

**Department Of Information Technology**

**Academic Term Jan-May 2021**

**Class: TE IT (Sem VI)**

**Subject: Wireless Sensor Network Lab Project**

<b>Title of the Project</b>	Smart Shopping Cart
<b>Date Of Performance</b>	
<b>Date Of Submission</b>	
<b>Roll No (Group members)</b>	8659 8670 8671
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**Evaluation:**

<b>Sr. No</b>	<b>Rubric</b>	<b>Grade</b>
<b>1</b>	<b>Timeline(2)</b>	
<b>2</b>	<b>Completeness(5)</b>	
<b>3</b>	<b>Project specific Features (9)</b>	
<b>4</b>	<b>Total (10)</b>	

**Signature of Teacher:**

# **Title: Smart Shopping Cart**

## **Abstract:**

During this worldwide pandemic we have a wide range of demand from a variety of domains. People need to purchase essential goods from supermarkets/shops maintaining social distancing. There is also a chance of spread of the virus at the billing stations as people tend to stand close to each other. Also supermarkets/shops have to run on minimal staff for cost cutting and to avoid crowding. We need to address this problem efficiently by using our technologies. In this Project, we depict reasonable and cost-effective Smart Shopping Cart utilizing IoT (Internet of Things) innovations. Rather than influencing the customers to sit tight in a long line for billing, this framework helps in mechanizing the easy and comfortable billing process. We plan to assign RFID tags to each product. The customer can easily scan the tag as RFID tags are very easy to scan. The customer can also view a real time bill on their smartphone. Accordingly, the management team will have the ability to predict the rate of sales of all individual products and make the stock available based on the ongoing customer requirements. Overall, this system will ensure that the customers will have the best shopping experience.

## **Requirements:**

NodeMCU  
EM-18 RFID reader  
RFID cards (5)  
16x2 LCD Display  
Buttons, Led, Buzzer  
Arduino IDE for Coding (Software)  
Female to Female Jumpers

## **Features:**

The features of the system are as follows:

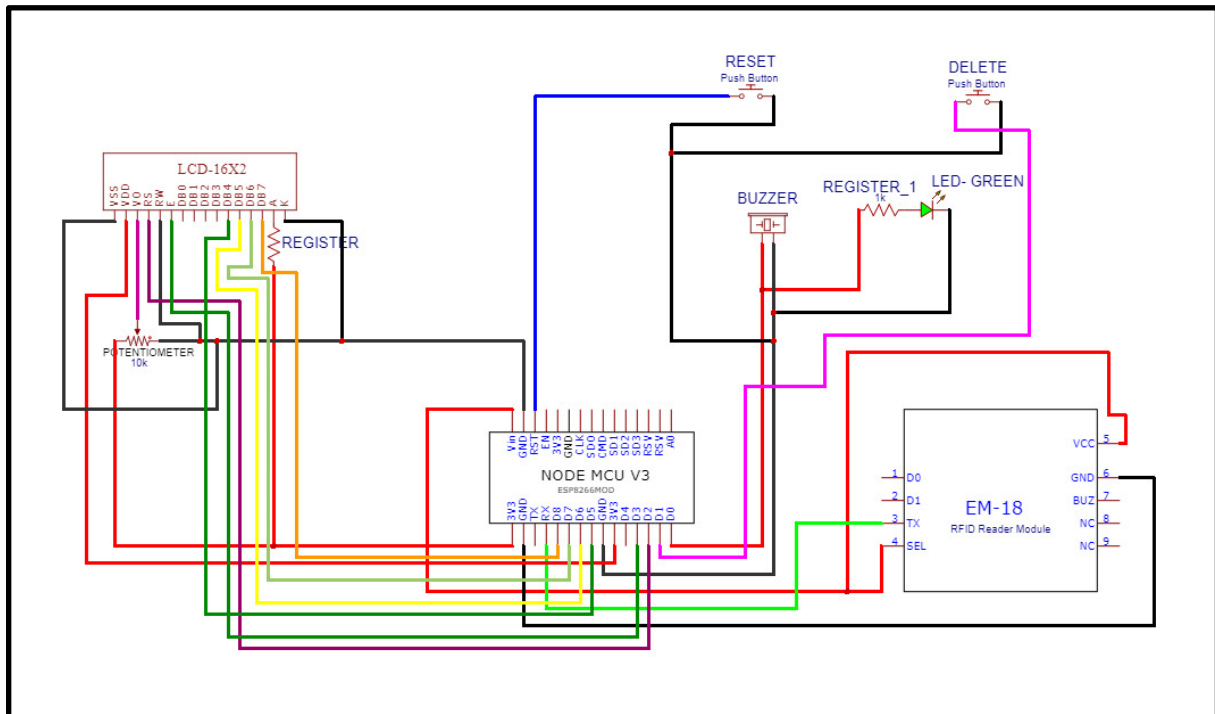
1. The system has a user-friendly UI.
2. It is cost efficient
3. Easy to implement in malls and shops.
4. Billing in shops gets easier.
5. User can keep tabs on his expenses along with the list of items in cart..

