A Mini-Project Report

on

SMART CART WITH AUTOMATIC BILLING AND ANTI-THEFT

Submitted in partial fulfillment of the requirements

for the award of degree of

BACHELOR OF TECHNOLOGY

in

Information Technology

by

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(NAAC 'A' Grade & NBA Accredited- ECE, EEE, CSE & IT)

January, 2023

DECLARATION

We hereby declare that the work presented in this project entitled "**SMART CART WITH AUTOMATIC BILLING AND ANTI-THEFT**" submitted towards completion of the project in IV year I sem of B.Tech IT at "BVRIT HYDERABAD College of Engineering for Women", Hyderabad is an authentic record of our original work carried out under the esteemed guidance of **Ms. Ch. Sai Lalitha Bala, Assistant Professor**, Department of IT.

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CERTIFICATE

This is to certify that the mini-project report on **"SMART CART WITH AUTOMATIC BILLING AND ANTI-THEFT"** is a bonafide work carried out by **Ms. M. Sahithi (19WH1A1209), M.V. Vanshita (19WH1A1225), G. Naga Preethi (19WH1A1239), S. Karthikeya Manasvi (20WH5A1203)** in the partial fulfillment for the award of B.tech degree in **Information Techonology, BVRIT HYDERABAD College of Engineering for Women, Bachupally, Hyderabad** affiliated to the Jawaharlal Nehru Technological University, Hyderabad under my guidance and supervision. The results embodied in the mini-project work have not been submitted to any other university or institute for the award of any degree or diploma.

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ACKNOWLEDGEMENT

We would like to express our profound gratitude and thanks to **Dr. K. V. N. Sunitha, Principal, BVRIT HYDERABAD** for providing the working facilities in the college.

Our sincere thanks and gratitude to **Dr. Aruna Rao S L, Professor & Head, Department of Information Technology, BVRIT HYDERABAD** for all the timely support, constant guidance and valuable suggestions during the period of our project.

We are extremely thankful and indebted to our internal guide **Ms. Ch. Sai Lalitha Bala, Assistant Professor, Department of IT, BVRIT HYDERABAD** for her constant guidance, encouragement and moral support throughout our project.

Finally, we would also like to thank our Project Coordinators **Ms S. Rama Devi, Associate Professor and Ms K. Kavitha , Assistant Professor**, all the faculty and staff of the Department of IT who helped us directly or indirectly, parents and friends for their cooperation in completing the project work.

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ABSTRACT

Shopping involves getting tired due to standing in a long queue for the bill and payment process. Hence, Smart Cart is designed with Instant Billing and Theft Protection. The main goal is to provide a technology oriented, low-cost, easy, and rugged system for aiding shopping in person. The automatic shopping cart will reduce the time and effort of the customer thereby helping the customers walk straightaway into the shop, purchase products and walk out of the shop. In order to realize this, a RFID reader and an LCD screen are attached to the cart. The RFID reader scans the RFID tag on the item when it is placed near the RFID reader where the item details will be displayed on the LCD screen. In this way the cost and weight of the item gets added to the bill. A weight sensor installed on the smart cart for weighting items.During the time of checkout, If the added weight of all items is equal to total weight of the cart, then it is concluded that no theft is detected and the shopper can proceed with a final checkout. In case of theft, extra unaccounted weight will be detected and a theft detected message will be displayed on the LCD. In this way, a security check is implemented. When a customer finishes shopping, they pay at the checkout point using the generated billing information and the bill is sent as an Message through Telegram to the customer's phone number. Hence this system is suitable in places such as supermarkets, where it can help in reducing workforce and in creating better shopping experience for customers. By this practice,the cart will itself do all the billing and the problem of long queues on counters will be solved.

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1. INTRODUCTION

In the modern world, every supermarket and hypermarkets employ shopping baskets and shopping trolleys in order to aid customers to select and store the products which they intend to purchase. The customers have to drop every product which they wish to purchase into the shopping cart and then proceed to checkout at the billing counter. The billing process is quite tedious and highly time consuming and has created the need for shops to employ more and more human resource in the billing section, and yet waiting time remains considerably high. In this project, we seem it fit to propose the "Smart Cart with automated billing and Anti-theft using ESP" which aims to reduce ,and possibly eliminate the total waiting time of customers, lower the total manpower requirement and expenses for markets and increase efficiency overall.

Now a day's human lifestyle has changed and has become more hectic. As people don't have much time to spend for shopping which is an inevitable thing. Hence they prefer shopping in the malls so that they can get all the products at the same place. This saves them from going into different shops to purchase only a limited type of products. Time flies like an arrow". So, people are unable to spend more time in shopping. Due to this reasons people where preferring shopping malls which is used for getting their daily necessities. Even though shopping in mall gives the benefit of saving time, but people have only time during weekends to visit shopping malls. The customers have to stand in the billing lines for a long time in a queue than actual shopping time, So the people find difficulties at the cash counter.

1.1 Objective

The main objective of this project is to reduce and eliminate time taken in billing counter in super markets by designing a project called "Smart Cart with automated billing and Anti-theft " which uses RFID scanners to allow users to self-checkout and increase productivity time. This innovative project consists of an automated billing system. This automated payment system consists of a RFID reader which is controlled by ESP32. So, whenever the shopper puts any product in trolley it is detected by the RFID module and is displayed on LCD along with the price of the product.

1.2 Problem Definition

A supermarket or a hypermarket is a form where wide variety of product items is available. These product items can be food, beverages or any household product. The main purpose of supermarkets is to provide availability of all the products and save the time of the customers but sometimes customer gets frustrated while waiting in the queue at billing counter and sometimes they get confused while comparing the total price of all the products with the budget in the pocket before billing. This makes a problem at the cash counter because of increasing number of consumers. The customers have to stand in the billing lines for a lot more time than actual shopping time sometimes. After the shopping is done that person have to stand in the queue for billing. In the billing process a person scans barcode of each and every product and gives final bill. This process is very time consuming and it becomes worst on holidays, special offers or weekends. And also it seems hectic to push the trolley till entire shopping is done. Moving a trolley is really difficult task to do in malls and shopping areas. So, to overcome these problems we are introducing project called “Smart Cart with automated billing and Anti-theft”. 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 ESP 32. So, whenever the shopper puts any product in trolley it is detected by the RFID module and is displayed on LCD along with the price of the product. There is no need for customer to wait in the queue for the scanning for the product items for billing purpose.

