

## SMART SHOPPING BASKET USING RFID

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**Abstract** - The purpose of this project is to provide a hands-free and hassle-free shopping experience to the user in the supermarket who suffers from the problems such as having chaotic time moving the baskets, overcrowding at one place for a certain product on sale, theft, spending a very long time standing in the queue in the counter for bill payment, etc. The project follows the user as per the command given in the smartphone application provided along with the smart shopping basket and installed on his phone. Customer will receive the total net amount of the bill he has to pay in the same application. The basket consists of the Bluetooth module to connect with the user's smartphone through which the basket's movements are commanded over. The basket also avoids coming in contact with any obstacles that it faces by taking deviation while following its user using ultrasonic sensors. Each product the user puts inside the basket is read using RFID technology, where each data is sent to the supermarket's server for a total billing of items the user wishes to buy. The total bill amount is sent to the user installed application so that customer can use any online payment applications available to complete his payment.

**Key Words:** Bluetooth Module, Smartphone, RFID.

### 1. INTRODUCTION

People go to the supermarket to buy everyday necessities and provisions for their livelihood. A supermarket is a hotspot for the necessities and provisions and it is always filled with a crowd of people buying their needs. As people keep buying the needs, they also face few problems, such as having chaotic time moving the baskets, overcrowding at one place for a certain product on sale, theft, spending a very long time standing in the queue in the counter for bill payment, etc.

People suffer from these problems and do not realize that their precious time that needed to be invested in their important busy schedules or with their family, is being wasted in a supermarket. As a solution to these problems, the proposed project prototype can be made into a mainstream product to help the people to shop better. The proposed project intends to provide a hands-free and hassle-free experience to the user in the supermarket and gives an instant total on the net amount that the user has to pay after he has finished his shopping.

### 2. RELATED WORK

The Intelligent shopping basket is a smart trolley which uses an embedded chip with a barcode scanner and a battery to allow users to self-egress at the supermarkets. The main theme of the paper is to decrease the time consumption the

billing counters at the supermarkets [1]. RFID systems carry data in suitable transponders, generally known as tags, and retrieve data, by machine-readable means. Radio Frequency Identification, an alternative to the barcode that uses tiny microchips in tags to hold and transmit detailed data about the item tagged. RFID has advantages over bar codes such as the ability to hold more data [2]. However, the new and emerging web technologies have transformed this scenario and now framework can be developed to include all the required flexibility and security for seamless applications such as monitoring of RFID tags [3]. The smart shopping basket is an innovative type of purchasing product that is designed to help shoppers fast tracking shopping experience. The concept of this smart cart will revolutionize the purchasing experience of every buyer. The RFID readers will be installed in the cart which will automatically scan the product being entered into the cart. Ultrasonic sensors also used to detect the obstacle and measure its distance between, according to that the movements continues [4]. Using wi-fi module the scanned data is transferred from Arduino mega to server.

### 3. PROBLEM STATEMENT

1. In Supermarket, people push or pull baskets to the places they want to browse through the super market products.
2. Elderly generation, physically disabled will face problem while browsing through the super market.
3. It is very difficult to search for a particular product in the super market and spending long hours is unavoidable.

### 4. OBJECTIVES

1. To help elder generation, physically disabled who require help while carrying groceries, clothes, etc. in supermarkets.
2. To design and implement a smart shopping basket with the help of RFID technology for improvising purchasing.
3. To implement the novel web application technology for bill payment at the billing counters in the supermarket.
4. To develop a system to avoid collisions with obstacles and detect accessible routes
5. Alert system to warn customers on condition that carts fall behind.

