

# Smart Shopping Cart System

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**Abstract:** In this century, malls and big departmental stores have become an indispensable part of our urban lifestyle. When someone visits a shopping mall or a supermarket, we need to put items in the cart and wait for a long period of time in a queue [3]. During the ongoing pandemic, maintaining social distancing in a queue has turned out to be a hassle which can even prove fatal at times. In our project Smart Shopping Cart System, we are using IoT concepts to resolve the issue [2]. With the utilization of RFID, the existing checkout process becomes quicker and more efficient. The RFID tags will be attached to every item and the RFID reader will read the tag. With our idea, we are not only striving to save the precious time of customer but also reduce the excessive manpower required by the departmental stores [2], making the shopping experience more pleasurable for the customer and more profitable for the store owners.

**Keywords:** RFID (Radio frequency identification), LCD (Liquid crystal display), I2C (Inter integrated circuit).

## System Architecture

The system architecture of smart shopping cart. The normal way of shopping till date was entering the shop, take trolley and search the items[2], put them into the trolley, stand in queue, wait for pay the bill and then exit the store so these are the steps of existing system[1]. From the new proposed system we are using Arduino UNO as a main device and LCD will attached with the trolley to show the bill of items and I2C module will be connected to LCD for converting serial data to parallel data [5], If we want to add one product we have to press the input switch and the buzzer will give the audio signal that product is added and bill will be display on LCD screen and when we want to remove the product we need to press the remove switch and the product will be removed and the price from the total price will be deducted. After that it will show the total bill and the total product.

## How RFID works

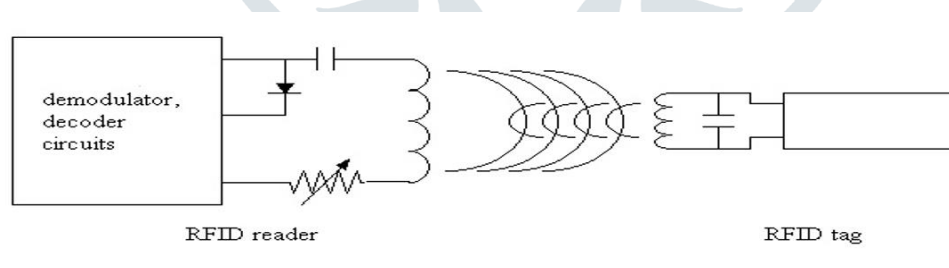


Figure 1: Working of RFID

The RFID stands for radio frequency identification this device operates on radio frequency signals [4]. It is consisting of reader and tag, the reader is mainly consisting of Antenna, Transceiver and Decoder. Transceiver is used to transfer and receive the data and it is consists of an oscillator to generate a signal which is modulated to required frequency and it is transmitted to air through Antenna and the Antenna is used to converts electrical signal into electromagnetic signal which emits signal into air [4]. When a radio frequency signal is detected at Antenna from the tag the decoder helps to retrieve the data [4]. When the tag comes in range of reader the tag detects the reader signal through the coil present in the tag and it converts receive radio frequency signal to electrical signal the converted signal powered on the microchip present in the tag and it sends the twelve digit unique identification string.

## Comparison between existing system and proposed system:

### Existing system

- Customers must wait in a queue for a long time
- The Checkout procedure is taking so much time
- On the off chance that work cost lessening is not overseen appropriately, client administration and store conditions may endure
- These reason a considerable measure of time wastages and tension on the general population who take the necessary steps. Frequently, absurdity trouble markets that work on a manually [2]