1.3 Aim of the Project

We proposed Smart shopping trolley with automated billing using ESP32 to overcome queues for billing and manpower. Shopping is simple but waiting on a bill counter makes shopping too boring and a tedious task. Huge amount of rush plus cashier preparing the bill with barcode scanner is too time consuming and results in long ques. 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 ESP. So, whenever the shopper puts any product in 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 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. At exit for verification the shopkeeper can verify the products purchased with the help of master card. 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.

2. LITERATURE SURVEY

2.1 Related Work

People have consistently imagined and built up an innovation to help their needs from the start of the humanity.Smart shopping cart, analyzed the main reason for these innovations has been making the regular tasks quicker and simple. A task on which people are discovered spending significant measure of time is going for shopping and purchasing the products needed. In olden days we used manual billing using pen and paper then we started using the barcode system but after some years it also started to have issues like LOS (line of sight), increasing queue etc. So, to overcome this issue a concept of smart shopping with RFID technology was proposed. [1]

It describes the implementation of smart shopping cart using radio frequency identification using the RFID sensors, Arduino microcontroller, Bluetooth module, and Mobile application. Where the mobile is connected to the shopping cart and the application is already installed, the data is shared using the Bluetooth from the arduino microcontroller and the mobile then with the server. [2]

Intelligent shopping cart using BOLT based on IOT". IOT kit consists of barcode scanner, LCD display, Bolt ESP8266. The broad clarification of its process is, when consumer takes an item and put inside the trolley, that time barcode scanner scans the item barcode and value as well as gain to show into the digital display panel. Later than consumer concluded their purchasing and the bill is sent to the counter section. [3]

Smart Trolley with Instant Billing to Ease Queues at Shopping Malls using ARM7 LPC2148. This is based on arm7 microcontroller fitted with an LCD and RFID scanner and a wireless technology called zigbee. The LCD used is a 16x2 and zigbee modules make the wireless network to work even at long distance due to its wide range, the RFID scanner scans the product's unique code and its price. And it gets displayed on the LCD screen. So, after costumer has finished with the shopping, he/she has to visit the counter and pay the bill as displayed on the LCD screen fitted on the trolley.[4]

In EM-18 RFID scanner module has been used. It uses a RFID reader which will read 125 kHz tags.So, it will be known as a low frequency RFID reader.The RFID Readers here used are big tags with range of 125KHZ which can be detected by EM-18 Module. It shows the real time billing and you can even delete the item you don't want by pressing the delete button. In this author has used ARDUINO Uno which one of the cheapest and most efficient models in the market. It contains everything required to support the microcontroller merely connect it to a laptop (or applicable wall power adapter) with a USB cable or power it with an AC-to-DC adapter or battery to get started. Once the item is scanned it will start billing and you can remove the item if you want. [5]

Automation of shopping cart using RFID module and ZIGBEE module, in this system, RFID tags are used instead of barcodes. These RFID tags will be on the product. When the customer takes a product and places it in the trolley, the trolley will contain an RFID reader which will sense the RFID tag which is present on the product. Thus displays the product price on the LCD display. Like this, the process continues. Along with it, comes a ZIGBEE transmitter in the trolley, which transfers data to the main computer. The ZIGBEE receiver is placed near the main computer which receives the data from transmitter. [6]

2.2 CHALLENGES OF EXISTING SYSTEM

1. It takes too much of time to scan details of each item.
2. Consumers used to estimate total sum to be paid manually to fix in modest.
3. Consumers have to wait in a long row for the transaction purpose.
4. Barcode scanners need a direct line of vision to the barcode to be capable to read.
5. Barcodes have not at all any read/write competences; they don't consist of any extra particulars for instance running out date etc.

3. SYSTEM ANALYSIS & DESIGN

3.1 Proposed System

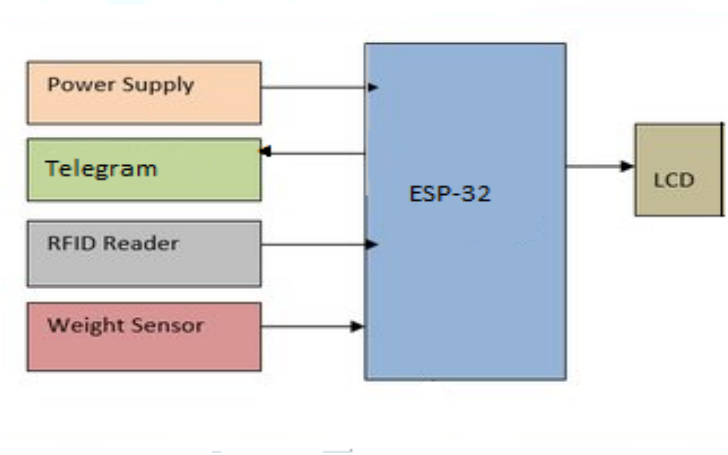

Figure 3.1.1: Block Diagram of the Proposed System

The numbers of small and large shopping malls keep on increasing over the years throughout the globe due to the demand of the public.Consumers often face many problems and inconvenience when shopping. These problems include worrying that the amount of money brought is not enough for paying all the items needed, insufficient information of the items that are for sale and also wasting time at the cashier. These are the problems that are currently faced by most consumers. There are some existing methods to solve the problems that are stated above but the effectiveness still consider improvable. Examples of existing problem solving techniques are substituting the conventional way of keying item per item by hand to the cash register with the technology of barcode scanning where the price are stored in the barcode, and also set up a customer information counter to help the consumer if there are any enquiries about the items at shopping mall. The problems stated above might eventually be solved or else improved by the implementation of RFID technology in shopping. The above figure 3.1.1 depicts the proposed system. The main objective of this project is to reduce and eliminate time taken in billing counter in super markets by designing a project.This automated payment system consists of a RFID reader which is controlled by Microcontroller which is ESP32.So, whenever the shopper puts any product in trolley it is detected by the RFID module and is displayed on LCD along with the price of the product. To avoid the theft we are using weight sensor for detecting any theft.

