

[SELF CHECKOUT SHOPPING TROLLEY]

A Course Project report Submitted in partial fulfillment of the Academic requirements for the award of the degree of

Bachelor of Technology

Submitted by

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UNDER THE COURSE

ENGINEERING EXPLORATION & PRACTICE



CENTRE FOR ENGINEERING EDUCATION RESEARCH

CMR COLLEGE OF ENGINEERING & TECHNOLOGY(Autonomous)

(Autonomous)

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(NAAC Accredited with 'A+' Grade & NBA Accredited)
(Approved by AICTE, Permanently Affiliated to JNTU Hyderabad)
KANDLAKOYA, MEDCHAL ROAD, HYDERABAD-501401 2022-23

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CERTIFICATE

This is to certify that the course project report entitled “**SELF CHECKOUT SHOPPING TROLLEY**” is a bonafide work done by of I B.Tech, Alavala Kavya (21H51A0528), Dasari Ajay Kumar (21H51A0533), Davuluri Sai Sujana (21H51A0534), Satvika Karumudi (21H51A0547), Thakur Abhinav Singh (21H51A0548) in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology, submitted to Centre for Engineering Education Research, CMR College of Engineering & Technology, Hyderabad during the Academic Year 2020-21.

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DECLARATION

We, the students of I B. Tech II Sem of Centre for Engineering Education Research , CMR COLLEGE OF ENGINEERING AND TECHNOLOGY, Kandlakoya , Hyderabad, hereby declare, that under the supervision of our guide course coordinators, we have independently carried out the project titled “Garbage Monitoring System ” and submitted the report in partial fulfillment of the requirement for the award of Bachelor of Technology in by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH) during the academic year 2020-2021.

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We own all our success to our beloved parents, whose vision, love and inspiration has made us reach out for these glories.

ABSTRACT

SELF CHECKOUT SHOPPING TROLLEY is an ARDUINO based innovative project. Shopping is one of the biggest hobbies known. In today's busy world standing in the queue after shopping or purchasing items till product gets billed is the biggest task for many people. Technology has changed so much, so is the rate of people of all ages who are attracted to electronic gadgets. In many industries, electronic devices such as smart card readers, barcodes, and RFID scanners are increasingly used. Supermarkets also need these kinds of gadgets. Currently, every person in the mall purchases the product placed in the trolley. Upon purchase, the person will have to stand in a queue for billing. In the billing process, an employee scans each product's barcode and bills it to the final. This process can take a lot of time and it can be even worse on holidays, special offers or weekends. To overcome this, a smart way to shop in malls has been developed. Each product has an RFID tag instead of a barcode. The Smart Trolley features an RFID reader, LCD module. When a person places any product on the trolley, it is scanned and the product's cost, name, and expiration date are displayed. The total cost will be added to the final check out bill. The bill is stored in the microcontroller's memory. Once the purchase is complete, the purchase details are sent to the customer through the GSM module. Arduino IDE software tool is used for programming and Proteus software is used to check simulation results before hardware implementation. This saves time of customers, which is really very precious and shopping convenient and easier

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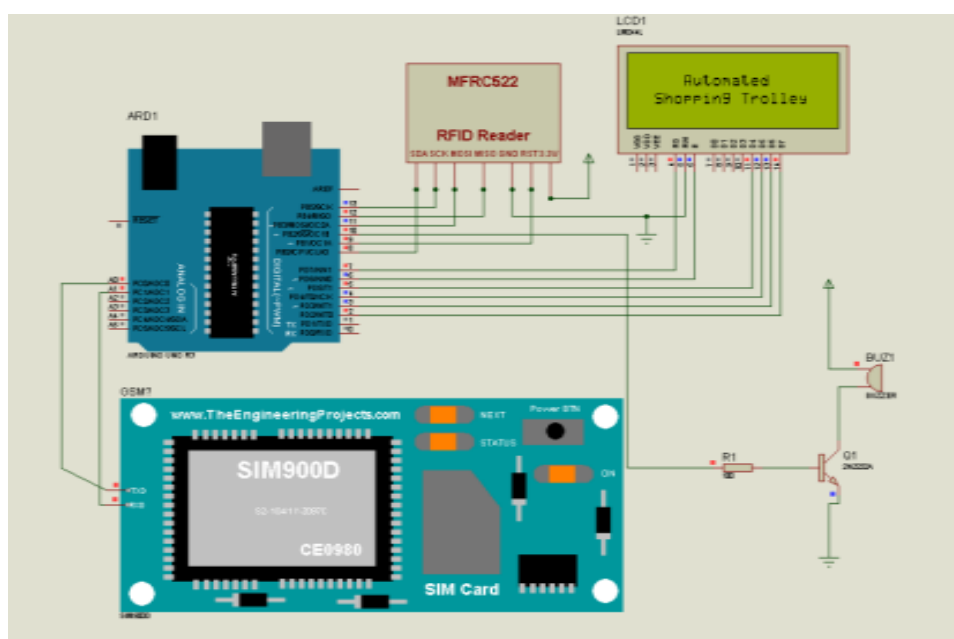
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1.INTRODUCTION