## **Description of the Project:**

A RFID card is attached to every product shelf in the mall and the reader system is attached to the trolley. At the time of purchase, the tag attached to the product is scanned by the reader. Each tag has a unique EPC (Electronic Product Code). Based on the EPC received by the NodeMCU, the information of the product is displayed on the LCD along with the updated cost. This information is also sent to a webpage hosted on the local server with the help of IP address provided at the start with the help of Wi-Fi module. If the customer wants to remove the added product, the product should be scanned again while pressing the 'Delete' push button on the system. Then the cost and the quantity of the corresponding product will be deducted from the bill. Along with the display of addition and deduction

of products on the LCD screen it can also be seen on the webpage at the given IP address. A special checkout card is required to show the Net total on the LCD screen which is available at the billing counter for payment. After billing, the system can be reset for a new transaction by using the ‘Reset’ button mounted on the scanner system.

### Diagram: -



### Result Analysis:

When the device is switched on, the NodeMCU successfully connects to the Wi-Fi and the IP for the site is displayed on the LCD screen for about 30 seconds. After entering the IP in the web browser, a web page containing the products along with their quantities and prices is displayed in tabular form. All the product cards were successfully scanned and the confirmation was displayed on the LCD screen. On scanning the RFID card of a product, information about the product along with the cost is displayed on the LCD screen as well the web page is updated with its content. Also, the deletion of items was successful. After scanning the checkout card, the total bill is displayed on the LCD screen. The system successfully resets after pressing the ‘Reset’ push button.

### Code Snippets:

### Import Libraries

```
#include<ESP8266WiFi.h>
#include<WiFiClient.h>
#include<ESP8266WebServer.h>
#include <LiquidCrystal.h>
```

### Declare LCD PINS

```
const int RS = 4, EN = 0, d4 = 14 , d5 = 12, d6 = 13, d7 = 15;
LiquidCrystal lcd(RS, EN, d4, d5, d6, d7);
```

### Set Wifi credentials

```
const char* ssid = "Oasis";//Replace with your network SSID
const char* password = "oasis123";//Replace with your network password
ESP8266WebServer server(80);
```

### Declare all required variables

```
String page = "";
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;

double total = 0;
int count_prod = 0;
```

### Declare the setup loop

```
void setup()
{
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);

  pinMode(D1,INPUT_PULLUP); //delete
  pinMode(D0,OUTPUT); //buzzer and led green

  Serial.begin(9600);
  WiFi.begin(ssid, password);

  lcd.setCursor(0, 0);
  lcd.print(" WELCOME TO ");
```

```
lcd.setCursor(0, 1);  
lcd.print(" SMART CART ");  
delay(4000);  
lcd.clear();  
  
while (WiFi.status() != WL_CONNECTED)  
{  
    delay(500);  
    lcd.setCursor(0, 0);  
    lcd.print("WiFi Connecting... ");  
    Serial.println(".");  
}  
lcd.clear();  
Serial.println("Wifi Connected....");  
Serial.println(WiFi.localIP());  
  
lcd.setCursor(0, 0);  
lcd.print("WiFi Connected");  
lcd.setCursor(0, 1);  
lcd.print(WiFi.localIP());  
delay(30000);  
  
Serial.println("PLZ ADD ITEMS TO CART");  
  
lcd.setCursor(0, 0);  
lcd.print(" PLZ ADD ITEMS ");  
lcd.setCursor(0, 1);  
lcd.print(" TO CART ");  
  
server.on("/",[](){
```

[illegible]

## The loop code

```
void loop()
{
  int a=digitalRead(D1);
  if (Serial.available())
  {
    count = 0;
    while (Serial.available() && count < 12)
    {
      input[count] = Serial.read();
      count++;
      delay(5);
    }
  }
}
```

```

if (count == 12)
{
if ((strcmp(input, "30004F5B5E7A", 12) == 0) && (a == 1))
{
Serial.println("Picks Added : Rs. 300");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Picks Added");
lcd.setCursor(0, 1);
lcd.print("Price(Rs):300/-");
p1++;
digitalWrite(D0,HIGH);
delay(300);
total = total + 300.00;
count_prod++;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();
}
else if ((strcmp(input, "30004F5B5E7A", 12) == 0) && (a == 0))
{
if(p1>0)
{
Serial.println("Picks Removed");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Picks Removed!!! ");
digitalWrite(D0,HIGH);
delay(500);
p1--;
total = total - 300.00;
count_prod--;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();

}
else
{
Serial.println("Not in Cart");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Not in cart!!!");
digitalWrite(D0,HIGH);
delay(500);
digitalWrite(D0,LOW);
}
}
}