3.2 Architecture Design

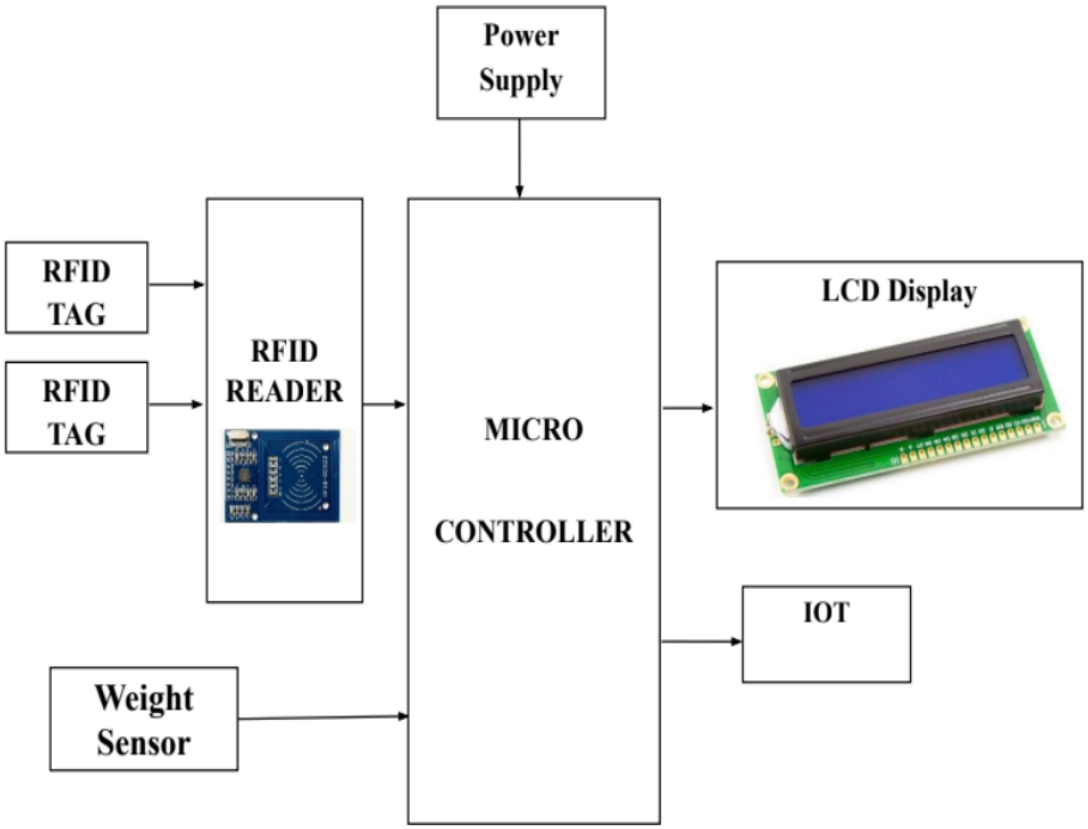

Figure 3.2.1: Architecture Design

In the above figure 3.2.1 first power supply is given to the microcontroller. The other hardware components like RFID scanner , RFID reader are connected to the microcontroller. The weight sensor is also connected to the microcontroller through HX711. The LCD is used as a hardware component to display the information. This hardware component converts analog weight into digital weight. When a product is scanner on RFID reader, it reads the information of the product and displays on LCD. After all the products are scanned(RFID tags) the membersip card is scanned to proceed to checkout where the customer receives payment information on his telegram application.

4. HARDWARE COMPONENTS

4.1 Transformer

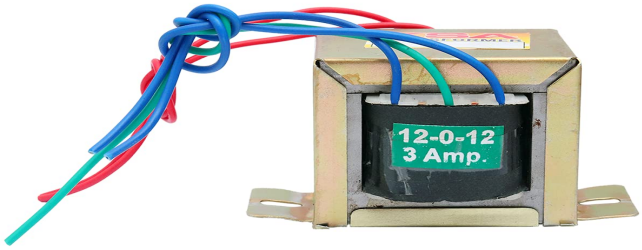

Figure 4.1.1: Transformer

The above figure 4.1.1 represents the Transformers which converts AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in India) to a safer low voltage.The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down current is stepped up. The transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the bridge rectifier, which is constructed with the help of PN junction diodes. The advantages of using bridge rectifier are it will give peak voltage output as DC.

4.2 ESP32

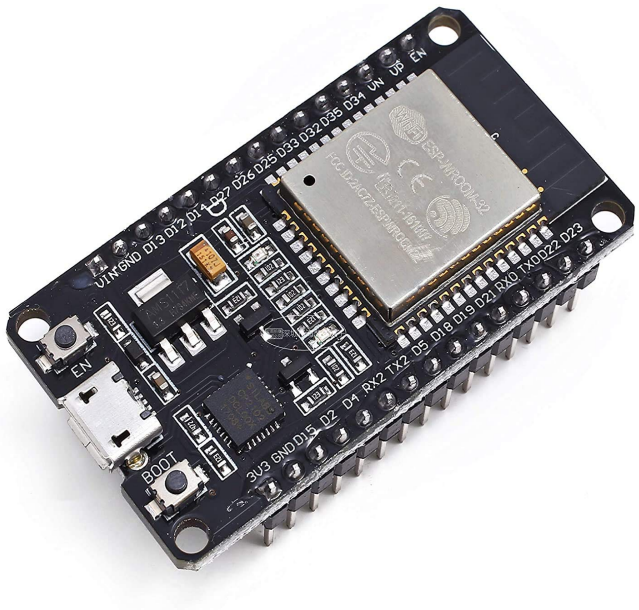

Figure 4.2.1: ESP 32

The above figure 4.2.1 represents the ESP32 which is created by Espressif Systems with a series of SoC (System on a Chip) and modules which are low cost with low power consumption.

This new ESP32 is the successor to the well-known ESP8266(became very popular with its inbuilt WiFi). ESP32 not only has Built in WiFi but also has Bluetooth and Bluetooth Low Energy. In other words we can define ESP32 as “ESP8266 on Steroids”.

ESP32 chip ESP32-D0WDQ6 is based on a Tensilica Xtensa LX6 dual core microprocessor with an operating frequency of up to 240 MHz.

The small ESP32 package has a high level of integrations such as:

1. Antenna switches
2. Balun to control RF
3. Power amplifier
4. Low noise reception amplifier
5. Filters and power management modules

On top of all that, it achieves very low power consumption through power saving features including clock synchronization and multiple modes of operation. The ESP32 chip's quiescent current is less than 5 A which makes it the ideal tool for your battery powered projects or IoT applications .

