

Signature of Guide

Head of Department

Examiner 1

Examiner 2

Principal
Dr. S. A. Patekar

ACKNOWLEGEMENT

We would like to express our deepest appreciation to all those who provided us the possibility to complete this report. We express our profound gratitude we give to our **Prof. Vinita Bhandiwad** Ma'am, our respectable project guide, for her gigantic support and guidance. Without her counseling our project would not have seen the light of the day.

We extend our sincere thanks to **Dr. Vipul Dalal**, Head of the Department of Information Technology for offering valuable advice at every stage of this undertaking.
We would like to thank all the staff members who willingly helped us. We are grateful to VIDYALANKAR INSTITUTE OF TECHNOLOGY for giving us this opportunity.

The days we have spent in the institute will always be remembered and also be reckoned as guiding in our career.

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Abstract

Nowadays, shopping malls are always crowded, especially in cities. We can see many numbers of people shopping at malls on holidays and weekends. The rush is even more when there are special offers and discounts. People purchase various things and place them in the trolley. After total purchase, one visits the billing counter for billing and making payments. The existing technology for billing includes barcode scanning. But customers must wait in long queues for this process. This project targets to improve this process and introduce a smart shopping cart which will display the total price of the products kept inside the cart. In this way, the customer can directly pay the amount and leave with the commodities he/she has bought. The hardware relies on NodeMCU, RFID Reader Module and RFID Cards for each item. It eliminates the normal scanning of products at the counter and in turn speeds up the entire process.

1. INTRODUCTION

Today's world has a fast-growing population with a wide range of demand from a variety of domains. Customers who need to purchase different products need lot of time and patience for successful shopping. We need to address this problem by efficiently using our technologies. In the advancement of technologies, the world is getting automated in many aspects. We introduce reasonable and cost-effective Smart Shopping Cart utilizing IoT (Internet of Things) innovations. Such a framework is appropriate for use in spots such as crowded supermarkets, as it can help in lessening the work and in making a superior shopping knowledge for the clients. Rather than the clients sitting tight in a long line purchasing their shopped things, this framework helps in mechanizing the process and thus resulting in an easy and comfortable billing process.

Smart shopping cart using NodeMCU and RFID can be a new advancement as this method shall not only skip the long queues in supermarkets and malls but also save plenty of your time for the purchasers. The system also helps the customer in saving money. The system uses RFID tags instead of Barcode tags which are much more efficient and powerful when it involves scanning of products. The device developed using NodeMCU and RFID shall be installed on the handbasket or trolley. The customer shall scan their products by themselves, and the calculation of the total amount happens on the cart and displays on the webpage itself. This shall also give a plan to the shoppers on what proportion their shopping session shall cost them. Hence, time management and money management shall be taken care of.

2. AIM & OBJECTIVE

The main objective involved in this plan is to implement a smart shopping cart with the help of RFID technology for improvising purchasing. The plan is to employ the RFID related surveillance implementation practice in the purchasing cart.

If a commodity has been placed in the shopping cart the price of the product appears and accordingly, the total amount will be shown and if we wish to remove the product from the trolley, you can take away the product and the amount of that specific product gets deducted from total amount.

The second objective is to reduce the time spent during the wait in the queue at the billing counter. By using the RFID technology, we can scan multiple items at a given time. RFID Reader is mounted upon the cart which scans Real Time objects placed inside the cart and displays the total amount on a webpage which can be accessed from mobile phones as well. This, thus, reduces the total time taken by any person during checkout.

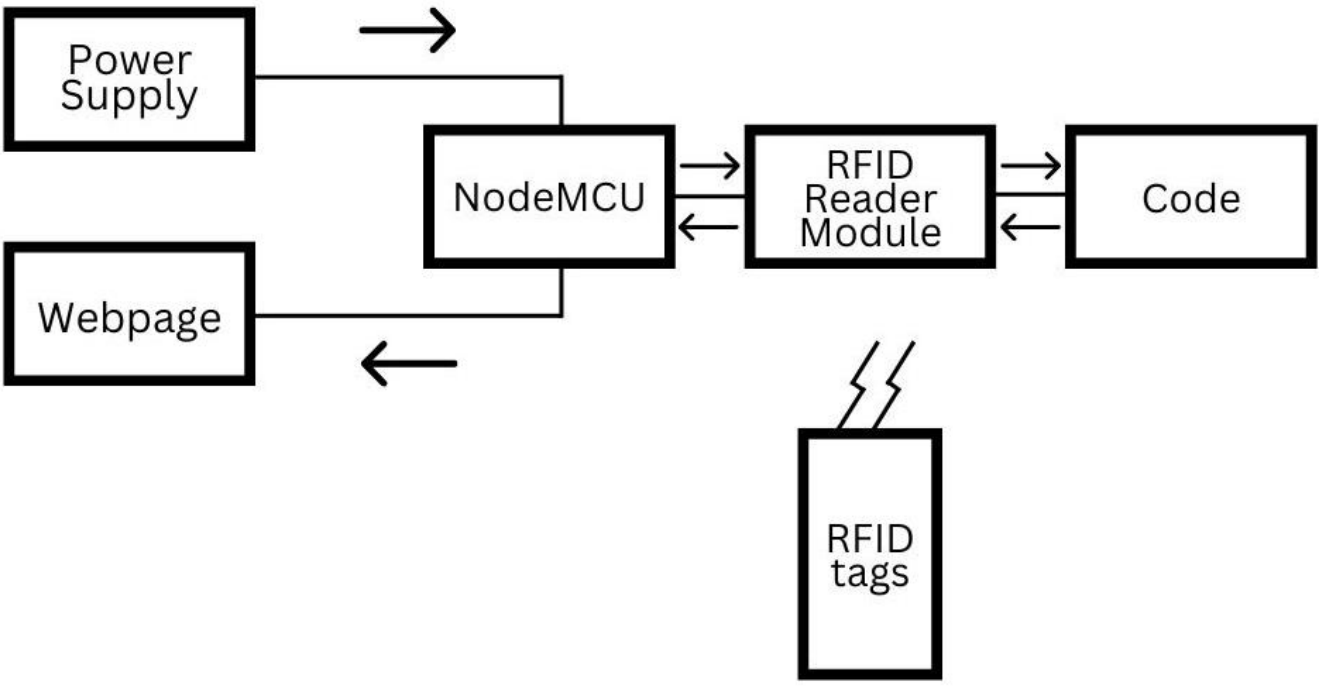
The principle point of proposed framework is to give an innovation which is minimal effort oriented, effectively adaptable, and efficiently feasible for helping shopping in individual. With the help of this a lot of time will be saved at the billing counters.

