

# Smart Shopping Cart with Automatic billing system Using Arduino Uno

# Abstract

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- To minimise waiting time of customers for billing products using RFID Technology.
  - Products can be scanned and billed in this system, thus providing ease of transaction.
  - To Display Product name, ID and Total billing cost using LCD Module placed in shopping cart.
  - Total amount is displayed on the LCD Screen.
  - Helps Customer to budget items accordingly.

## BASIC WORKING OF THE PROPOSED SYSTEM






- As the customer goes on adding products, all products are detected by the RFID Reader module and therefore the total 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 customer will press the button which when pressed adds all the product along with their price and gives the total amount to be paid.

# MODULES OF THE SYSTEM

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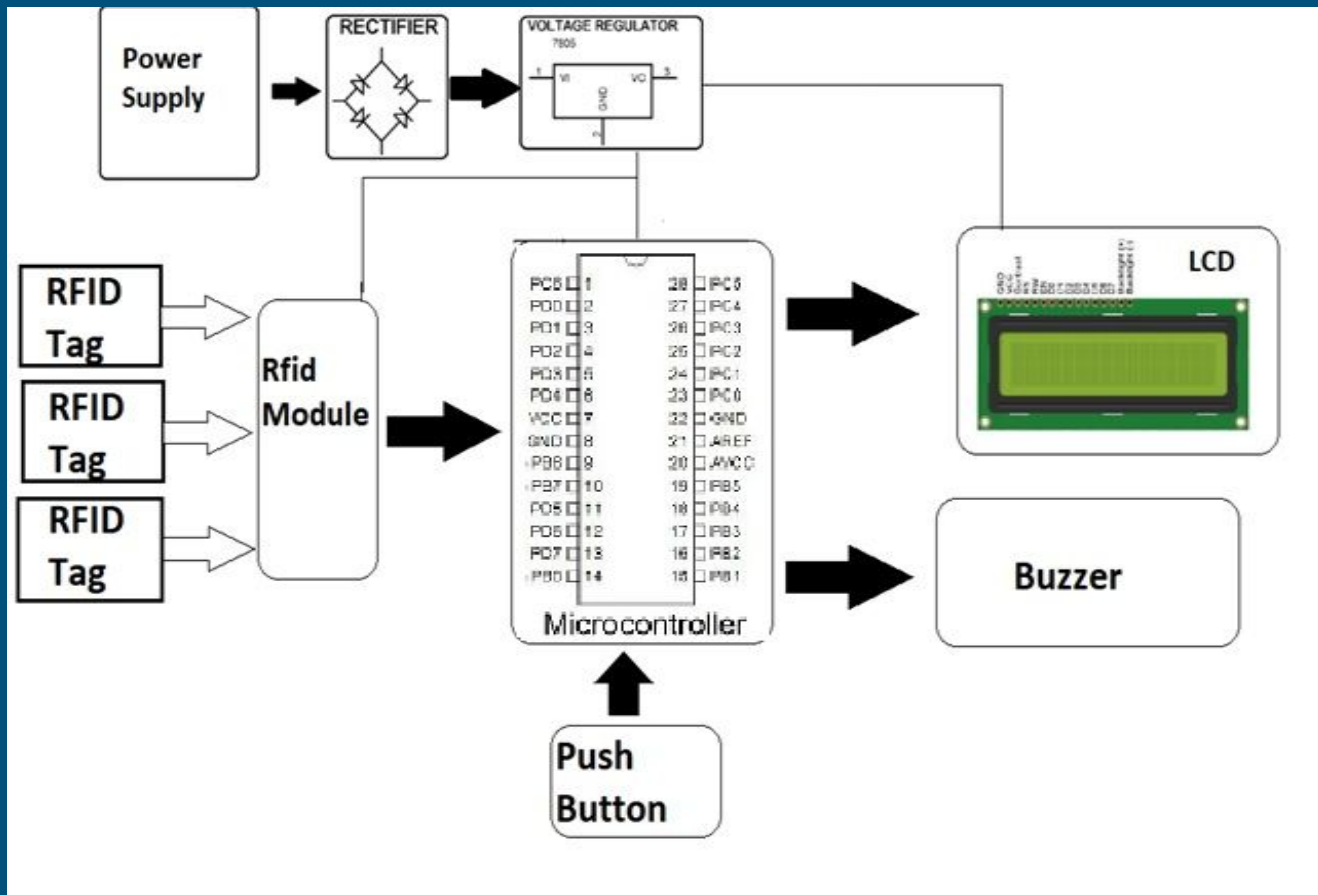
1. Reading and scanning the RFID
2. Reading data from tag and displaying on LCD
3. Generating the total bill amount