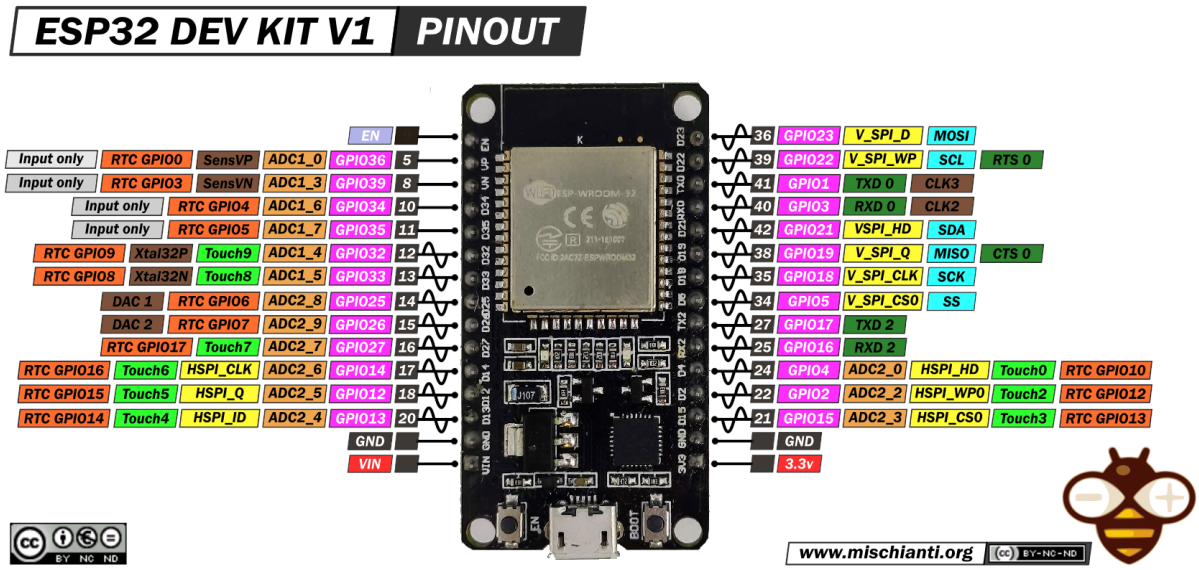

Figure 4.2.2: ESP32 Pin Diagram

1. GPIO Pins :

   The above figure 4.2.2 represents the pin diagram of ESP32 development board which has 25 GPIO pins which can be assigned to various functions programmatically. Each digital enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance.

2. Input Only GPIOs :

   Pins GPIO34, GPIO35, GPIO36(VP) and GPIO39(VN) cannot be configured as outputs, they can be used as either digital inputs, analog inputs, or for other unique purposes. Also note that they do not have internal pull-up or pull-down resistors, like the other GPIO pins. Also pins GPIO36(VP) and GPIO39(VN) are an integral part of the ultra-low-noise pre-amplifier for the ADC, which help to configure the sampling time and noise of the pre-amp.

3. ESP32 Interrupt Pins :

   All GPIOs can be configured as interrupts.

4. ADC Pins :

   The ESP32 has fifteen 12-bit ADC input channels. These are GPIOs that can be used to convert the analog voltage on the pin to a digital number.

5. DAC Pins :

   The ESP32 features two 8-bit DAC channels that can be used to convert digital signals into true analog voltages. It can be used as a “digital potentiometer” to control analog devices.

6. Touch Pins :

   ESP32 has 9 capacitive touch-sensing GPIOs. When a capacitive load (such as a human finger) is in close proximity to the GPIO, the ESP32 detects the change in capacitance.

7. SPI Pins :

   SPI Pins ESP32 features three SPIs (SPI, HSPI and VSPI) in slave and master modes. These SPIs also support the following general-purpose SPI features:
   4 timing modes of the SPI format transfer
   Up to 80 MHz and the divided clocks of 80 MHz
   Up to 64-Byte FIFO.

8. I2C Pins :

   The ESP32 has a single I2C bus that allows you to connect up to 112 sensors and peripherals. The SDA and SCL pins are, by default, assigned to the following pins. However, you can bit-bang the I2C protocol on any GPIO pins with wire.begin(SDA, SCL) command.

9. Power Pins :

   There are two power pins viz. VIN pin 3.3V pin. The VIN pin can be used to directly supply the ESP32 and its peripherals, if you have a regulated 5V voltage source. The 3.3V pin is the output of an on-board voltage regulator. This pin can be used to supply power to external components. GND is a ground pin of ESP32 development board.

10. Enable Pin :

    EN Pin is used to enable ESP32. The chip is enabled when pulled HIGH. When pulled LOW the chip works at minimum power.

4.3 RFID Module RC522

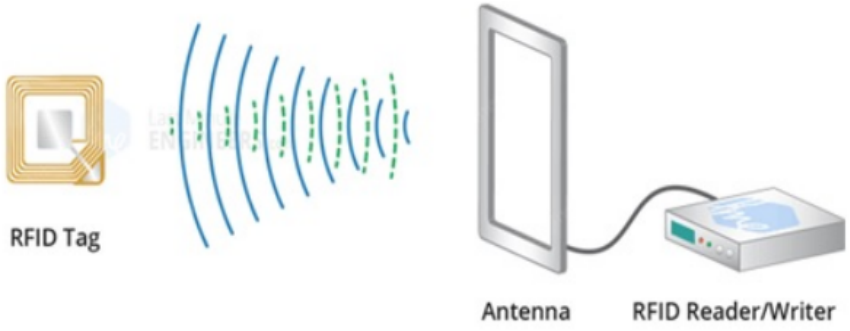

Figure 4.3.1: Working of RFID Module

RFID stands for radio frequency identification and it basically uses the radio waves to read the information on the tag. The RFID tags contain the embedded transmitter and receiver attached to an object. RFID is fast and does not require any contact between the reader and the tag and they can be read from feet's away. The above figure 4.3.1 reprsents the RFID or Radio Frequency Identification system which consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader. RFID stands for radio frequency identification and it basically uses the radio waves to read the information on the tag. The RFID tags contains the embedded transmitter and receiver attached to an object. A Reader consists of a Radio Frequency module and an antenna which generates high frequency electromagnetic field. On the other hand, the tag is usually a passive device, meaning it doesn't contain a battery. Instead it contains a microchip that stores and processes information, and an antenna to receive and transmit a signal. To read the information encoded on a tag, it is placed in close proximity to the Reader (does not need to be within direct line-of-sight of the reader). A Reader generates an electromagnetic field which causes electrons to move through the tag's antenna and subsequently power the chip.

An RFID system consists of two parts:

1. Tag
2. Reader

RFID Tags can be passive or active:

1. A Passive tag has no battery and it uses the energy transmitted by the reader.
2. The below figure 4.3.2 is an active tag. An Active tag contains a built in battery which makes it able to send a stronger signal and the range increases to 100 feet. Other features are same as the passive tags.
3. Passive tags have no battery. Instead, they draw power from the reader, which sends out electromagnetic waves that induce a current in the tag's antenna. Semi-passive tags use a battery to run the chip's circuitry, but communicate by drawing power from the reader. Active and semi-passive tags are useful for tracking high-value goods that need to be scanned over long ranges, such as railway cars on a track, but they cost more than passive tags, which means they can't be used on low-cost items.
4. Active RFID tags have a transmitter and their own power source (typically a battery). The power source is used to run the microchip's circuitry and to broadcast a signal to a reader (the way a cell phone transmits signals to a base station).