3. PROBLEM DEFINITION

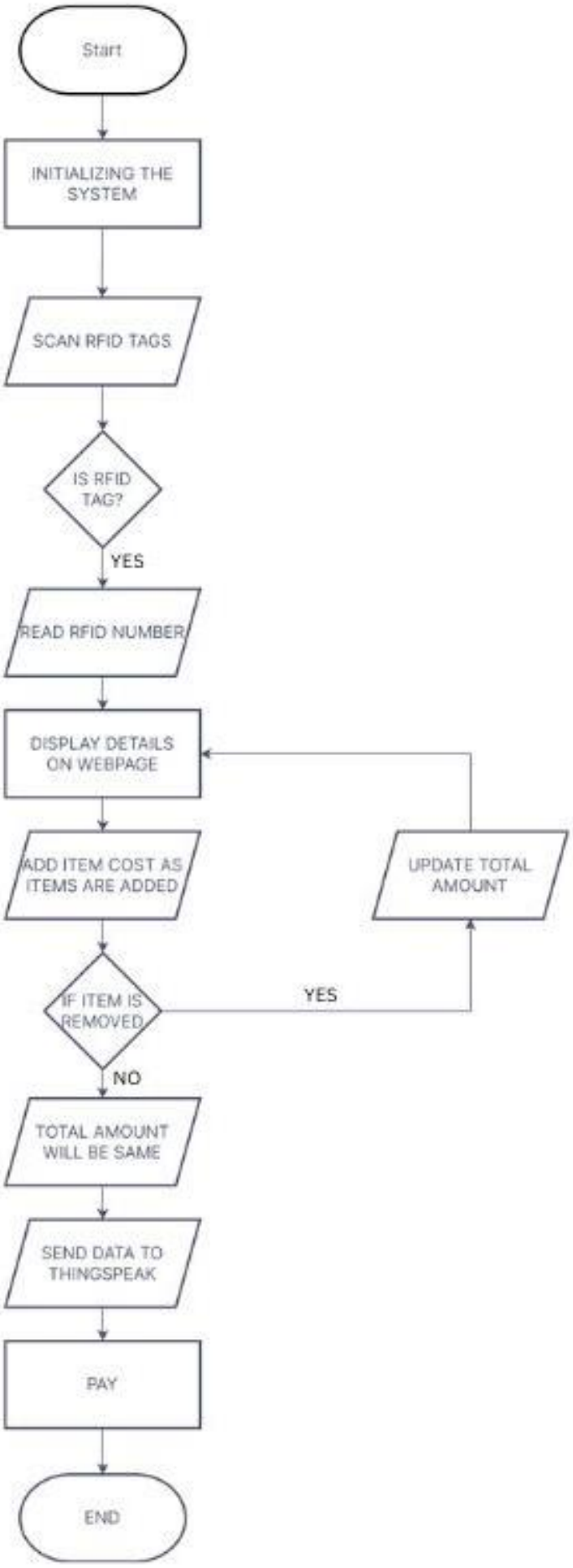
Malls and markets are a big corner for customers to purchase items. We can see a huge rush at such public places. The existing system for billing uses the barcode method. The products are scanned by the cashier through a barcode reader one by one. After this, the cashier provides the bill. But this method turns out to be tedious once a ton of products are to be scanned. Therefore, this billing method becomes slow. This eventually results in long queues. Thus, to increase the quality of shopping experience of the customers and to overcome these problems, we need to introduce an improved billing system.

4. PROPOSED SYSTEM

4.1 Block Diagram



4.2 Flow Chart



5. COMPONENTS

5.1 Hardware

5.1.1 RFID Reader Module:

It is used to read unique ID from RFID tags. Whenever RFID tags comes in range, RFID reader reads its unique ID and transmits it serially to the microcontroller or PC. RFID reader has transceiver and an antenna mounted on it. It is mostly fixed in stationary position. RFID Reader Module, is also called as - interrogator.

5.1.2 RFID Tag:

A Radio Frequency Identification Tag (RFID tag) is an electronic tag that exchanges data with a radio frequency identification (RFID) reader by using radio waves. RFID tag includes microchip with radio antenna mounted on substrate which carries 12 Byte unique Identification number.

5.1.3 Node MCU:

NodeMCU is an open-source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). Strictly speaking, the term "NodeMCU" refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source.

5.1.4 Jumper Wires:

A jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

5.1.5 LEDs – Red, Green

LEDs (light-emitting diodes) are small, bright, power-efficient lights commonly used in electronic products. An LED light is a polarized part, meaning it must be connected to a circuit in a certain way to work properly. Specifically, each LED has a positive leg and a negative leg.

5.1.6 Push Button

A push button switch controls an action in a machine or other type of process. They are common features within the home and workplace and are also referred to as pushbutton switches or push switches. The buttons are typically made from plastic or metal and the push button may either be flat or customised to ergonomic specifications.