Technology has changed so much, so is the rate of people of all ages who are attracted to electronic gadgets. In many industries, electronic devices such as smart card readers, barcodes, and RFID scanners are increasingly used. Supermarkets also need these kinds of gadgets. Currently, every person in the mall purchases the product placed in the trolley. Upon purchase, the person will have to stand in a queue for billing. In the billing process, an employee scans each product's barcode and bills it to the final. This process can take a lot of time and it can be even worse on holidays, special offers or weekends. To overcome this, a smart way to shop in malls has been developed. Each product has an RFID tag instead of a barcode. The Smart Trolley features an RFID reader, LCD module. When a person places any product on the trolley, it is scanned and the product's cost, name, and expiration date are displayed. The total cost will be added to the final check out bill. The bill is stored in the microcontroller's memory. Once the purchase is complete, the purchase details are sent to the customer through the GSM module. Arduino IDE software tool is used for programming and Proteus software is used to check simulation results before hardware implementation

2.LITERATURE REVIEW

Nowadays every device's operation is based on digital technology. Alike all these shopping can also be made easier using technology. Standing in queues for hours and hours after getting tired by shopping is something everyone should think of. Many shopping complexes such as D-mart, metro which is usually crowded ,where every product is available which makes people get attracted, but standing in queues for manual billing scanning each and every product takes huge time. To minimize the effort of customers this project is helpful.



Existing solutions

- **NORMAL PUSH TROLLEY** : Normal trolley which is regularly available in all shopping marts is used to carry the products purchased and need to scanned manually by standing in long queues which is really very



- **CARRYING BASKET** : The carrying basket is used to carry products purchased from the store. It has limited storage capacity and the heavy items cannot be put in the basket. It is the customers who have to carry the basket which is quite difficult task for them to stand in such a long queues for billing.



- **CARRYING BAG:**

One of the main problems with carrying a bag is that it puts lots of stress on your upper body, especially as you are carrying it around the course for up to 4 to 5 hours. Some people also use polypropylene reusable grocery bags too but a disadvantage of using them is that this material is a non-renewable source which means that it is not compostable or biodegradable. Only a small percent of plastic bags are recycled, many of them end up entering the waste stream. Heavy items often tend to break the handle of plastic bags making them unusable.



3.PROBLEM DEFINITION

People usually shop for needs. Shopping may be online or offline. Problem arises when it comes to offline is standing in queues after shopping for long time to get billed manually by scanning each and every product by scanning barcode of each product customer needs to buy, this process takes huge and tests huge patience of customers. When it comes to holidays or weekends we can't even imagine the line of queues in marts.

3.1 PROBLEM STATEMENT

Keeping in the view that "Time is really very precious".This Trolley in built with arduino, gsm module to send bill to customers phone,lcd to display the product bought, weight, number of contents, cost of product and soon. This gets updated till the shopping ends. At the end if the shopper wants to end the shopping, he/she gets a bill to the given mobile number given by the customer in the beginning. This saves a huge amount of time for shoppers standing in queues.

3.2 OBJECTIVE

Main thought behind this idea is SAVING TIME. All of us know the importance of time in our busy lives. Many of us shop in marts where billing is done manually by scanning each and every product using barcode scanner. This makes shopper to stand in queues for huge time after shopping for long time. This project makes shopping easier, efficient, convenient, and simpler. This generates bill digitally. This also reduces maximum of man power in shopping complexes.