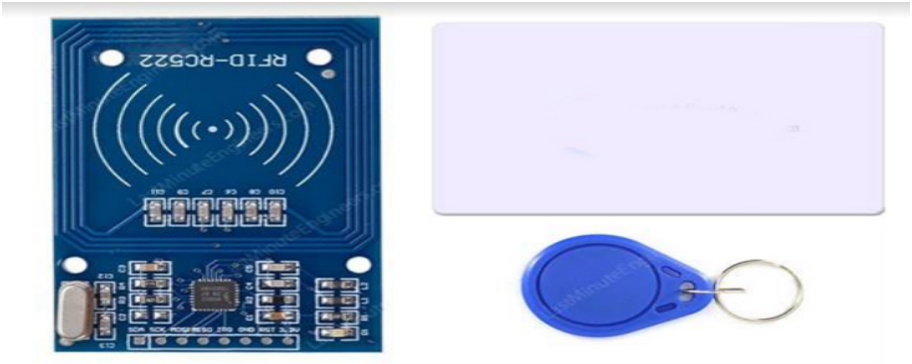

Figure 4.3.2: RFID Reader and Tags

4.4 LCD

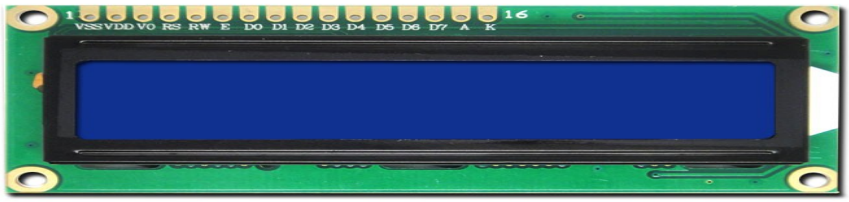

Figure 4.4.1: Liquid Crystal Display

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. In this figure 4.4.1, represents the character based LCDs, their interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff and tricks you can do with these simple looking LCDs which can give a new look to your application.

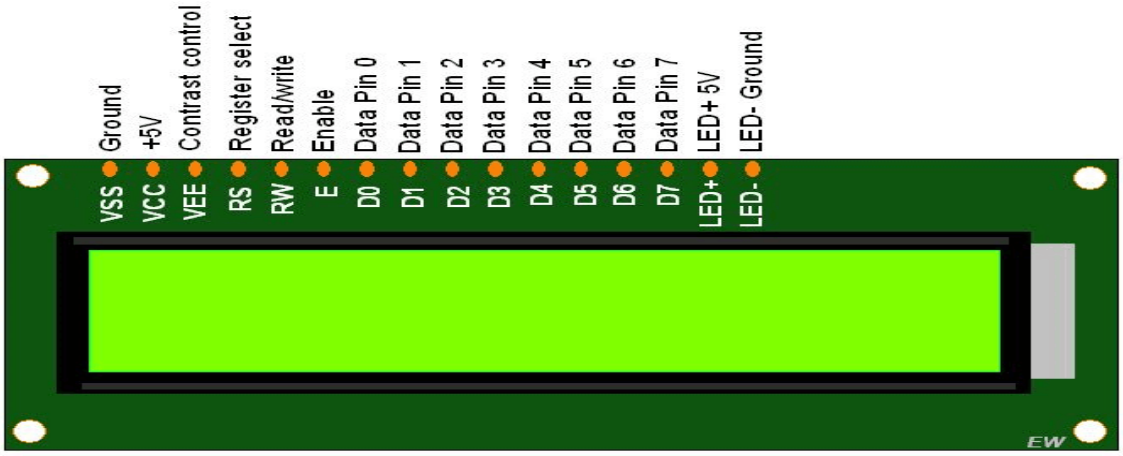

Figure 4.4.2: LCD Pin Diagram

The above figure 4.4.2 shows the pin diagram of LCD. These displays are mainly preferred for

multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

1. Pin1 (Ground/Source Pin): This is a GND pin of display, used to connect the GND terminal of the microcontroller unit or power source.

2. Pin2 (VCC/Source Pin): This is the voltage supply pin of the display, used to connect the supply pin of the power source.

3. Pin3 (V0/VEE/Control Pin): This pin regulates the difference of the display, used to connect a changeable POT that can supply 0 to 5V.

4. Pin4 (Register Select/Control Pin): This pin toggles among command or data register, used to connect a microcontroller unit pin and obtains either 0 or 1(0 = data mode, and 1 = command mode).

5. Pin5 (Read/Write/Control Pin): This pin toggles the display among the read or writes operation, and it is connected to a microcontroller unit pin to get either 0 or 1 (0 = Write Operation, and 1 = Read Operation).

6. Pin 6 (Enable/Control Pin): This pin should be held high to execute Read/Write process, and it is connected to the microcontroller unit constantly held high.

7. Pins 7-14 (Data Pins): These pins are used to send data to the display. These pins are connected in two-wire modes like 4-wire mode and 8-wire mode. In 4-wire mode, only four pins

8. are connected to the microcontroller unit like 0 to 3, whereas in 8-wire mode, 8-pins are connected to microcontroller unit like 0 to 7.

9. Pin15 (+ve pin of the LED): This pin is connected to +5V

10. Pin 16 (-ve pin of the LED): This pin is connected to GND.

4.5 Weight Sensor

Figure 4.5.1: Weight Sensor

The above figure 4.5.1 shows the weight sensor. A weight sensor is a type of transducer, specifically a weight transducer. It converts an input mechanical force such as load, weight, tension, compression, or pressure into another physical variable, in this case, into an electrical output signal that can be measured, converted and standardized. As the force applied to the sensor increases, the electrical signal changes proportionally.

First, we must comprehend the physics and material science that underlie the strain gauge, the fundamental component of the strain weight measurement system (sometimes referred to as Strain gauge). A sensor called a metal foil strain gauge changes electrical resistance in response to the applied force. To put it another way, it transduces—or converts—force, pressure, tension, compression, torque, weight, etc. into a change in electrical resistance that can be measured. As a result, the voltage output from the load cell circuit may be used to compute the physical force exerted on the flexure, which is proportional to the change in voltage. Sensitivity and accuracy are crucial ideas in weight transducers. The smallest force that may be applied to the sensor body and still result in a linear and repeatable fluctuation in the voltage output is known as the weight sensor accuracy.