5.2 Software

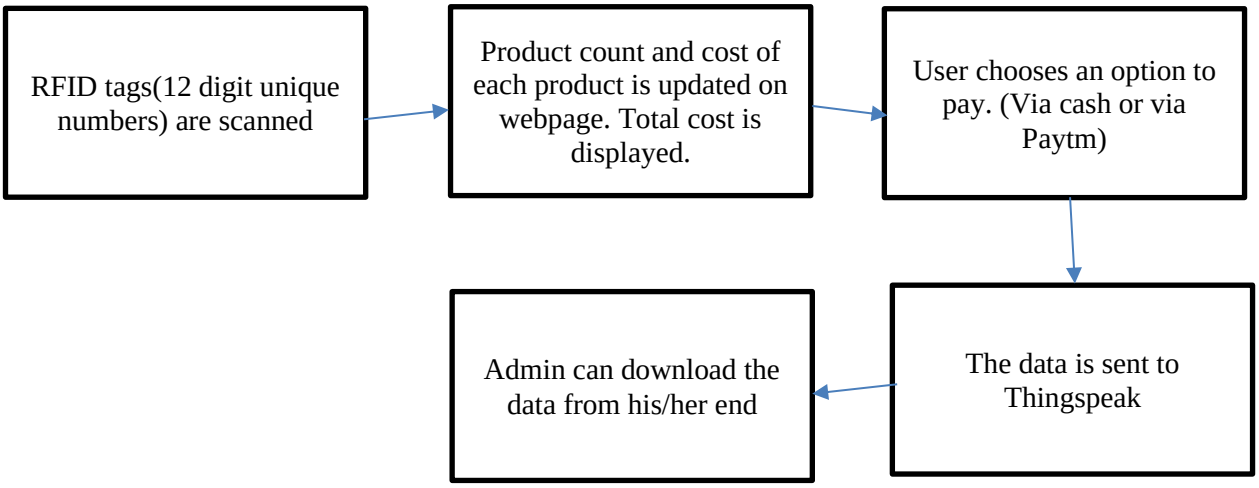
5.2.1 Thingspeak web server:

According to its developers, Thingspeak is an open-source Internet of Things (IOT) application and API to store and retrieve data from things using the HTTP and MQTT protocol over the Internet or via a Local Area Network. Thingspeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. Thingspeak has integrated support from the numerical computing software MATLAB from Math Works, allowing Thingspeak users to analyze and visualize uploaded data using MATLAB without requiring the purchase of a MATLAB license from Math works.

5.2.2 Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus.

6. PROJECT ARCHITECTURE



- When a user collects an item from the shopping mall and puts it in the cart, the 12-digit unique number written within the RFID tag is detected.
- The product count and cost are updated on the webpage with the help of the 12-digit unique number detected and the actions mentioned in the code of the software.
- Users can add and remove as many products as they wish to.
- After the shopping is done, the user chooses an option to pay – either via cash or using Paytm.
- The data is sent to Thingspeak and the admin can download the transaction details as an excel file.