# Components Required

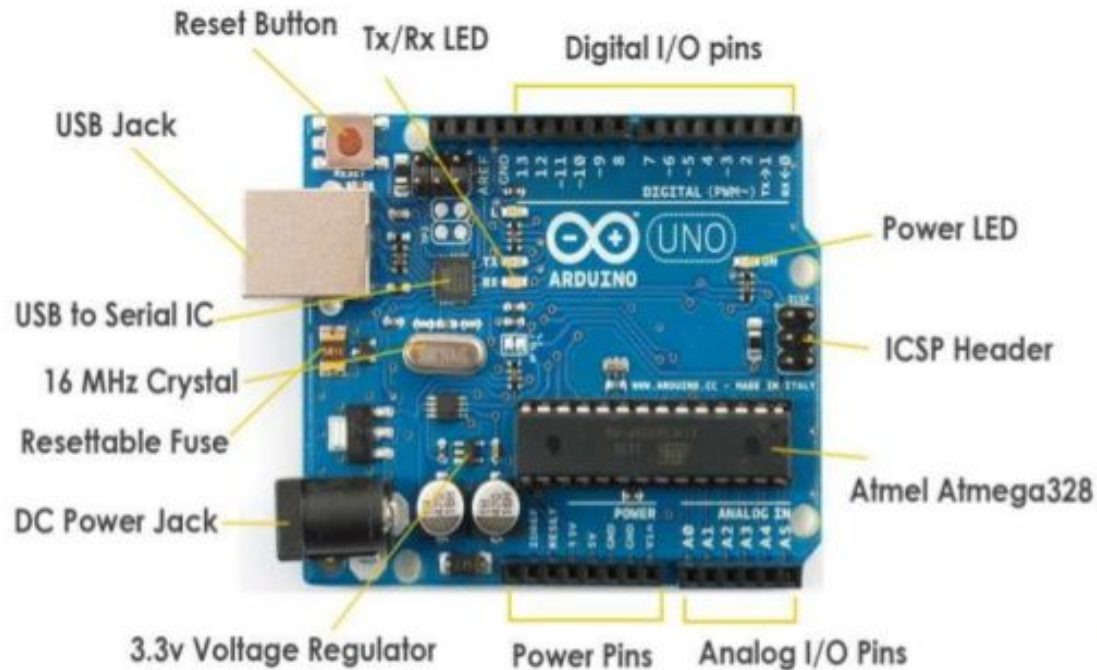
-  **Arduino UNO**
-  **RFID Reader Module & Cards**
-  **LCD Display**
-  **Crystal Oscillator**
-  **Resistor**
-  **Cables and Connectors**

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- **LED**
  - **Push Buttons**
  - **Switch**

# Block Diagram



# ARDUINO UNO





# COMPONENTS

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## 1. RFID

- Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves.
- RFID technology does not require contact or line of sight for communication. RFID data can be read through the human body, clothing and nonmetallic materials.
- RFID Tag – RFID Reader – Computer and Software Infrastructure

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RFID consists of two parts:

- i. RFID tags - Passive RFID tags for products-Passive RFID tags are attached to the products and are scanned by the reader attached to the cart. The data (product name, RFID number and cost) corresponding to respective card gets displayed on the LCD.
- ii. Passive RFID tags for user – RFID credit cards are of great advantage because they permit contactless payment transactions which are fast, easy, can be more reliable than magstripe transactions, and require only physical proximity (rather than physical contact) between the credit card and the reader. RFID based credit cards are issued to the user at the time of registration and the card is recharged with money.

## 2. RFID Reader

RFID reader (MFRC-522) is installed in the cart which scans the products which pass through the inlet and are entered to the cart. After reading the RFID number corresponding data about the product gets displayed on the LCD.

## 3. LCD

LCD displays the information i.e. cost, RFID product number and name of the product when the product is scanned by the RFID reader. Up/down switches are interfaced with the microcontroller which can be used to view all the purchases

## **4. Buzzer**

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A buzzer is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. A buzzer is interfaced with the microcontroller to indicate scanning of the product by the RFID reader.