5. IMPLEMENTATION

5.1 Modules

1. **Power Supply**

   The power supply section is the section which provide +5V for the components to work.IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

2. **RFID**

   To read the information encoded on a tag, it is placed in close proximity to the Reader. A Reader generates an electromagnetic field which causes electrons to move through the tag's antenna and subsequently power the chip.

3. **Weight Sensor**

   Once the membership card is scanned, the products can be scanned. When the products are scanned, they are put on the weight sensor. It calculates the weight of the products on the weight sensor with actual weight and proceeds to payment if both are equal. If weight is more than scanned weight , it displays theft detected.

4. **Billing**

   Once the weight of the products scanned matches the actual weight, It redirects to the telegram application where the user receives the billing information. The user can pay the bill through telegram

5.2 Results

Code: Smartcart.c

```
#include WiFi.h
include WiFiClientSecure.h
include UniversalTelegramBot.h
include ArduinoJson.h
//include Arduino.h
include ”HX711.h”
include ”soc/rtc.h”
include LiquidCrystal.h
include SPI.h
include MFRC522.h

// Network credentials
const char* ssid = ”ZORO”;
const char* password = Ädithya_111”;

// Initialize Telegram BOT Token and Chat ID
define BOTtoken ”5888885352:AAEQpPWR3nkEm3LNmhrxBYzk9cQtH8b1vmA”

#define CHAT_ID ”1567999386”
//#define CHAT_ID ”969506549”

// Checks for new messages every 1 second.
int botRequestDelay = 1000;
unsigned long lastTimeBotRan;

WiFiClientSecure client;
UniversalTelegramBot bot(BOTtoken, client);

//rs/en/D0/D1/D2/D3
```

```
LiquidCrystal lcd(13,12,14,27,26,25);

const int buzzp = 21;
const int buzzn = 3;

int quantity =0;

// HX711 circuit wiring
const int LOADCELL_DOUT_PIN = 16;
const int LOADCELL_SCK_PIN = 4;

//RC522 RFID
define SS_PIN 5
define RST_PIN 17

MFRC522 rfid(SS_PIN, RST_PIN); // Instance of the class
MFRC522::MIFARE_Key key;

HX711 scale;

// Init array that will store RFID NUMBER
byte nuidPICC[4];

int card1[4]3,52,94,23;
int card2[4]146,140,15,71;
int card3[4]195,100,18,22;
int card4[4]146,166,88,71;

int card5[4]243,54,225,145;
int card6[5]211,54,178,148;
```

```
int sno=0;
unsigned int total=0;
int user1=0;
int user2=0;
int chocoweight=0;
int weight=0;
int flag0=0;
int flag1=0;

// Assign some variables to allow us read and send data every minute
unsigned long lastTime = 0;
unsigned long timerDelay = 60000;

unsigned int objectweight=0;

void handleNewMessages(int numNewMessages) {

for (int i=0; i¡numNewMessages; i++) {
// Chat id of the requester
String chat_id = String(bot.messages[i].chat_id);
if (chat_id != CHAT_ID)
bot.sendMessage(chat_id, Ünauthorized user", );
continue;
}

// Print the received message
String text = bot.messages[i].text;
Serial.println(text);

String from_name = bot.messages[i].from_name;
```

```
if (text == /start") {
String welcome = "Welcome, - from_name + ".";
welcome += Üse the following commands.";
welcome += /pay' to Make payment ";
welcome += /leave' to Drop the transation ";
bot.sendMessage(chat_id, welcome, );
}

if (text == /pay") bot.sendMessage(chat_id, "Payment Made", );
flag0=1;flag1=1;total=0;user1=0;user2=0;quantity=0;
objectweight=0;

if (text == /leave") bot.sendMessage(chat_id, Restricted", );

flag1=1;
flag0=1;
total=0;
user1=0;
user2=0;
quantity=0;
objectweight=0;
}

}
}

void setup() {
SPI.begin();
Serial.begin(9600);
//WiFi.mode(WIFI_STA);
```

```
WiFi.begin(ssid, password);
lcd.begin(16,2);
lcd.clear();
lcd.setCursor(0,0);
lcd.print(”Smart Cart Auto ”);
lcd.setCursor(0,1);
lcd.print(”Billing  Theft ”);
while (WiFi.status() != WL_CONNECTED) {
WiFi.begin(ssid, password);
Serial.print(’.’);
delay(1000);
}
Serial.println(Çonnected”);
client.setCACert(TELEGRAM_CERTIFICATE_ROOT);


rfid.PCD_init();


lcd.begin(16,2);
lcd.clear();
lcd.setCursor(0,0);
lcd.print(”Smart Cart Auto ”);
lcd.setCursor(0,1);
lcd.print(”Billing  Theft ”);

bot.sendMessage(CHAT_ID, ”Bot started up”, );

for (byte i = 0; i 6; i++){
key.keyByte[i] = 0xFF;
```

```
// rtc_clk_cpu_freq_set(RTC_CPU_FREQ_80M);


scale.begin(LOADCELL_DOUT_PIN, LOADCELL_SCK_PIN);
scale.set_scale(231,32);
scale.tare(); //resetthescaleto0
}
voidloop(){
while(WiFi.status()! = WL_CONNECTED){
WiFi.begin(ssid, password);
Serial.print('.');
delay(1000);
}
//lcd.clear();
//lcd.setCursor(0,0);
//lcd.print("ScanYourCard");

if(user1 == 0user2 == 0){
lcd.setCursor(0,0);
lcd.print("ScanYouruser");
lcd.setCursor(0,1);
lcd.print("Card");

if ( ! rfid.PICC_IsNewCardPresent())
return;

// Verify if the NUID has been readed
if ( ! rfid.PICC_ReadCardSerial())
return;

Serial.print(F("PICC type: "));
```

```
MFRC522::PICC_Type piccType = rfid.PICC_GetType(rfid.uid.sak);
Serial.println(rfid.PICC_GetTypeName(piccType));

// Store NUID into nuidPICC array
for (byte i = 0; i 4; i++) {
nuidPICC[i] = rfid.uid.uidByte[i];
Serial.println(nuidPICC[i]);
}
}

if(card5[0] == nuidPICC[0] card5[1] == nuidPICC[1]  card5[2] == nuidPICC[2]  card5[3] == nuidPICC[3])
{


user1=1;user2=0;lcd.setCursor(0, 1); lcd.print(ÜSER 1 "); //delay(1000);
lcd.setCursor(0, 0);
lcd.print("SCAN PRODUCT ");

}

else if(card6[0] == nuidPICC[0] card6[1] == nuidPICC[1]  card6[2] == nuidPICC[2]  card6[3] == nuidPICC[3])
{

user2=1;
user1=0;
lcd.setCursor(0, 1);
lcd.print(ÜSER 2 ");
//delay(1000);