3.3 REQUIREMENT ANALYSIS

HARDWARE DESCRIPTION

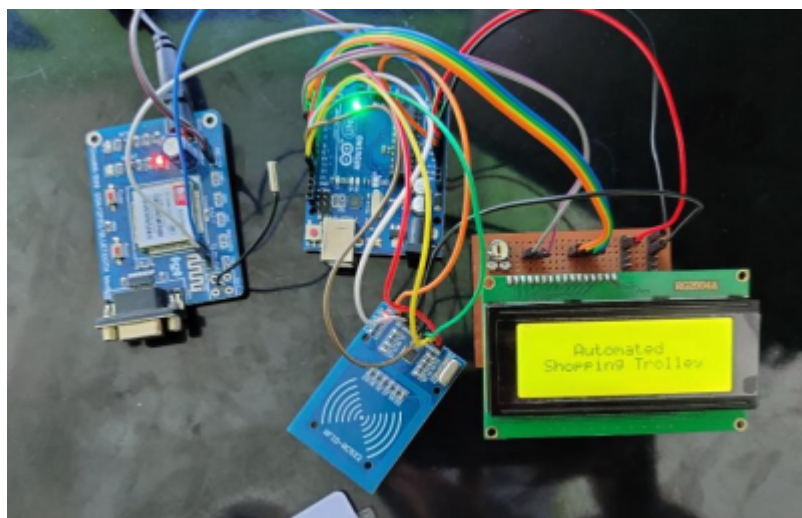
- 1.Arduino
- 2.LCD Display & Screen
- 3.Barcode scanner
- 4.Crystal Oscillator
- 5.Cables and Connectors
- 6.Diodes
- 7.Push Buttons
- 8.IC Sockets

SOFTWARE DESCRIPTION

- 1.Programming Language: 'C'
2. Arduino tool (IDE)

3.4 METHODOLOGY

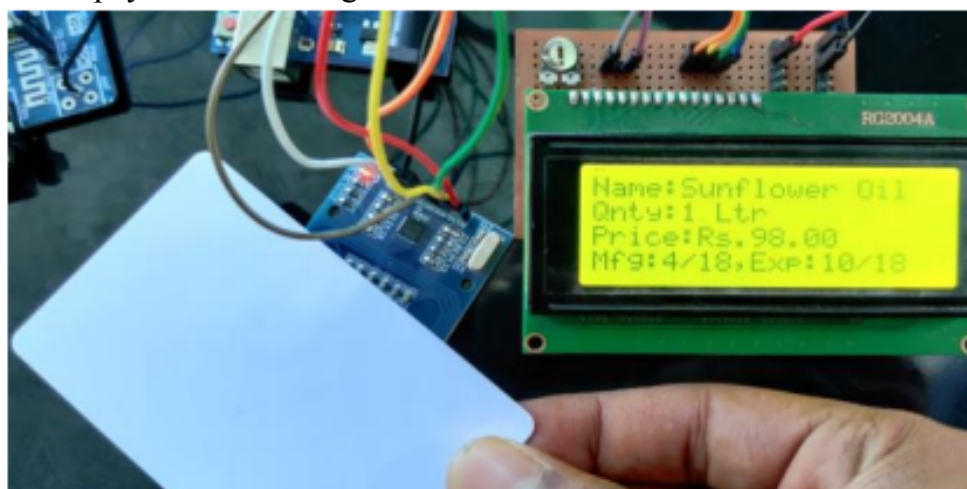
This innovative project includes an automated billing system that can be placed in a shopping trolley. This automated payment system includes an RFID reader controlled by Arduino instead of the traditional barcode readers. A unique membership card is provided to every customer where all the personal details & the account balance details of the customer are stored. The shoppers can deposit cash in counters before shopping, balance & other details will be updated whenever the shopper deposits cash at the billing counter. so, whenever the shopper goes shopping, he/she has to scan the special membership card against the RFID reader attached to the cart. Therefore, all the required personal details will be transferred to the microcontroller's memory. Then a welcome text with account balance details is displayed on the LCD screen. Now the system will be ready to start scan



the products. Any product, he/she has to scan it against the RFID reader & then has to get it into the cart. All the product details are displayed on the LCD along with the price of the product. As the shopper goes on adding products, every product is detected by the module & therefore the price will increase accordingly. In case if the shopper changes his/her mind & doesn't want any product added into the trolley, he/she can remove it by scanning the same product once again against the reader & the price added will be deducted automatically. A buzzer is used to verify whether the membership card/product scanning is successful or not. Buzzer beeps once the product scanning is successful. At the end of shopping, the shopper has to scan the membership card, when done the final bill details will be displayed on the LCD screen. The bill amount will be deducted from the membership card & the remaining balance amount will be displayed. Immediately after the bill is paid an SMS is sent to the prescribed member's mobile phone via GSM module. Hence this technique is an appropriate method to be used in places like supermarkets. This will help in reducing manpower & helps in making a better shopping experience for customers.