## 5. BLOCK DIAGRAM

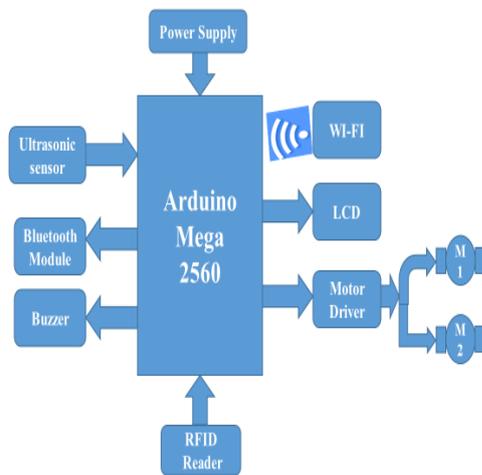


Fig. 1 Proposed block diagram

The Fig. 1, shows the block diagram of the proposed project work.

### 5.1 Arduino Mega 2560

The Arduino Mega 2560 is the main controlling unit here. Arduino mega 2560 has 54 I/O pins which required for the project as many components need to be connected.

### 5.2 Power Supply

Power supply is provided through battery to the Arduino. The rechargeable batteries are lead-lead dioxide systems. It has a specification of 12v of output voltage and 7.2Ah of output current.

### 5.3 Ultrasonic Sensor

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module.

HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc.

### 5.4 Bluetooth Module

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

### 5.5 Buzzer

Buzzer sounds when the obstacle is detected by Ultrasonic sensor.

### 5.6 RFID

Radio-frequency identification (RFID) is a technology to electronically record the presence of an object using radio signals.

### 5.7 Motor Driver

The Motor Driver module will allow you to easily and independently control two motors of up to 2A each in both directions.

### 5.8 LCD

LCD is used to display the net amount.

### 5.9 Wi-Fi

ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

## 6. METHODOLOGY

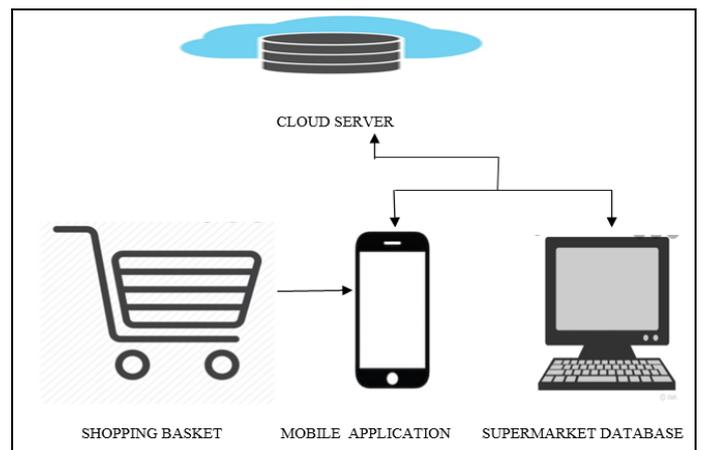


Fig. 2 Design of Shopping Basket

The design of the shopping basket is shown in Fig. 2 with the smart shopping basket, consist of Arduino Mega 2560 and Node MCU ESP8266 for sending information to the server through Wi-Fi network.

The accelerometer sensor present in the mobile senses different hand movements and sends the information through Bluetooth and with the help of MIT app inventor 2 is a cloud-based tool, to create our own app in the mobile for moving the trolley in different directions.

HC-SR04 Ultrasonic sensor is used for detection of obstacle i.e., ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the ultrasonic receiver.

RFID technology is the alternative to the barcode that uses tiny microchips in tags to hold and transmit detailed data about the item tagged.

RFID has advantages over barcodes such as the ability to hold more data and ability to change the stored data as processing occurs, it does not require line-of-sight to transfer data and is very effective in harsh environment where barcode label may not work.

Whatever the product is scanned by RFID is directly send to the server through Wi-Fi module and 000 Webhost is the website where we make the database, consist of customer details and product details will be uploaded, it acts as an intermediate between server and the basket.