7. CODE

```
#include<ESP8266WiFi.h>
#include<WiFiClient.h>
#include<ESP8266WebServer.h>
#include<Wire.h>
#include<time.h>
#include "ThingSpeak.h"

ESP8266WebServer server (80);

unsigned long ch_no = 1884500;
const char * write_api =
"MT9WXY82MXWMQ4CN";
const char* ssid = "WiFi name";
const char* password = "WiFi Password";

WiFiClient client;
char input[12];
int count = 0;
int a;
int p1=0,p2=0,p3=0,p4=0;
int c1=0,c2=0,c3=0,c4=0;

int total = 0;
int count_prod = 0;
String page = "";
void setup()
{
  pinMode(D6,INPUT_PULLUP);
  pinMode(D0,OUTPUT);
  pinMode(D3,OUTPUT);
  pinMode(D4,OUTPUT);

  Serial.begin(9600);
  configTime(11 * 1800, 0, "pool.ntp.org",
"time.nist.gov");

  Wire.begin(D2, D1);
server.on("/", []()
  {
    page = "<html><head><title>E Cart using
IoT</title>
</head><style type=\"text/css\">";
    page += "table{border-collapse:
collapse;}th
{background-color:  #3498db ;color:
white;}table,td {border: 1px solid black;font-
size: x-large;";
page += "text-align:center;border-color:
 rgb(255,0,0);}</style><body><center>";
    page += "<h1>Smart Shopping Cart</h1>
<br><br><table style=\"width: 1200px;
height: 450px;\"><tr>";
    page += "<th>ITEMS</th><th>
QUANTITY</th>
<th>COST</th></tr><tr><td>Biscuit</td><td>"
+String(p1)+"</td><td>"+String(c1)+"</td></tr>";
    page +=
"<tr><td>Soap</td><td>"+String(p2)+"</td>
<td>"+String(c2)+"</td></tr><tr><td>Rice(1KG)
</td><td>"+String(p3)+"</td><td>"
+String(c3)+"</td>";
    page +=
"</tr><tr><td>Milk(50g)</td><td>"+String(p4)+"
</td><td>"+String(c4)+"</td></tr><tr><th>Grand
Total</th><th>"+String(count_prod)+"</th>
<th>"+String(total)+"</th>";
    page += "</tr></table><br>
<input type=\"button\" name=\"Paytm\" onclick =
\"window.location.href='https://paytm.com/'\"
value=\"Paytm\" style=\"width: 200px;height:
50px;\"></body></html>";
    page += "<input type=\"button\" name=\"Cash
Payment\" onclick = \"\" value=\"Cash Payment\"
style=\"width: 200px;height: 50px;\">
</body></html>";
    page += "<meta http-equiv=\"refresh\"
content=\"2\">";
    server.send(200, "text/html", page);
  });
server.begin();
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.println("WiFi Connecting...  ");
  }
  Serial.print(WiFi.localIP());
  Serial.println("WiFi Connected");
  delay(2000);
  ThingSpeak.begin(client);
}
void loop()
{
  int a=digitalRead(D6);
  time_t now = time(nullptr);
  if (Serial.available())
  {
    count = 0;
```

```
while (Serial.available() && count < 12)
   {
    input[count] = Serial.read();
    count++;
    delay(5);
   }
   Serial.println(input);
if (count == 12)
   {
    if ((strncmp(input, "4C00965C50D6", 12) == 0)
&& (a == 1))
    {
     p1++;
     c1 = p1 * 24.00;
     digitalWrite(D0,HIGH);
     digitalWrite(D4,HIGH);
     delay(2000);
     total = total + 24.00;
     count_prod++;
     digitalWrite(D0,LOW);
     digitalWrite(D4,LOW);
     senddata("Biscuit");
    }
else if ((strncmp(input, "4C00965C50D6", 12) ==
0) && (a == 0))
    {
     if(p1>0)
     {
     digitalWrite(D0,HIGH);
     digitalWrite(D3,HIGH);
     delay(2000);
     p1--;
     c1 = p1 * 24.00;
     total = total - 24.00;
     count_prod--;

     digitalWrite(D0,LOW);
     digitalWrite(D3,LOW);
     }
else
     {
     digitalWrite(D0,HIGH);
     digitalWrite(D3,HIGH);
     delay(2000);
     digitalWrite(D0,LOW);
     digitalWrite(D3,LOW);
         }
    }
else if ((strncmp(input, "4C0095B5016D", 12) ==
0) && (a == 1))
    {
     total = total + 30.00;
     digitalWrite(D0,HIGH);
     digitalWrite(D4,HIGH)
delay(2000);
     p2++;
     c2 = p2 * 30.00;
     count_prod++;
     digitalWrite(D0,LOW);
     digitalWrite(D4,LOW);
     senddata("Soap");
    }
else if ((strncmp(input, "4C0095B5016D",
12) == 0) && (a == 0))
    {
     if(p2>0)
     {
     digitalWrite(D0,HIGH);
     digitalWrite(D3,HIGH);
     delay(2000);
     p2--;
     c2 = p2 * 30.00;
     total = total - 30.00;
     count_prod--;
     digitalWrite(D0,LOW);
     digitalWrite(D3,LOW);
     }
else
     {
     digitalWrite(D0,HIGH);
     digitalWrite(D3,HIGH);
     delay(2000);

     digitalWrite(D0,LOW);
     digitalWrite(D3,LOW);
     }
    }
else if ((strncmp(input, "4C00963E06E2",
 12) == 0) && (a == 1))
    { total = total + 60.00;
     digitalWrite(D0,HIGH);
     digitalWrite(D4,HIGH);
     delay(2000);
     p3++;
     c3 = p3 * 60.00;
     count_prod++;
     digitalWrite(D0,LOW);
     digitalWrite(D4,LOW);
     senddata("Rice");
    }
else if ((strncmp(input, "4C00963E06E2",
12) == 0) && (a == 0))
    {
     if(p3>0)
     {
     digitalWrite(D0,HIGH);
     digitalWrite(D3,HIGH);
     delay(2000);
```

```
      p3--;
      c3 = p3 * 60.00;
      total = total - 60.00;
      count_prod--;
      digitalWrite(D0,LOW);
      digitalWrite(D3,LOW);
      }
else
      {
      digitalWrite(D0,HIGH);
      digitalWrite(D3,HIGH);
      delay(2000);

      digitalWrite(D0,LOW);
      digitalWrite(D3,LOW);
      }
    }
    else if ((strncmp(input, "4C0095AC7603", 12)
== 0) && (a == 1))
    {
      total = total + 50.00;
      digitalWrite(D0,HIGH);
      digitalWrite(D4,HIGH);
      delay(2000);
      p4++;
      c4 = p4 * 50.00;
      count_prod++;
      digitalWrite(D0,LOW);
      digitalWrite(D4,LOW);
      senddata("Milk");
    }
else if ((strncmp(input, "4C0095AC7603", 12) ==
0) && (a == 0))
    {
       if(p4>0)
      {
      digitalWrite(D0,HIGH);
      digitalWrite(D3,HIGH);
      delay(2000);
      p4--;
      c4 = p4 * 50.00;
      total = total - 50.00;
      count_prod--;
      digitalWrite(D0,LOW);
      digitalWrite(D3,LOW);
      }
      else
      {
      digitalWrite(D0,HIGH);
      digitalWrite(D3,HIGH);
      delay(2000);

      digitalWrite(D0,LOW);
      digitalWrite(D3,LOW);
       }
     }
else if (strncmp(input, "4000351B7B15", 12)
== 0)
    {

      digitalWrite(D0,HIGH);
      digitalWrite(D4,HIGH);
      delay(5000);
      digitalWrite(D0,LOW);
      digitalWrite(D4,LOW);
      digitalWrite(D0,LOW);
      digitalWrite(D4,LOW);
    }
   }

  }

server.handleClient();
}
void senddata(String input)
{
 ThingSpeak.setField(1,c1);
 ThingSpeak.setField(2,c2);
 ThingSpeak.setField(3,c3);
 ThingSpeak.setField(4,c4);
 ThingSpeak.setField(5,count_prod);
 ThingSpeak.setField(6,total);
 ThingSpeak.writeFields(ch_no, write_api);
}
```

8. IMPLEMENTATION

8.1 Working

1. When a person adds an item to the trolley, the card will be scanned by the RFID reader.

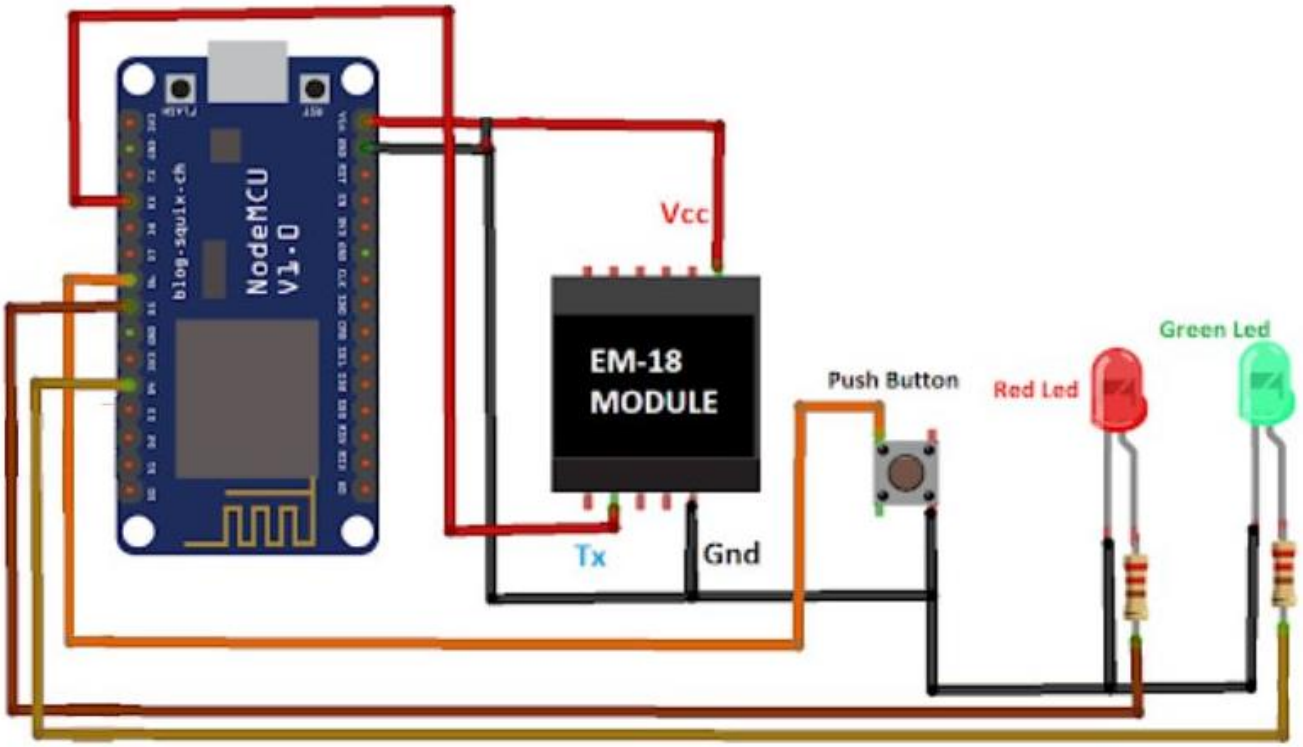
2. Reader detects the unique code of RFID cards. Then a smart shopping cart application fetches the data and displays it on the webpage. The item details like name, price & total bill of things inserted in the cart are displayed on the webpage.