### Proposed system

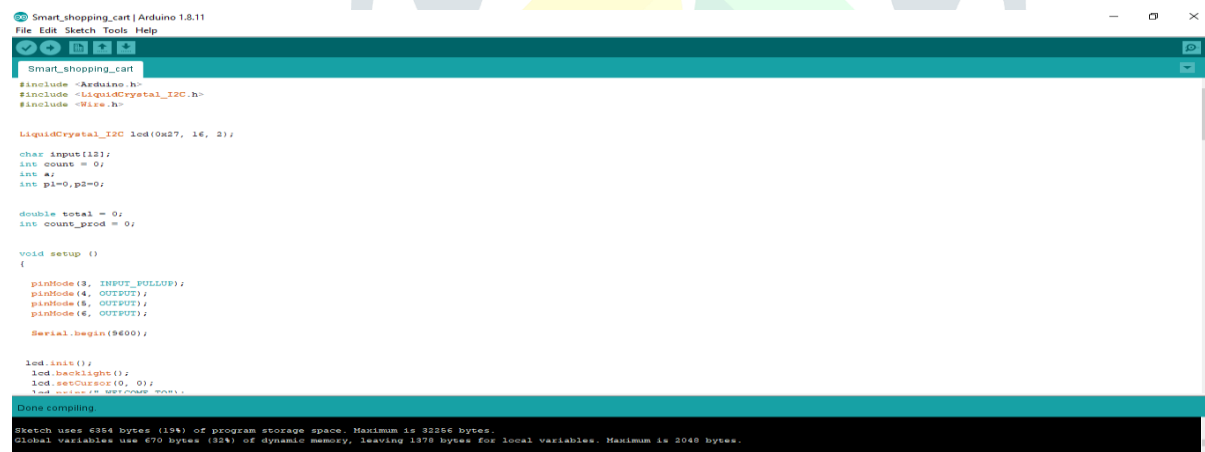
- Reading of RFID tag from product [2]
- RFID placed inside the product
- It can scan from any sight
- Long reading distance capability
- Having read and write capability

### Software Requirements

- Arduino
- Proteus
- Virtual Serial Ports Emulator

### Arduino

In this application we have done the program for LCD, RFID tag, and reader, Buzzer and Switches [5].



```

Smart_shopping_cart | Arduino 1.8.11
File Edit Sketch Tools Help
Smart_shopping_cart
#include <Arduino.h>
#include <LiquidCrystal_T2C.h>
#include <Wire.h>

LiquidCrystal_T2C lcd(0x27, 16, 2);

char input[12];
int count = 0;
int av;
int p1=0,p2=0;

double total = 0;
int count_prod = 0;

void setup ()
{
  pinMode(3, INPUT_PULLUP);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  Serial.begin(9600);

  lcd.init();
  lcd.backlight();
  lcd.setCursor(0, 0);
  lcd.print("SMART SHOPPING CART");
}

void loop ()
{
  if (digitalRead(3) == LOW)
  {
    input[0] = '0';
    input[1] = '0';
    input[2] = '0';
    input[3] = '0';
    input[4] = '0';
    input[5] = '0';
    input[6] = '0';
    input[7] = '0';
    input[8] = '0';
    input[9] = '0';
    input[10] = '0';
    input[11] = '0';
    count++;
    total = total + 100;
    count_prod++;
  }
  Serial.print("Count: ");
  Serial.print(count);
  Serial.print(" Total: ");
  Serial.print(total);
  Serial.print(" Product Count: ");
  Serial.print(count_prod);
  Serial.println();
}
Done compiling.
Sketch uses 4354 bytes (10%) of program storage space. Maximum is 32256 bytes.
Global Variables use 470 bytes (52%) of dynamic memory, leaving 1370 bytes for local variables. Maximum is 2048 bytes.
  
```

Figure 2: Coding on Arduino IDE

### Proteus

In this application we have done the simulation of the circuit consist of Arduino Uno, RFID reader, RFID tag, LCD, Switches and Buzzer.