WORKING MODEL:

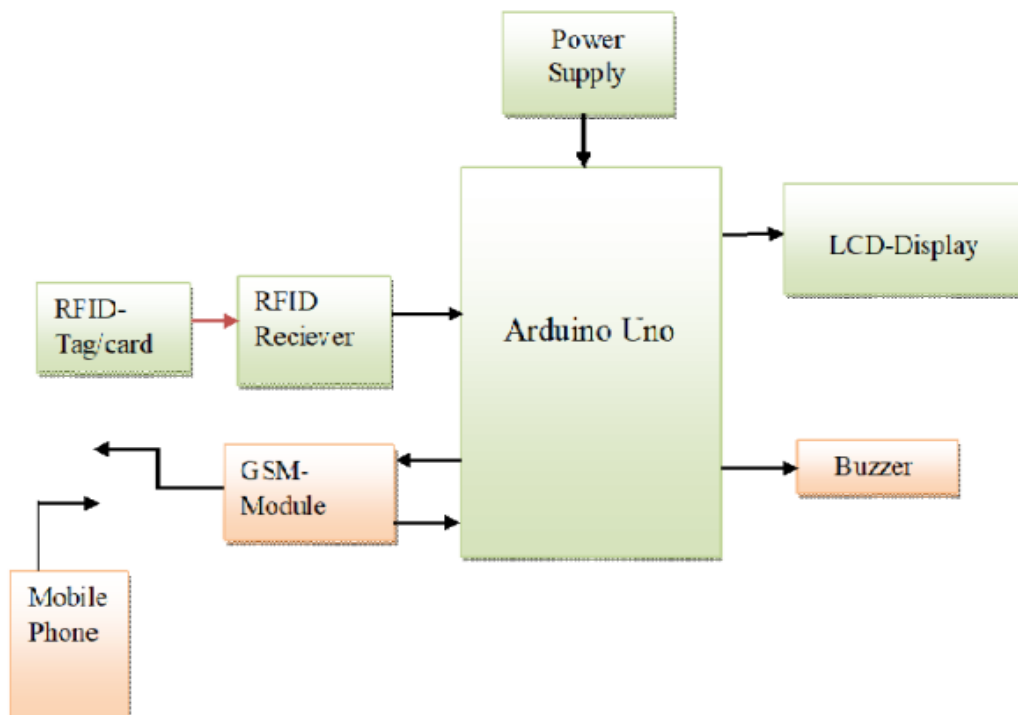
When the system is powered up, it displays the initial data on the LCD and asks customers to enter their respective mobile number. Now the product scanning process is ready. If the scanned product code is detected, display all the product details on the LCD screen. If not, the product has to be scanned until it gets detected. This process applies to each & every product. If a scanned product is scanned once again then that product is removed from the microcontroller's memory & in the ongoing bill (here we use RFID tags in place of products). Finally, to end the shopping, then the complete bill summary is displayed on the LCD. Immediately a SMS is sent to the prescribed shopper's mobile phone via a GSM module regarding the shopping details. Shoppers can make offline or online payment according to their will and wish.