3. As we add the items, the costs will get added to the total. Thus, the billing is done. Simultaneously all details are displayed on the webpage.

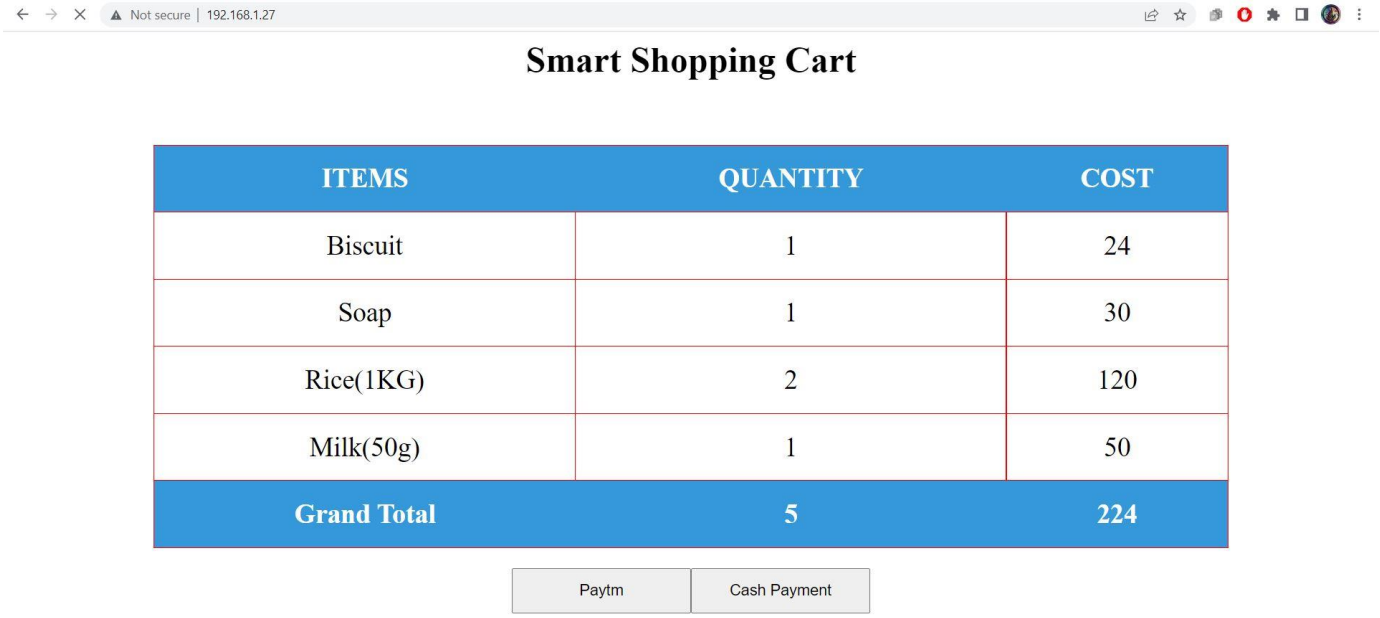
4. And additionally, if we would like to get rid of some inserted item, then that product can be removed by pressing the push button and scanning it again from the trolley. The cost of the removed product will be deducted from the total amount which will be displayed on the webpage.