## **5. Push Buttons**

Push buttons are used for adding one product at a time and also for showing the total amount to be paid on the LCD

# ALGORITHM

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1. Start the process
2. Initialize the system
3. Scan an item using RFID Tags
4. Check the RFID Tags
5. If the tag is registered or scanned, RFID Reader can read the data related from memory
6. Display the data and cost with help of LCD
7. The item is added automatically along with the product cost and total cost is computed along with the total number of items
8. If the item is removed from the cart total cost is subtracted from the cost of removed item
9. Send the total amount in billing system
10. Print the bill

## Advantages

- Saves the time of the customer
- Reduces the pay given for workers
- Possible to rewrite RFID Tags
- Does not need line of sight

## Limitation

- Can be manipulated (*RFID code can be retrieved*)

# ARDUINO CODE

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```
#include <SPI.h> // Serial Peripheral Interface for interacting with peripheral devices
#include <MFRC522.h> // RFID Module
#include <LiquidCrystal.h> // LCD Module

#define SS_PIN 10
#define RST_PIN 9
MFRC522 mfrc522(SS_PIN, RST_PIN); // Create MFRC522 instance.

#define beep_pin 8
float amt1=0;           // for RFID-1
float amt2=0;           // for RFID-2
float total=0;          // Total Billing amount
LiquidCrystal lcd(2, 3, 4, 5, 6, 7); // Setting RS:2,EN:3,D4:4,D5:5,D6:6,D7:7 PINS of LCD display
```

```
void setup()
{
  Serial.begin(9600); // Initiate a serial communication

  pinMode(beep_pin,OUTPUT); // Setting pin 8 as output pin for BUZZER
  digitalWrite(beep_pin,LOW); // Initializing BUZZER->LOW

  lcd.begin(16, 2); // Number of columns and rows of LCD Display (Size of LCD Display)
  lcd.setCursor(0, 0); // Setting up co-ordinates(X,Y) on LCD for cursor at (0,0)
  lcd.print("Circuit is Ready"); // Display in LCD
  delay(2000); // Time the Text should be displayed on LCD in milliseconds
  lcd.clear(); // Clear the LCD display

  SPI.begin(); // Initiate SPI bus
  mfrc522.PCD_Init(); // Initiate MFRC522
  Serial.println("Put your card to the reader...");
  Serial.println();
}
```



```
void loop()
{
    digitalWrite(beep_pin, LOW); // Set the buzzer as low initially
    lcd.clear(); // Clear the display of LCD
    lcd.setCursor(0,0); // Set the coordinates of Display
    lcd.print("SMART SHOPPING"); // Display the text on LCD
    lcd.setCursor(0,1); // Next line of LCD
    lcd.print("  CART"); // Display the text on LCD
    delay(1000); // Display the text for 1 second
    lcd.setCursor(0, 0); // Set the coordinates of Display
    lcd.print("Put your card to"); // Display the text on LCD
    lcd.setCursor(0, 1); // Next line of LCD
    lcd.print("the reader.....");// Display the text on LCD
    delay(4000); // Display the text for 4 seconds

    // Look for new cards
    if ( ! mfrc522.PICC_IsNewCardPresent())
    {
        return;
    }