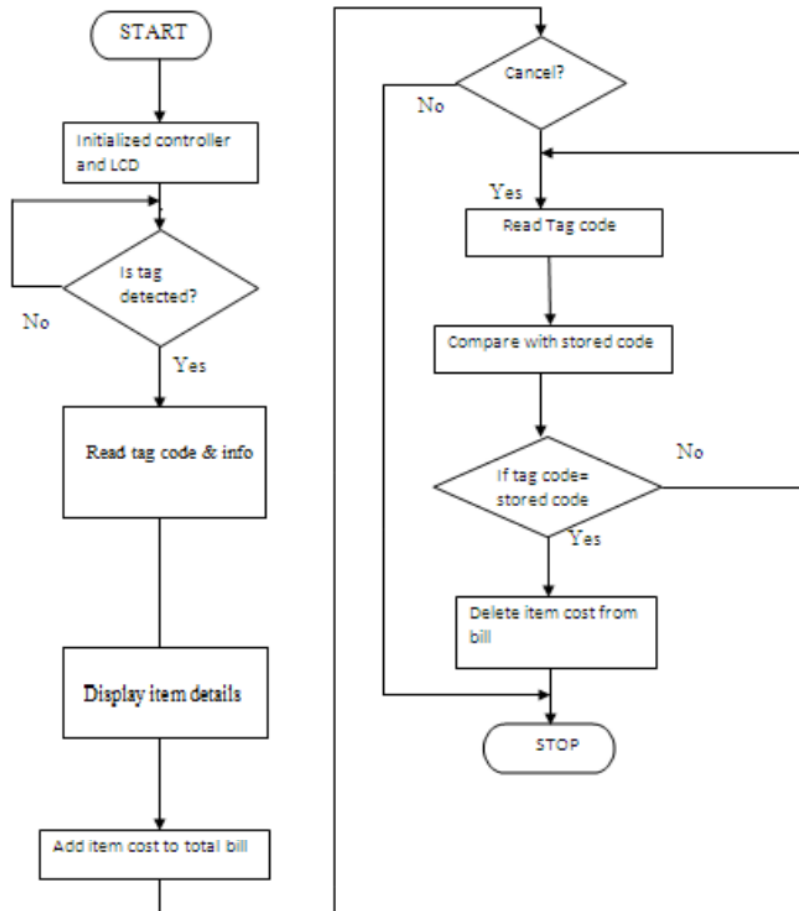


4.1 CONCEPTUAL DESIGN

As shown in the below block diagram in page 18, the Arduino is interfaced with all the remaining components. Once the microcontroller is powered up with the use of a 9v battery it is initialized and set to the basic settings, now the system is ready to proceed which means the RFID card and the tag can be scanned. Then the RFID card or tag is scanned the RFID reader fetches all the details from the scanned card or tag, and if the scanning process is successful the product details will be transferred to the microcontroller's memory and then will be transferred to the LCD module to be displayed on the LCD screen. Here the RFID module uses the SPI communication technique to transfer or to retrieve the data from the RFID card or tag . After the shopping is completed the entire bill details will be displayed on the LCD screen, each card or tag acts as a product, where the product details are pre early set or dumped into the card. When the bill amount is paid, the shopping details will be sent via the sim900 gsm module to the prescribed customer's mobile number. The entire working process is implemented by the software called Arduino IDE. The Proteus simulation software is used to check the simulation results before the hardware implementations

4.2 BLOCK DIAGRAM





4.3 DESIGN DESCRIPTION

HARDWARE DESCRIPTION

1. Arduino
2. LCD Display & Screen
3. Potentiometer
4. Jumper wires
5. RFID Reader
6. RFID Tags
7. Battery(9v)
8. Breadboard
9. GSM Module

SOFTWARE DESCRIPTION

1. Programming Language: 'C'
2. Arduino tool (IDE)

1. ARDUINO UNO: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino.



2.LCD SCREEN & DISPLAY: LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology.



3.POTENTIOMETER: On an LCD the potentiometer is used to adjust the bias level of the LCD - that is the contrast. You need to use it to set a voltage between Vcc and Vee, which you feed into Vo. That is, a voltage somewhere between +5V and -5V. You can't do that with one resistor. You can, however, do it with two resistors.



4.JUMPER WIRES:

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), 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. Jumper wires are of three types :male-male, female-male ,female-female



5. RFID READER: Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. There are two types of RFID readers -- fixed readers and mobile readers. The RFID reader is a network-connected device that can be portable or permanently attached.



6.BATTERY(9V): The nine-volt battery, or 9-volt battery, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in smoke detectors, gas detectors, clocks, walkie-talkies, electric guitars and effects units.

7.GSM MODULE: A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets.



5. IMPLEMENTATION

Shopping is simple but waiting on a bill counter makes shopping too boring and a tedious task. Huge amount of rush plus the cashier preparing the bill with a barcode scanner is too time consuming and results in long queues. This innovative project consists of an automated billing system which can be placed within the shopping trolley. This automated payment system consists of a RFID reader which is controlled by Arduino. So, whenever the shopper puts any product in the trolley it is detected by the RFID module and is displayed on LCD along with the price of the product. As the shopper goes on adding products, all products are detected by the module and therefore the price will increase accordingly. In case if a 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 shopper will press the button which when pressed adds all the product along with their price and gives the total amount to be paid. Shoppers can pay the bill online and need to enter the transaction id. This generates the bill and will be sent to the customers mentioned phone number in the start. Hence this technique is an appropriate method to be used in places like supermarkets, this will help in reducing manpower and helps in making a better shopping experience for customers. Hence this technique is an appropriate method to be used in places like supermarkets, this will help in reducing manpower and helps in making a better shopping experience for customers.