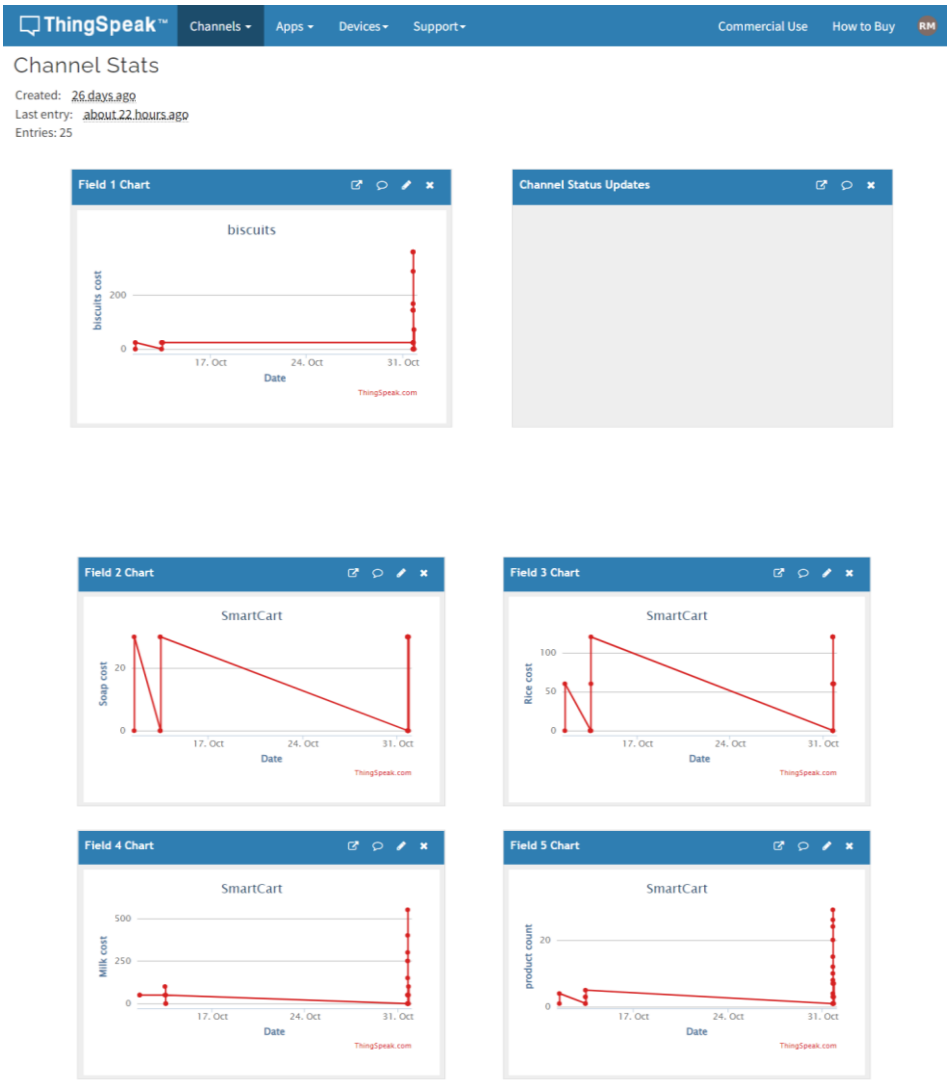
5. Thus, the smart shopping cart would be able to automatically read the products that have been put into the cart by scanning RFID.

8.2 Circuit Diagram



9. RESULTS


Not secure | 192.168.1.27
Smart Shopping Cart
ITEMS
QUANTITY
COST
Biscuit
1
24
Soap
1
30
Rice(1KG)
2
120
Milk(50g)
1
50
Grand Total
5
224
Paytm
Cash Payment


ThingSpeak™
Channels
Apps
Devices
Support
Commercial Use
How to Buy
RM
Channel Stats
Created: 26 days ago
Last entry: about 22 hours ago
Entries: 25
Field 1 Chart
biscuits
biscuits cost
200
0
17. Oct
24. Oct
31. Oct
Date
ThingSpeak.com
Channel Status Updates
Field 2 Chart
SmartCart
Soap cost
20
0
Field 3 Chart
SmartCart
Rice cost
100
50
0
Field 4 Chart
SmartCart
Milk cost
500
250
0
Field 5 Chart
SmartCart
product count
20
0

	A	B	C	D	E	F	G	H
1	created_a	entry_id	field1	field2	field3	field4	field5	field6
2	2022-10-1	1	0	0	0	50	1	50
3	2022-10-1	2	24	30	60	50	4	164
4	2022-10-1	3	0	0	0	50	1	50
5	2022-10-1	4	24	0	0	100	3	124
6	2022-10-1	5	24	0	0	0	1	24
7	2022-10-1	6	24	30	60	0	3	114
8	2022-10-1	7	24	30	120	50	5	224
9	2022-10-3	8	24	0	0	0	1	24
10	2022-10-3	9	144	30	0	0	7	174
11	2022-10-3	10	144	30	60	0	8	234
12	2022-10-3	11	144	30	120	50	10	344
13	2022-10-3	12	144	30	120	150	12	444
14	2022-10-3	13	168	30	120	250	15	568
15	2022-10-3	14	288	30	120	250	20	688
16	2022-10-3	15	360	30	120	300	24	810
17	2022-10-3	16	360	30	120	400	26	910
18	2022-10-3	17	360	30	120	550	29	1060
19	2022-10-3	18	0	0	0	50	1	50
20	2022-10-3	19	0	0	60	0	1	60
21	2022-10-3	20	24	0	0	0	1	24
22	2022-10-3	21	24	30	0	50	3	104
23	2022-10-3	22	24	30	60	50	4	164
24	2022-10-3	23	0	0	60	0	1	60
25	2022-10-3	24	0	30	60	50	3	140
26	2022-10-3	25	72	30	60	100	7	262
27								

10. CONCLUSION AND FUTURE SCOPE

The smart shopping cart application helps the retailers to manage the customers in an efficient way since the customers need not have to wait in long queues. Since the data of the purchased products are displayed in the mobile display the customers can get to know about the bill details in advance with which the customer can plan for an affordable purchase. This system thus helps in achieving a faster billing system. Through this way of shopping system, more customers can be served at the same time thus benefiting the customers and retailers as well.

The proposed smart shopping trolley system will reduce the customers time in searching the location of the product. The customer just types the name of the product he/she wants to purchase on android device. The trolley will automatically guide them to the location of the product.

TECHNICAL POSTER

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DEPARTMENT OF INFORMATION TECHNOLOGY

SMART SHOPPING CART USING RFID AND NODEMCU

GUIDE - PROF. VINITA BHANDIWAD
ROHINI MALLADI, ANUSHREE DANDEKAR, SANIKA CHAVAN

ABSTRACT

Nowadays, shopping malls are always crowded, especially in cities. People purchase various things and place them in the trolley. After total purchase, one visits the billing counter for billing and making payments. Customers must wait in long queues for this process. This project targets to improve this process and introduce a smart shopping cart which will display the total price of the products kept inside the cart. The hardware relies on NodeMCU, RFID Reader Module and RFID Cards for each item. It eliminates the normal scanning of products at the counter and in turn speeds up the entire process.

INTRODUCTION

Smart shopping cart using NodeMCU and RFID can be a new advancement as this method shall not only skip the long queues in supermarkets and malls but also save plenty of your time for the purchasers. The system also helps the customer in saving money. The system uses RFID tags instead of Barcode tags which are much more efficient and powerful when it involves scanning of products. Hence, time management and money management shall be taken care of.