Step 1: (basket)

Start the program when the user  $\rightarrow$  **int i=1**

Step 2: (basket $\leftrightarrow$ bluetooth)

Arduino mega 2560 receive **int b=1**  $\rightarrow$ when Bluetooth **connected successfully**

**Display on LCD**

Ultrasonic sensor **While(1)**

$\rightarrow$  if (u=0) //obstacle **NOT** detected

**IN1=1; IN2=0; IN3=1; IN4=0** $\rightarrow$ FORWARD

Else //obstacle detected

**IN1=0; IN2=1; IN3=0; IN4=1** $\rightarrow$ REVERSE,

then **IN1=0; IN2=1; IN3=1; IN4=0** $\rightarrow$  LEFT

Step 3: (application)

Receive **b=1** $\rightarrow$  get string user="name" and float

ph.no=1234567890

If (**ph.no<10||ph.no>10**) $\rightarrow$  print **invalid**

**Display on smart phone application**

Step 4: (application $\rightarrow$ basket $\rightarrow$ server)

Receive **w=1**, when wi-fi **NodeMCU** is connected to supermarket server. **Display connected on LCD.**

**Push the user data** to supermarket **server** through **Wi-Fi module.**

**Auto-Increment** the number of **users** in the supermarket **user database.**

Step 5: (basket $\rightarrow$ server)

If (**r=1**) $\rightarrow$ product **int flag++**

Int f=1 $\rightarrow$ when RFID **reads** a product tag.

**Display Product added on LCD**

Else (**r=0**) $\rightarrow$ product **int flag--**

Int f=1 $\rightarrow$ when RFID **reads** a product tag.

**Display product subtracted on LCD**

Product tag  $\rightarrow$  product id $\rightarrow$  checked in the product database(server).

Step 6: (basket $\rightarrow$ server $\rightarrow$ counter)