5.1 RESULTS AND DISCUSSIONS

Huge amount of rush and cashier preparing the bill by scanning each and every product is too time consuming. So our SELF CHECKOUT SHOPPING TROLLEY helps customer to scan every product and displays them which automatically generates the bill soon after completion of the shopping. After having detailed study and discussions our team have decided to build a project which will be really very much useful to all people who loves shopping. Our main aim is to save the time of the customers by automatically billing the products by scanning which generates a bill and list of items purchased even to our given mobile number. . RFID cards scanning is manually done & after the scanning is completed then the GSM module gets to work & sends a message to the customer's mobile phone. Therefore, an RFID tag/card is used for accessing the products. hence this project will help in improving the security & also the shopping time can be reduced. It also provides an enjoyable & userfriendly shopping experience to the customers

5.2 CONCLUSIONS

After having detailed study and discussions our team have decided to build a project which will be really very much useful to all people who loves shopping. Our main aim is to save the time of the customers by automatically billing the products by scanning which generates a bill and list of items purchased even to our given mobile number. The progression in science & technology development is an unstoppable process. Now & then evolution changing technologies are being invented. We can't imagine the upcoming future in which technology may occupy each & every place [2]. This innovative project idea can be used in places like shopping complexes, supermarkets & malls to purchase the products. Here RFID card is used to securely access every product in shopping places. If a product is scanned & put into the cart, all the required details of the product will be displayed on the LCD screen. Therefore, an RFID tag/card is used for accessing the products. hence this project will help in improving the security & also the shopping time can be reduced. It also provides an enjoyable & userfriendly shopping experience to the customers.

6.APPENDIX

6.1 SOURCE CODE

```
#include <LiquidCrystal.h>
int Contrast=75;
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

boolean stringComplete=false;
String inputString="";
int n=0,tb=0;
String
str1="4A00A68FB7D4",str2="4A00A6922957",str3="4A00A6915924",str4="4A00A6A57B32";
String a="BISCUIT = 50",b="CHOCOLATE = 100",c="COOL DRINK = 200",d="YOGURT =
300",ok="ok",com;

void setup()
{
  analogWrite(6,Contrast);
  lcd.begin(16, 2);
  Serial.begin(9600);
  inputString.reserve(200);
}
void loop()
{
  if(Serial.available())
  {
    n++;
    char inChar=(char)Serial.read();
    inputString+=inChar;
    if(n>=12)
    {
      n=0;
```

```
        stringComplete=true;
    }
}
if(stringComplete)
{
    if(inputString.equals(str1))
    {
        Serial.println(a);
        lcd.println(a);
        tb=tb+50;
        totalbill();
    }
    else if(inputString.equals(str2))
    {
        Serial.println(b);
        lcd.println(b);
        tb=tb+100;
        totalbill();
    }
    else if(inputString.equals(str3))
    {
        Serial.println(c);
        lcd.println(c);
        tb=tb+200;
        totalbill();
    }
    else if(inputString.equals(str4))
    {
        Serial.println(d);
        lcd.println(d);
        tb=tb+300;
        totalbill();
    }
}
```

[SELF CHECKOUT SHOPPING TROLLEY]

```
    }  
    stringComplete=false;  
    inputString="";  
  }  
}  
  
void serialEvent()  
{  
  while(Serial.available())  
  {  
    n++;  
    char inChar=(char)Serial.read();  
    inputString+=inChar;  
    if(n>=12)  
    {  
      n=0;  
      stringComplete=true;  
    }  
  }  
}  
  
void totalbill()  
{  
  lcd.println("TOTAL BILL = ");  
  lcd.print(tb);  
}
```

6.2 REFERENCES

- [1] The working principle of an Arduino, Abuja, Electronics, Computer and Computation(ICECCO), 2014 11th International Conference, IEEE
- [2] <http://arduino.cc/tutorial>
- [3] <http://instructables.com>
- [4] Component details <http://en.wikipedia.org/>
- [5] Theodore S. Rappaport, Wireless Communications, second edition, PHI. New Delhi