```

```

delay(3000);
lcd.clear();
}
}
else if ((strcmp(input, "300050E00D8D", 12) == 0) && (a == 1))
{
Serial.println("Strings Added : Rs. 400/-");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Strings Added ");
lcd.setCursor(0, 1);
lcd.print("Price(Rs):400/- ");
total = total + 400.00;
digitalWrite(D0,HIGH);
delay(300);
p2++;
count_prod++;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();
}
else if ((strcmp(input, "300050E00D8D", 12) == 0) && (a == 0))
{
if(p2>0)
{
Serial.println("Strings Removed");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Strings Removed!!! ");
digitalWrite(D0,HIGH);
delay(500);
p2--;
total = total - 400.00;
count_prod--;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();

}
else
{
Serial.println("Not in Cart");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Not in cart!!! ");
digitalWrite(D0,HIGH);

```



```

delay(500);
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();

}
}
else if ((strcmp(input, "3000506ECBC5", 12) == 0) && (a == 1))
{
Serial.println("Capo Added: Rs. 500");

lcd.setCursor(0, 0);
lcd.print("Fender Capo Added ");
lcd.setCursor(0, 1);
lcd.print("Price(Rs):500/- ");
total = total + 500.00;
digitalWrite(D0,HIGH);
delay(300);
count_prod++;
p3++;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();

}
else if ((strcmp(input, "3000506ECBC5", 12) == 0) && (a==0))
{
if(p3>0)
{
Serial.println("Fender Capo Removed");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Fender Capo Removed!!! ");
digitalWrite(D0,HIGH);
delay(500);
total = total - 500.00;
p3--;
count_prod--;
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();
}
else
{
Serial.println("Not in Cart");

lcd.clear();
lcd.setCursor(0, 0);

```

```

    lcd.print("Not in cart!!! ");
    digitalWrite(D0,HIGH);
    delay(500);
    digitalWrite(D0,LOW);
    delay(3000);
    lcd.clear();

}
}
else if ((strcmp(input, "30004F5B6743", 12) == 0) && (a == 1))
{
    Serial.println("Strap Added: Rs. 900");

    lcd.setCursor(0, 0);
    lcd.print("Strap Added ");
    lcd.setCursor(0, 1);
    lcd.print("Price(Rs): 900/- ");
    total = total + 900.00;
    count_prod++;
    digitalWrite(D0,HIGH);
    delay(300);
    p4++;
    digitalWrite(D0,LOW);
    delay(3000);
    lcd.clear();

}
else if ((strcmp(input, "30004F5B6743", 12) == 0) && (a == 0))
{
    if(p4>0)
    {
        Serial.println("Strap Removed");

        lcd.clear();
        total = total - 900.00;
        lcd.setCursor(0, 0);
        count_prod--;
        p4--;
        lcd.print("Strap Removed!!! ");
        digitalWrite(D0,HIGH);
        delay(500);
        digitalWrite(D0,LOW);
        delay(3000);
        lcd.clear();
    }
    else
    {
        Serial.println("Not in Cart");
    }
}