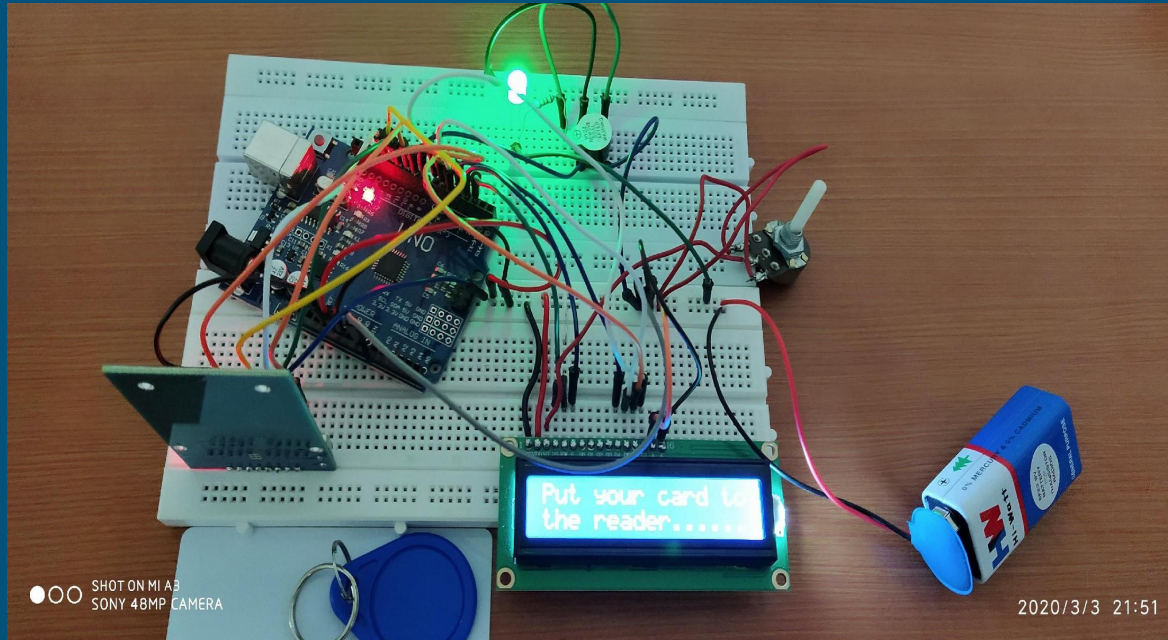
    // Select one of the cards
    if ( ! mfrc522.PICC_ReadCardSerial())
    {
        return;
    }
}
```

```
// Look for new cards
if ( ! mfrc522.PICC_IsNewCardPresent())
{
    return;
}
// Select one of the cards
if ( ! mfrc522.PICC_ReadCardSerial())
{
    return;
}
//Show UID on serial monitor
Serial.print("UID tag :");
String content= "";
byte letter;
for (byte i = 0; i < mfrc522.uid.size; i++)
{
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
Serial.println();
Serial.print("Message : ");
content.toUpperCase();
```

```
if (content.substring(1) == "F9 B4 28 B9" or content.substring(1) == " B2 74 F0 2D" /*|| content.substring(1) == " 41 38 B0 09"*/ ) //change here the UID of the card/cards that have Access
digitalWrite(beep_pin,HIGH); // Buzzer is set to high
delay(200); // For 2 seconds
digitalWrite(beep_pin,LOW); // Then buzzer is set to low
delay(100); // In 1 second
lcd.clear(); // Clear the LCD Display
lcd.setCursor(0,0);
lcd.print("Product ID : ");
lcd.print(content.substring(1)); // Display the UID of the tag
delay(1500);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("ITEM-1 scanned"); // Display Name of Product
delay(1500);
lcd.clear();
lcd.setCursor(1,0);
lcd.print("Amount: Rs.100/-"); //Display price of Product
delay(1500);
lcd.clear();
lcd.setCursor(1,0);
lcd.print("THANK YOU!!!!");
Serial.println("Authorized access"); // Access Accepted
delay(1500);
}

else {
digitalWrite(beep_pin,HIGH);
lcd.setCursor(0,0);
lcd.print("ID : "); // UID of the tag
lcd.print(content.substring(1));
lcd.setCursor(0,1);
lcd.print("Access denied"); // Access denied for not registered members
Serial.println(" Access denied");
delay(1500);
}
}
```

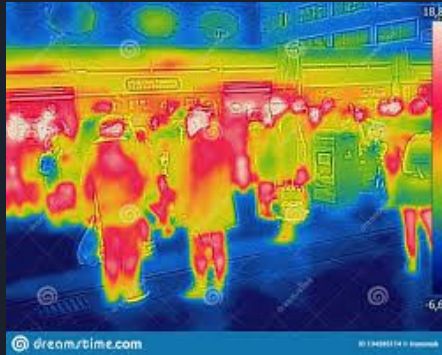
# IMPLEMENTATION



# Future Work

## In consideration with Post COVID-19

- **Thermal Screening** for temperature monitoring & Reporting



- Using **Infrared Sensors** and **High Quality** Camera for measuring temperature and recording temperature data



# References

- **Arduino Documentation**  
<https://www.arduino.cc/en/main/docs>
- **RFID & MFRC Tutorials**  
<https://www.youtube.com/watch?v=3uWz7Xmr55c>
- **Potentiometer Set-up**  
<https://www.youtube.com/watch?v=t9DEAreCD3g>
- **Infrared Camera with Arduino Tutorials**  
<https://www.youtube.com/watch?v=k6qim96wB4k>



**Thank You  
for  
providing this opportunity!**