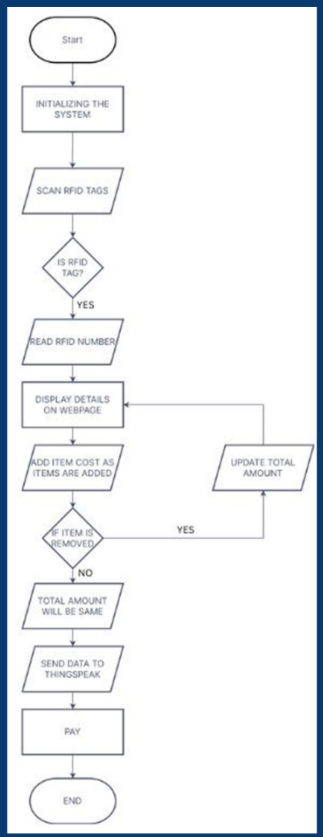
PROBLEM DEFINITION

Malls and markets are a big corner for customers to purchase items. We can see a huge rush at such public places. The existing system for billing uses the barcode method. The products are scanned by the cashier through a barcode reader one by one. After this, the cashier provides the bill. But this method turns out to be tedious once a ton of products are to be scanned. Therefore, this billing method becomes slow. This eventually results in long queues. Thus, to overcome these problems, we need to introduce an improved billing system.

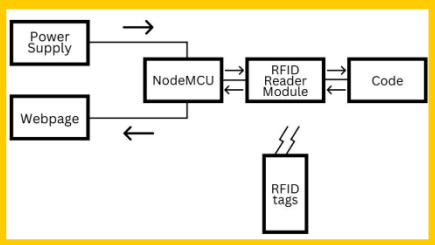
AIM AND OBJECTIVE

The principle point of proposed framework is to give an innovation which is minimal effort oriented, effectively adaptable, and efficiently feasible for helping shopping in individual. With the help of this a lot of time will be saved at the billing counters.

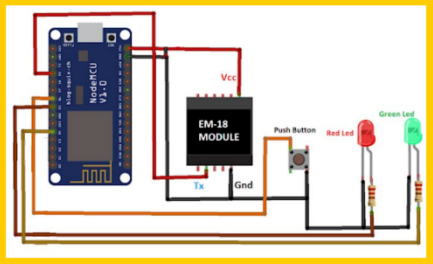
FLOW CHART



BLOCK DIAGRAM



CIRCUIT DIAGRAM



COMPONENTS

Hardware -

1. RFID Reader Module
2. RFID Tag
3. NodeMCU
4. Jumper Wires
5. LEDs
6. Push Button

Software -

1. Thingspeak
2. Arduino IDE

CONCLUSION AND FUTURE SCOPE

The smart shopping cart application helps the retailers to manage the customers in an efficient way since the customers need not have to wait in long queues. Since the data of the purchased products are displayed in the mobile display, the system thus helps in achieving a faster billing system. The proposed smart shopping trolley system will reduce the customers time in searching the location of the product. The customer just types the name of the product he/she wants to purchase on android device. The trolley will automatically guide them to the location of the product.

GITHUB LINKS

https://github.com/2322rohini/IOE-SEM7

“Smart Shopping Cart using RFID and NodeMCU”

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***Abstract*—** Nowadays, shopping malls are always crowded, especially in cities. We can see many numbers of people shopping at malls on holidays and weekends. The rush is even more when there are special offers and discounts. People purchase various things and place them in the trolley. After total purchase, one visits the billing counter for billing and making payments. The existing technology for billing includes barcode scanning. But customers must wait in long queues for this process. This project targets to improve this process and introduce a smart shopping cart which will display the total price of the products kept inside the cart. In this way, the customer can directly pay the amount and leave with the commodities he/she has bought. The hardware relies on NodeMCU, RFID Reader Module and RFID Cards for each item. It eliminates the normal scanning of products at the counter and in turn speeds up the entire process.

I. INTRODUCTION

Today’s world has a fast-growing population with a wide range of demand from a variety of domains. Customers who need to purchase different products need lot of time and patience for successful shopping. In the existing system, shopping malls are using barcode standards. Though this technique has replaced the previous manual system, it has its own limitations. Barcode scanners require manual tracking. They additionally need a considerable quantity of manpower and human effort. The barcode system needs the client to wait in long queues to get their purchased products scanned and their bills generated. Thus, we need to come up with more innovative solutions to address these problems. The advent of newer techniques like RFID technology and wireless networks can make the process of shopping at a faster pace, making it more efficient as well as making it more transparent. We need to use our technologies efficiently. We introduce reasonable and cost-effective Smart Shopping Cart utilizing IoT (Internet of Things) innovations. Such a framework is appropriate for use in spots like crowded supermarkets, as it can help in lessening the work and in making a superior shopping knowledge for the clients. Rather than the clients sitting tight in a long line purchasing their shopped things, this framework helps in mechanizing the process and thus resulting in an easy and comfortable billing process.

Smart shopping cart using NodeMCU and RFID can be a new advancement as this method shall not only skip the long queues in supermarkets and malls but also save plenty of your time for the purchasers. The system also helps the customer in saving money. The system uses RFID tags instead of Barcode tags which are much more efficient and powerful when it involves scanning of products. The device developed using NodeMCU and RFID shall be installed on the handbasket or trolley. The customer shall scan their products by themselves, and the calculation of the total amount happens on the cart and displays on the webpage itself. This shall also give a plan to the shoppers on what proportion their shopping session shall cost them. Hence, time management and money management shall be taken care of.