```

```

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Not in cart!!! ");
digitalWrite(D0,HIGH);
delay(500);
digitalWrite(D0,LOW);
delay(3000);
lcd.clear();

}
}
else if (strcmp(input, "30004F5B684C", 12) == 0)
{
Serial.print("Total Prod: ");
Serial.print(count_prod);
Serial.println("Price ");
Serial.print(total);
Serial.println(" Thank You for shopping");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Total Prod: ");
lcd.setCursor(11, 0);
lcd.print(count_prod);
lcd.setCursor(0, 1);
lcd.print("Price: ");
lcd.setCursor(6, 1);
lcd.print(total);

digitalWrite(D0,HIGH);
delay(200);
digitalWrite(D0,LOW);
delay(20);
digitalWrite(D0,HIGH);
delay(200);
digitalWrite(D0,LOW);
delay(10000);

lcd.clear();
lcd.setCursor(0, 0);
lcd.print(" Thank you ");
lcd.setCursor(0, 1);
lcd.print(" for Shopping ");
delay(10000);
}
}
c1=p1*300.00;
c2=p2*400.00;
c3=p3*500.00;

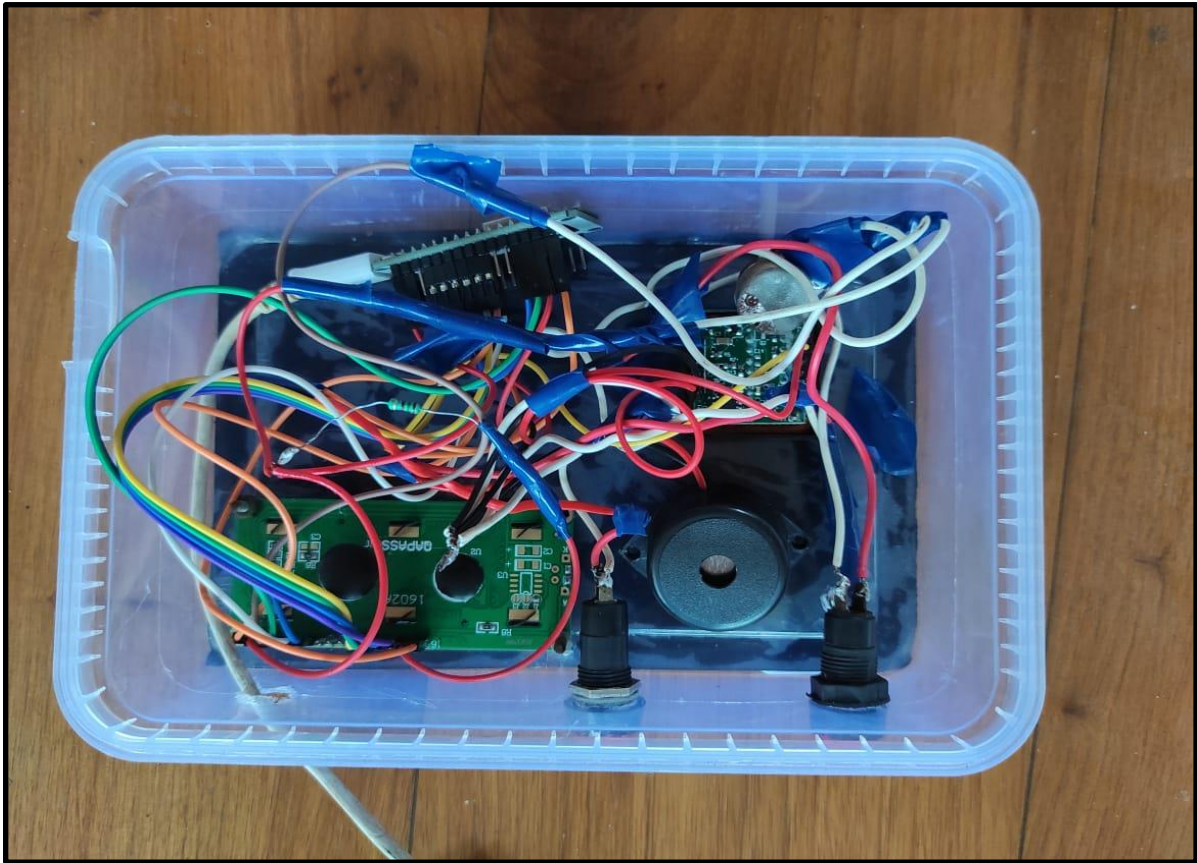
```

```
c4=p4*900.00;  
}  
server.handleClient();  
}
```

**Output screenshots (Model) :**

**The main Device:**





## Webpage Output

NIRVANA GUITAR SHOP

← → ↻ ⚠ Not secure | 192.168.31.221 ☆ Incognito

### NIRVANA GUITAR SHOP

ITEMS	QUANTITY	COST
Dunlop Picks	1	300
Ernie Strings	2	800
Fender Capo	3	1500
Guitar Strap	1	900
<b>Total</b>	<b>7</b>	<b>3500.00</b>

[Submit Bill](#)

## **Conclusion:**

Whenever a product is added into the cart, it reads the product and adds it to the total bill. After the successful addition of the item the customer checks out at the billing counter where their bill is generated and payment is done. The customer then pays their bill through credit/debit cards or through cash as the bill is generated automatically. Hence, by using our RFID based smart shopping cart, the shopping can be made easy for the customers. It can be implemented on a low budget and does not need any special training. The time efficiency will increase phenomenally since this system will eliminate the waiting queues. This makes shopping easier and more efficient, avoiding contact with other customers. Also unwanted items can be easily deleted by the user. The system is also fairly easy to maintain.

## **Future Scope:**

1. This project can be improved in many ways in the future, where RFID cards can be replaced by RFID stickers which are small in size and low in cost.
2. A database can be attached to the system to keep a record of the customers transactions for further references if needed.

## **References:**

- M. Shahroz, M. F. Mushtaq, M. Ahmad, S. Ullah, A. Mehmood and G. S. Choi, "IoT-Based Smart Shopping Cart Using Radio Frequency Identification," in IEEE Access, vol. 8, pp. 68426-68438, 2020, doi: 10.1109/ACCESS.2020.2986681.
- All Answers Ltd. November 2018. Smart Trolley System for Automated Billing Using RFID. [online]. Available from: <https://ukdiss.com/examples/smart-trolley-system-automated-billing.php?vref=1> [Accessed 10 May 2021].