Combine the user data and product data $\rightarrow$  counter database

**Auto-increment until stop int j=1** is received;

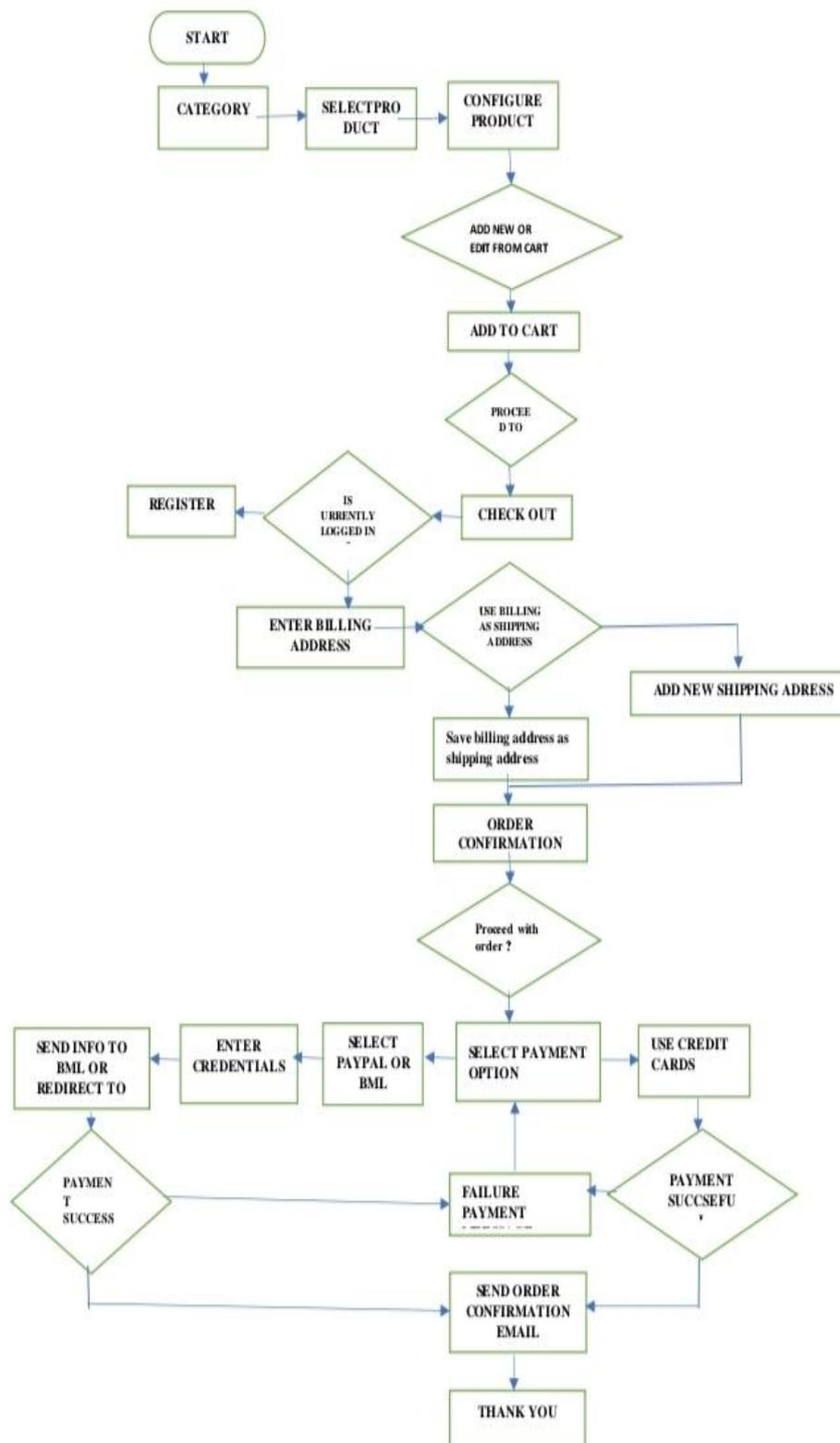
**Display "The Bill is at counter".**

Step 7: (counter $\rightarrow$ application)

Receive **int k=1** when the bill payment is done.

Stop the program

7. FLOWCHART



### 8. RESULT

Whenever people go for shopping with this basket, while they put products into basket the total net amount of basket is displayed on LCD. Wherein people can pay through online to that supermarket. It also reduces queuing time near the billing counters of supermarkets. The smart basket's data is also sent to the supermarket server as shown in Fig. 3

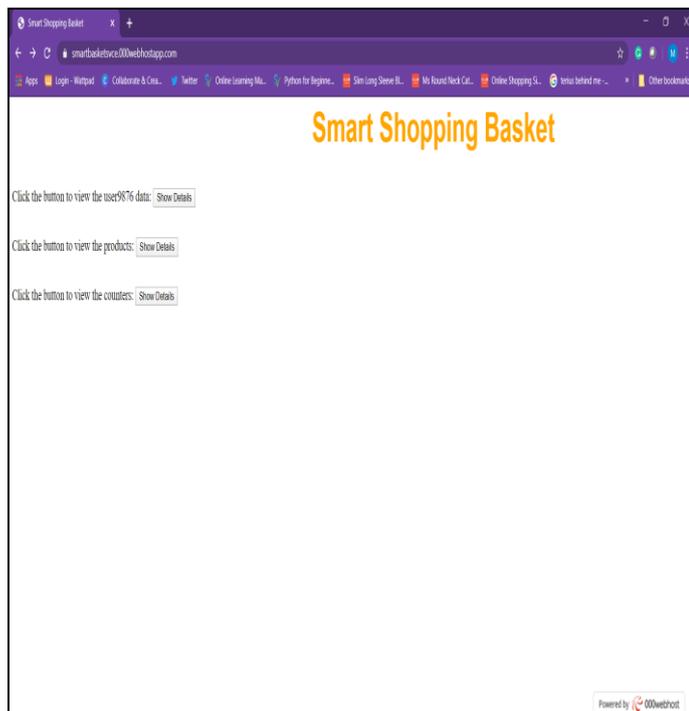


Fig. 3 Supermarket Server Website

Firstly, the customer details like name and phone number is given as shown in the Fig. 4