lcd.setCursor(0, 0);lcd.print("SCAN PRODUCT ");
```

```
}

if(user1==1 or user2==1){

Serial.println(ïn user1”);
// Look for new cards
if ( ! rfid.PICC_IsNewCardPresent())
return;

// Verify if the NUID has been readed
if ( ! rfid.PICC_ReadCardSerial())
return;

Serial.print(F(”PICC type: ”));
MFRC522::PICC_Type piccType = rfid.PICC_GetType(rfid.uid.sak);
Serial.println(rfid.PICC_GetTypeName(piccType));



// Store NUID into nuidPICC array
for (byte i = 0; i 4; i++) {
nuidPICC[i] = rfid.uid.uidByte[i];
Serial.println(nuidPICC[i]);
}

if (card1[0] == nuidPICC[0] card1[1] == nuidPICC[1]  card1[2] == nuidPICC[2]  card1[3] ==
nuidPICC[3] )
{
//digitalWrite(buzzp, HIGH);
digitalWrite(buzzn, LOW);
delay(100);
digitalWrite(buzzp, LOW);
```

```
digitalWrite(buzzn, LOW);
sno=1;

}
else if (card2[0] == nuidPICC[0] card2[1] == nuidPICC[1]  card2[2] == nuidPICC[2]  card2[3] == nuidPICC[3] )
{
//digitalWrite(buzzp, HIGH);
digitalWrite(buzzn, LOW);
delay(100);digitalWrite(buzzp, LOW);
digitalWrite(buzzn, LOW);
sno=2;



}
else if (card3[0] == nuidPICC[0] card3[1] == nuidPICC[1]  card3[2] == nuidPICC[2]  card3[3] == nuidPICC[3] )
{
//  digitalWrite(buzzp,  HIGH);digitalWrite(buzzn,  LOW);delay(100);digitalWrite(buzzp, LOW);digitalWrite(buzzn, LOW);
sno=3;

}
else if (card4[0] == nuidPICC[0] card4[1] == nuidPICC[1]  card4[2] == nuidPICC[2]  card4[3] == nuidPICC[3] )
{
//  digitalWrite(buzzp,  HIGH);digitalWrite(buzzn,  LOW);delay(100);digitalWrite(buzzp, LOW);digitalWrite(buzzn, LOW);
sno=4;
}
```

```
else if (card5[0] == nuidPICC[0] card5[1] == nuidPICC[1]  card5[2] == nuidPICC[2]  card5[3] == nuidPICC[3] )
{
// digitalWrite(buzzp, HIGH);
digitalWrite(buzzn, LOW);
delay(100);
digitalWrite(buzzp, LOW);
digitalWrite(buzzn, LOW);
sno=5;
}

else if (card6[0] == nuidPICC[0] card6[1] == nuidPICC[1]  card6[2] == nuidPICC[2]  card6[3] == nuidPICC[3] )
{
// digitalWrite(buzzp, HIGH);
digitalWrite(buzzn, LOW);
delay(100);
digitalWrite(buzzp, LOW);
digitalWrite(buzzn, LOW);
sno=5;
}

Serial.print(sno);

switch(sno)
{
case 1:
flag0=0;flag1=0;
sno=6;
total+=10;
objectweight=objectweight+25;
```

```
lcd.clear()
lcd.setCursor(0, 0);
lcd.print(ÇHOCO ”);lcd.print(”S ”);
quantity=quantity+1;
lcd.print(quantity);lcd.print();
//Serial.println(F(quantity));
lcd.setCursor(0, 1);
lcd.print(”P:”);
lcd.print(”10 ”);
delay(1000);
lcd.print(”W:”);
lcd.print(scale.get_units(), 1);
chocoweight=scale.get_units(), 1;
scale.power_down(); // put the ADC in sleep mode
delay(3000);
scale.power_up();
Serial.println(F(ÇHOCOLATE”));
break;


case 2:
flag0=0;flag1=0;
sno=6;
total+=5;
objectweight=objectweight+15;
lcd.clear() ;
lcd.setCursor(0, 0);
lcd.print(”GEMS ”);
lcd.setCursor(0, 1);
lcd.print(”Scan: ”);
quantity=quantity+1;
```

```
//delay(1000);
lcd.setCursor(6, 1);
lcd.print(quantity);
lcd.setCursor(9, 1);
lcd.print("P:");
lcd.print("5 ");
Serial.println(F("GEMS"));
delay(1000);
break;

case 3:
flag0=0;flag1=0;
sno=6;
total+=20;
objectweight=objectweight+60;
lcd.clear() ;
lcd.setCursor(0, 0);
lcd.print(ÖREO ");
lcd.setCursor(0, 1);
lcd.print("Scan: ");
quantity=quantity+1;
//delay(1000);
lcd.setCursor(6, 1);
lcd.print(quantity);
lcd.setCursor(9, 1);
lcd.print("P:");
lcd.print("20 ");
//Serial.println(F("Flour BAG."));
delay(1000);
break;
case 4:
```

```
flag0=0;flag1=0;
sno=6;
total+=50;
objectweight=objectweight+50;
lcd.clear() ;
lcd.setCursor(0, 0);
lcd.print(”Ponds cream ”);
lcd.setCursor(0, 1);
lcd.print(”Scan: ”);
quantity=quantity+1;
//delay(1000);
lcd.setCursor(6, 1);
lcd.print(quantity);
lcd.setCursor(9, 1);
lcd.print(”P:”);
lcd.print(”50 ”);
//Serial.println(F(çhocholate Bar”));
delay(1000);
break;
case 5:
sno=6;
lcd.clear() ;lcd.setCursor(0,0);
lcd.print(”TOTAL AMOUNT ”); lcd.setCursor(0, 1);
lcd.print(ÏNR:”);lcd.print(total);lcd.print(/-”);
delay(1000);
lcd.print(”W:”);
lcd.print(scale.get_units(), 1);
weight=scale.get_units(), 1;
scale.power_down(); // put the ADC in sleep mode
delay(3000);
scale.power_up();
```

```
while(weight =10  weight =100)
{
if(flag1==0){
lcd.setCursor(0,0);
lcd.print(”Theft detected”);
lcd.setCursor(0,1);
lcd.print();
bot.sendMessage(CHAT_ID,”Theft Detected”, );
if (millis() lastTimeBotRan + botRequestDelay) {
int numNewMessages = bot.getUpdates(bot.last_message_received + 1);
while(numNewMessages) {
Serial.println(”got response”);
handleNewMessages(numNewMessages);
numNewMessages = bot.getUpdates(bot.last_message_received + 1);
}
lastTimeBotRan = millis();

}
while(weight 10  weight ¡160 or weight==objectweight) {
if(flag0==0)
{
Serial.print(”STATUS:”);
Serial.println(WiFi.status());
lcd.clear() ;lcd.setCursor(0,0);
lcd.print(.Online Payment ”);
String msg=”Total: -String(total)+ÏNR-/pay’ -”Quantity: -String(quantity);
bot.sendMessage(CHAT_ID,msg, );

if (millis() lastTimeBotRan + botRequestDelay)
int numNewMessages = bot.getUpdates(bot.last_message_received + 1);
while(numNewMessages)
```

```
Serial.println(”got response”);
handleNewMessages(numNewMessages);
numNewMessages = bot.getUpdates(bot.last_message_received + 1);
}
lastTimeBotRan = millis();}
}
break;

default:
// Halt PICC
rfid.PICC_HaltA();
// Stop encryption on PCD
rfid.PCD_StopCrypto1();

}



/*
//Reading Weight
// Serial.print(scale.get_units(), 1);
lcd.clear();
lcd.setCursor(0,0);
lcd.print(”WEIGHT ”);
lcd.setCursor(0,1);
lcd.print(scale.get_units(), 1);
scale.power_down(); // put the ADC in sleep mode
delay(5000);
scale.power_up();*/
}
```