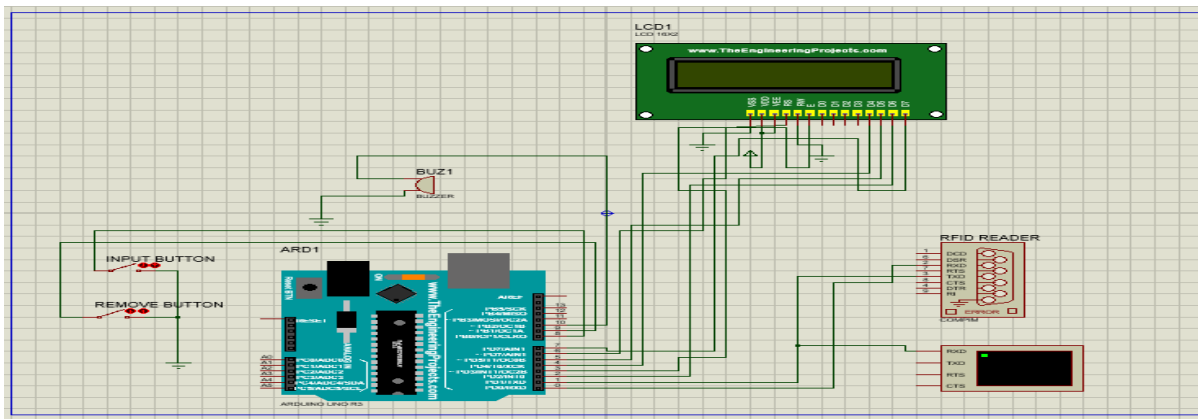


Figure 3: Simulation on Proteus

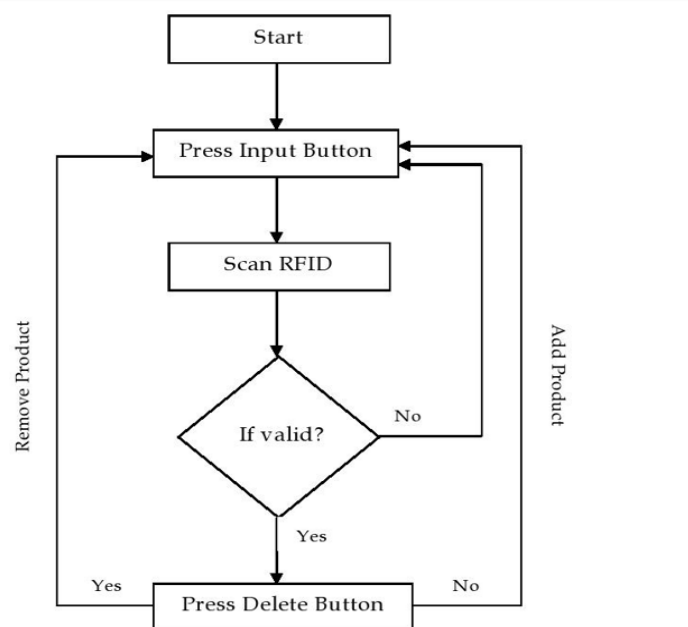
### Virtual Serial Ports Emulator

It is a software where we can connect the serial ports virtually, we connect the port of Arduino COM1 with this software.