II. PROPOSED SYSTEM

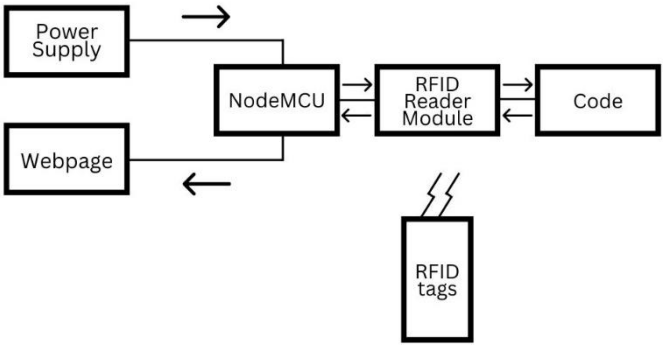


Fig 1.1: Block diagram for Smart Shopping cart with RFID and NodeMCU

III. COMPONENTS

1. Hardware Components

1. RFID Reader Module:

It is used to read unique ID from RFID tags. Whenever RFID tags comes in range, RFID reader reads its unique ID and transmits it serially to the microcontroller or PC. RFID reader has transceiver and an antenna mounted on it. It is mostly fixed in stationary position. RFID Reader Module, is also called as - interrogator.

2. RFID Tag:

A Radio Frequency Identification Tag (RFID tag) is an electronic tag that exchanges data with a radio frequency identification (RFID) reader by using radio waves. RFID tag includes microchip with radio antenna mounted on substrate which carries 12 Byte unique Identification number.

3. NodeMCU:

NodeMCU is an open-source firmware for which open-source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). Strictly speaking, the term "NodeMCU" refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source.

4. Jumper Wires:

A jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

5. Led:

LEDs (light-emitting diodes) are small, bright, power-efficient lights commonly used in electronic products. An LED light is a polarized part, meaning it must be connected to a circuit in a certain way to work properly. Specifically, each LED has a positive leg and a negative leg.

6. Push Button:

A push button switch controls an action in a machine or other type of process. They are common features within the home and workplace and are also referred to as pushbutton switches or push switches. The buttons are typically made from plastic or metal and the push button may either be flat or customised to ergonomic specifications.

2. Software Components

1. Thingspeak web server:

According to its developers, Thingspeak is an open source Internet of Things (IOT) application and API to store and retrieve data from things using the HTTP and MQTT protocol over the Internet or via a Local Area Network. Thingspeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. Thingspeak has integrated support from the numerical computing software MATLAB from Math Works, allowing Thingspeak users to analyze and visualize uploaded data using MATLAB without requiring the purchase of a MATLAB license from Math works.

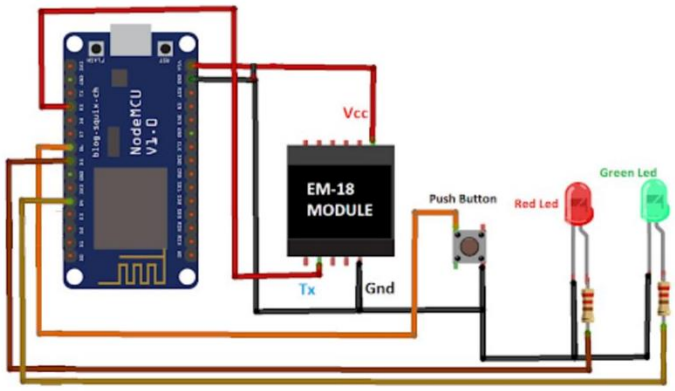
2. Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino to upload programs and communicate with them.

IV. IMPLEMENTATION

1)Working: When a person adds an item to the trolley, the card will be scanned by the RFID reader. Reader detects the unique code of RFID cards. Then a smart shopping cart application fetches the data and displays it on the webpage. The item details like name, price & total bill of things inserted in the cart are displayed on the webpage. As we add the items, the costs will get added to the total. Thus, the billing is done. Simultaneously all details are displayed on the webpage. And additionally, if we would like to get rid of some inserted item, then that product can be removed by pressing the push button and scanning it again from the trolley. The cost of the removed product will be deducted from the total amount which will be displayed on the webpage. Thus, the smart shopping cart would be able to automatically read the products that have been put into the cart by scanning RFID.

2) Circuit Diagram



V. RESULT

Smart Shopping Cart

ITEMS	QUANTITY	COST
Biscuit	1	24
Soap	1	30
Rice(1KG)	2	120
Milk(50g)	1	50
Grand Total	**5**	**224**

Paytm | Cash Payment

	A	B	C	D	E	F	G	H
1	created_a	entry_id	field1	field2	field3	field4	field5	field6
2	2022-10-1	1	0	0	0	50	1	50
3	2022-10-1	2	24	30	60	50	4	164
4	2022-10-1	3	0	0	0	50	1	50
5	2022-10-1	4	24	0	0	100	3	124
6	2022-10-1	5	24	0	0	0	1	24
7	2022-10-1	6	24	30	60	0	3	114
8	2022-10-1	7	24	30	120	50	5	224
9	2022-10-3	8	24	0	0	0	1	24
10	2022-10-3	9	144	30	0	0	7	174
11	2022-10-3	10	144	30	60	0	8	234
12	2022-10-3	11	144	30	120	50	10	344
13	2022-10-3	12	144	30	120	150	12	444
14	2022-10-3	13	168	30	120	250	15	568
15	2022-10-3	14	288	30	120	250	20	688
16	2022-10-3	15	360	30	120	300	24	810
17	2022-10-3	16	360	30	120	400	26	910
18	2022-10-3	17	360	30	120	550	29	1060
19	2022-10-3	18	0	0	0	50	1	50
20	2022-10-3	19	0	0	60	0	1	60
21	2022-10-3	20	24	0	0	0	1	24
22	2022-10-3	21	24	30	0	50	3	104
23	2022-10-3	22	24	30	60	50	4	164
24	2022-10-3	23	0	0	60	0	1	60
25	2022-10-3	24	0	30	60	50	3	140
26	2022-10-3	25	72	30	60	100	7	262
27								

VI. CONCLUSION AND FUTURE SCOPE

The smart shopping cart application helps the retailers to manage the customers in an efficient way since the customers need not have to wait in long queues. Since the data of the purchased products are displayed in the mobile display the customers can get to know about the bill details in advance with which the customer can plan for an affordable purchase. This system thus helps in achieving a faster billing system. Through this way of shopping system, more customers can be served at the same time thus benefiting the customers and retailers as well.

The proposed smart shopping trolley system will reduce the customers time in searching the location of the product. The customer just types the name of the product he/she wants to purchase on android device. The trolley will automatically guide them to the location of the product.

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