Output

First the user scans his/her membership ID. It is represented in figure 5.2.1

Figure 5.2.1: Scan your User Card

Figure 5.2.2 depicts when he /she has to scan the products that needs to be purchased.

Figure 5.2.2: Scanning product card

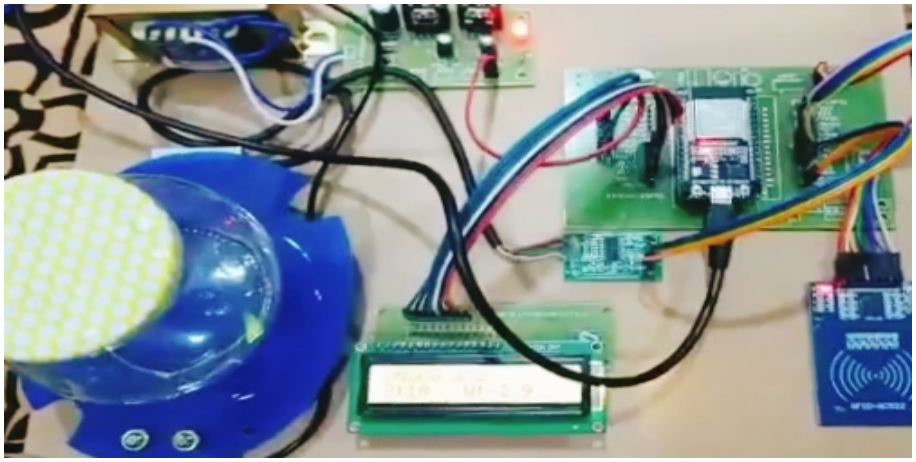

Figure 5.2.3: Displaying Scanned products on LCD

Figure 5.2.3 displays the products scanned on the LCD along with price and quantity.

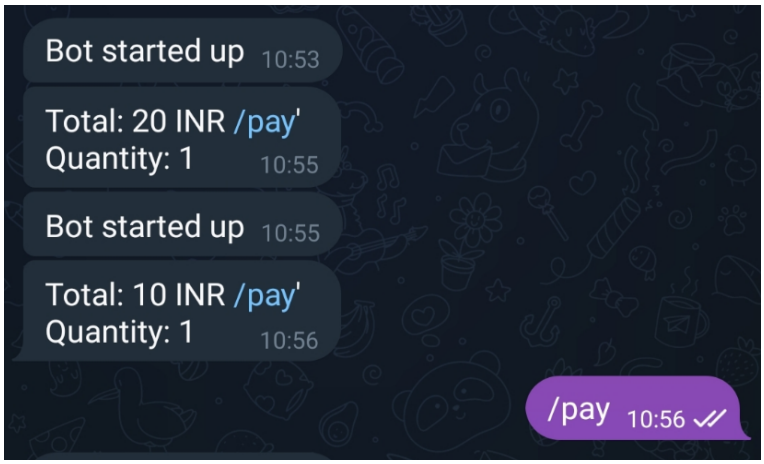

Figure 5.2.4: Redirected to Telegram for payment

After comparing the weight on the weight sensor with actual weight,Figure 5.2.4 represents after it redirects to online payment in telegram.

Figure 5.2.5: Theft Displayed on LCD

The figure 5.2.5 shows the theft displayed on LCD.

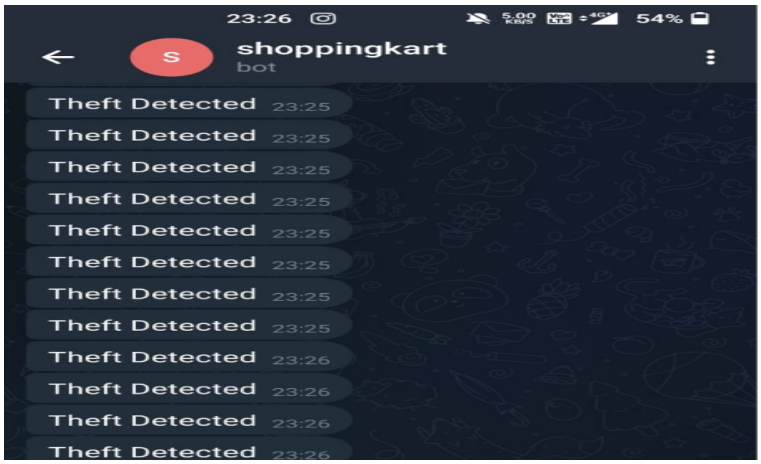

Figure 5.2.6: Theft Displayed in Telegram

The figure 5.2.6 shows the theft displayed in telegram.

6. CONCLUSION & FUTURE ENHANCEMENTS

In the modern world, every supermarket and hypermarkets employ shopping baskets and shopping trolleys in order to aid customers to select and store the products which they intend to purchase. The customers have to drop every product which they wish to purchase into the shopping cart and then proceed to checkout at the billing counter which is a time taking process. The main aim of the project is to reduce the wait time at the billing counter and also detect the theft when the weight is greater than the actual weight of the product.

Moving forward, there are few things which we can improve further and tune our model. First we need to add payment gateway to our system by which users can pay the bill after checkout. Second, a delete option should be included to the device which helps customers delete the product from the cart during product scanning.

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