Figure 3: Connection of Virtual Serial Ports Emulator

### Block diagram of setup



## Simulation

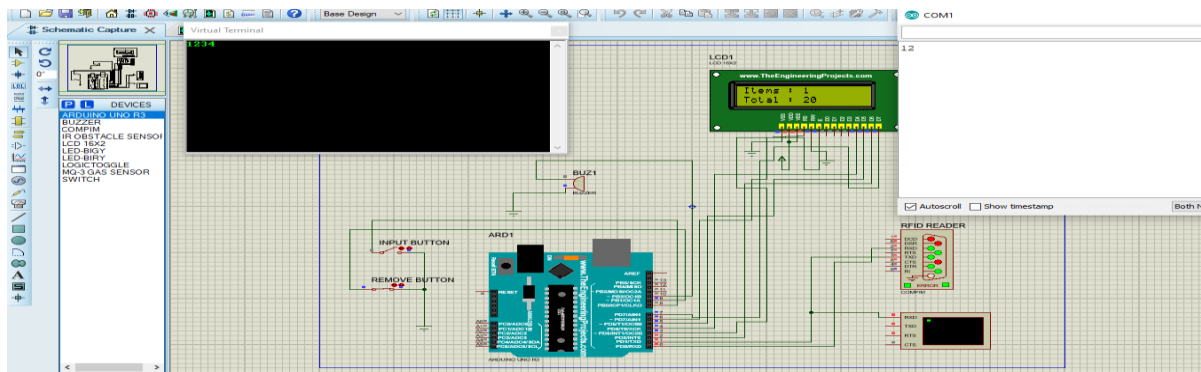


Figure 4: When the product 1 is added

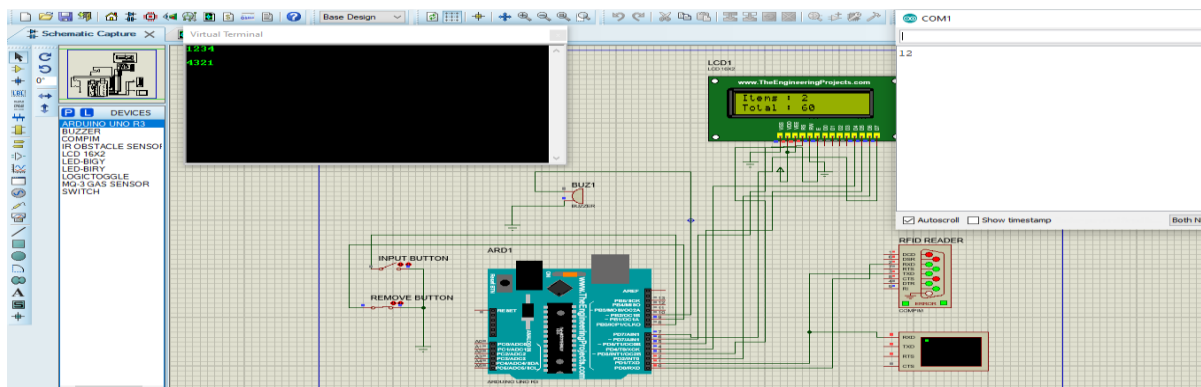


Figure 5: When the product 2 is added

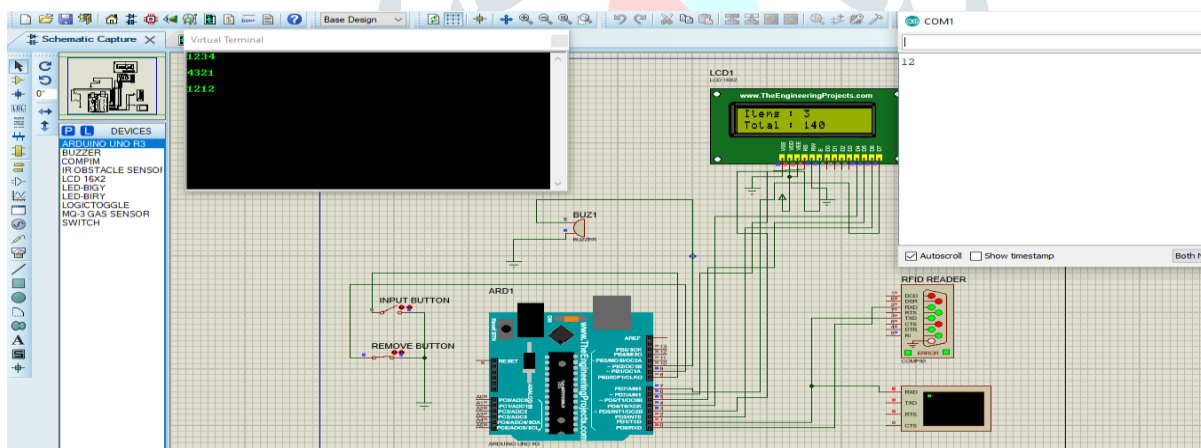


Figure 6: When the product 3 is added

## Hardware Requirements

- Radio frequency identification (RFID) reader is used to read the data from the tag
- Liquid crystal display (LCD) It is used to display the rate of items and simultaneously add the rate for total bill
- Arduino Uno: This is the main device where we are operating the peripheral devices
- Switches: This device is used to input and remove the product by pressing switch
- Buzzer: It gives the audio signal by doing beep

## Advantages of this project

- Low manufacturing costs
- Easily portable
- Easy to use for customer
- Faster shopping as compared to previous method

## Conclusion

From this project customer will be satisfy by the method of smart shopping cart system , it will save so much time and energy of the customers and the problems faced by the customers one problem is to pursue line through the billing procedure will be solve and it will be applied in shopping malls and supermarkets soon.

## References

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- [4] <https://www.atlasrfidstore.com/rfid-beginners-guide/>
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