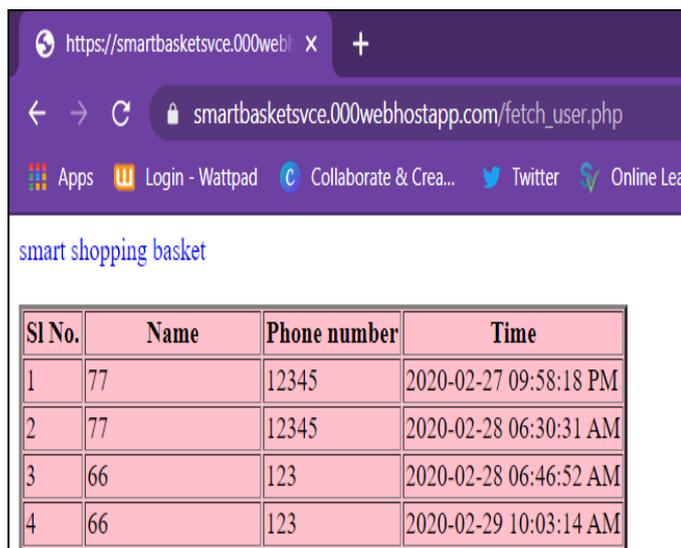


Fig. 4 User Details at supermarket

Secondly, the list of total types of products in the supermarket as shown below in Fig. 5

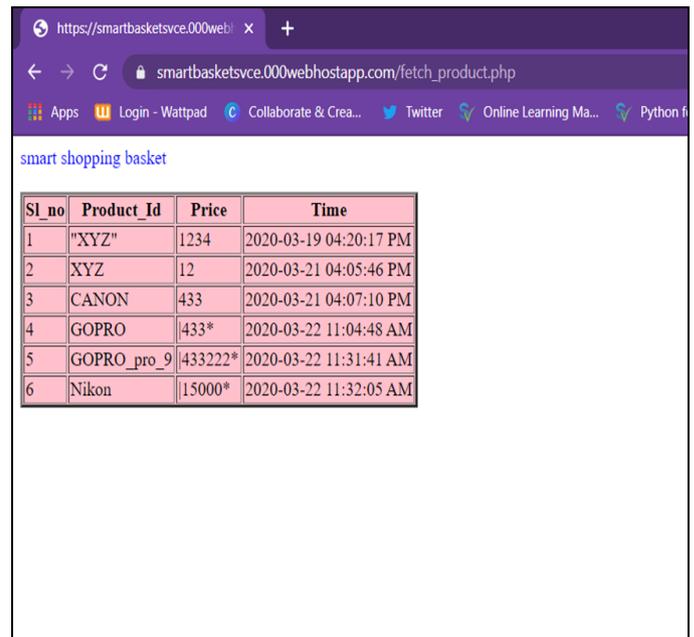


Fig. 5 List of products in supermarket

Thirdly, the billing details at the supermarket billing counter as shown in Fig. 6

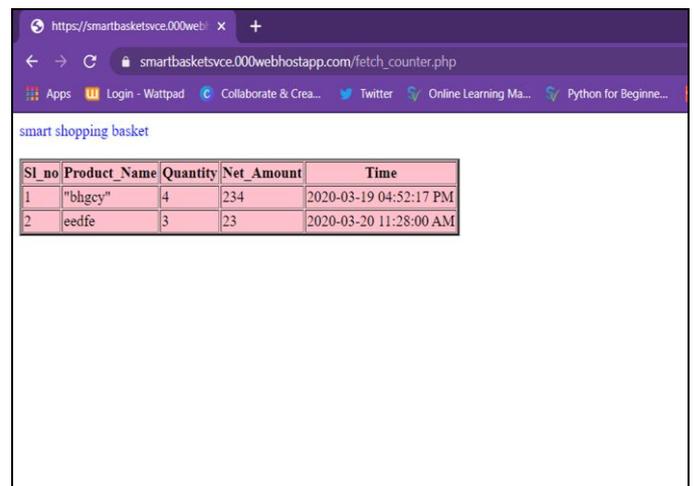


Fig. 6 Billing Details

### 9. CONCLUSION

The Smart Shopping Basket will be useful for physically disabled people, as they are follow-up human bags. It also reduces the time of shopping and payment. The main aim of the project is to provide an enjoyable shopping experience for the customers. Reducing delay billing time is mainly considered in shopping basket implementation.

### 10. ACKNOWLEDGEMENT

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