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Gesture Controlled Smart Covid Basket with Automated Billing System

Vaibhav Kohli[1], Vivurdhan Shrivastava[2], Netra Patil[3]

[1,2]*Student, Dept. of Computer Engineering, Bharati Vidyapeeth Deemed to be University College of Engineering, Maharashtra, India*
[3]*Professor, Dept. of Computer Engineering, Bharati Vidyapeeth Deemed to be University College of Engineering, Maharashtra, India*

Abstract - *In this research, we implemented a smart covid basket. We use the following technologies: RFID, Bluetooth, Wi-Fi module and Arduino. The basic motivation behind the system is to present a proposal for the design and organization of a creative framework to get items on the market. This basket explores emerging cross-functional innovations and recognizable test advance scheduling (e.g. RFID, Bluetooth gesture control) as a way to enhance the management nature of retailers and expand customer self-esteem to save time and money. This smart basket is even more important in the context of the Covid pandemic, as it will be pre-equipped with gesture control, helping to maintain social distance by avoiding long lines and automatically sanitizing products.*

***Key Words*- RFID, Arduino, Bluetooth, Wi-fi Module**

1.INTRODUCTION

Since the birth of mankind, people have continued to create innovations to strengthen their needs. The fundamental reason for the development of innovation is the need for greater independence, which leads to improved tasks and makes supervision easier and faster. One important task that people put the most energy into is shopping. Shopping malls are places where people get daily necessities from daily necessities, clothing, motors, etc. Sometimes customers will encounter problems with unspecific data on reduced-price products and the abuse of excessive time at the counter. In this innovative world, every grocery store and supermarket uses a shopping cart with a specific end goal to help customers choose and store the items they want to buy. The customer usually buys the desired product and places it in the shopping cart, and then waits at the counter to pay the bill. Paying bills at the counter is a cumbersome and time-consuming process, adding to the crowds at the counter. A study by agencies in the US shows that under normal circumstances, people always spend 1.4 hours shopping. If the queue is too long, many customers will tend to line up. The current shopping environment can be divided into two categories:

(1) Personal purchases

(2) Absent purchases.

Away from shopping is supported from various angles, including online shopping, online shopping, etc. It is not necessary for the buyer to manually keep it on the counter. Due to different variables such as needs, comfort, brand, etc., personal purchases include personal phone calls at the place of purchase and selection of items. The proposed enthusiastic shopping cart framework program helps people shop, thereby minimizing shopping time. The usual time spent at the counter needs to be continuously changed to improve the nature of the customer's shopping experience. To overcome these problems and improve the current framework, we have written a shopping cart.

The basic motivation behind the system is to show the design and arrangement of innovative frameworks to obtain recommendations for goods on the market. This basket explores emerging multi-functional innovations and predetermined identifiable testing breakthroughs as a way to improve the nature of retailer management and expand customer respect, saving time and money. With this basket, an excellent opportunity will be developed to help customers by showing them the product catalogue and their respective costs. Therefore, this method helps the inventory management unit to instinctively update each product purchase. This smart shopping basket can make shopping easier, more convenient and more systematic

for customers, and it also makes the management of the store easier.

1.1 Bibliography Review

• Smart shopping cart is a smart shopping cart that uses an integrated chip with a barcode scanner and battery to allow users to self-adjust in the supermarket. The theme of this document is to reduce time consumption at the supermarket counter [1].

• The RFID system carries data on a suitable transponder (often called a tag) and retrieves the data in a machine-readable manner. Radiofrequency identification, an alternative to barcodes, uses small microchips on the label to store and transmit detailed data about the marked item. RFID has advantages over barcodes, such as the ability to store more data [2].

• However, emerging network technologies have changed this, and frameworks can now be developed to include all the flexibility and security necessary for embedded applications, such as RFID tag monitoring [3].

• The Smart Shopping Cart is an innovative shopping product designed to help shoppers get a quick shopping experience. The concept of this smart shopping cart will completely change every shopper's shopping experience. The RFID reader will be installed in the shopping cart, and it will automatically scan the products that enter the shopping cart. As the movement continues, ultrasonic sensors are also used to detect obstacles and measure the distance between them [4].

1.2 Problem Statement

Today, quite a few people use the market to protect most goods. Project procurement involves an unpredictable process involving time spent in aisles, project areas, and checkout lines. Consumers often encounter some problems and difficulties in the buying process. These problems include worrying that the money they bring in will not be enough to pay for all the items purchased and wasting a lot of time at the cashier. During COVID 19, people are concerned about long lines and want to save time and maintain social distancing.

2. GOALS

The main goals of this plan are:

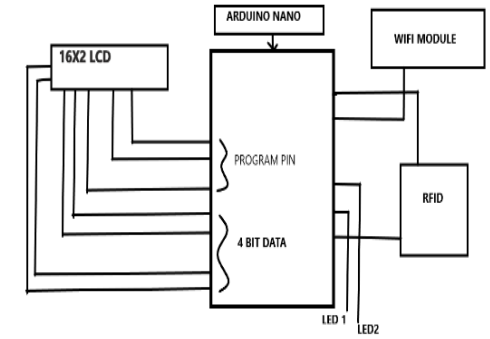
• Implement smart shopping carts with the help of RFID technology, and make impromptu purchases. The plan is to use RFID-related monitoring and implementation practices in the shopping cart.

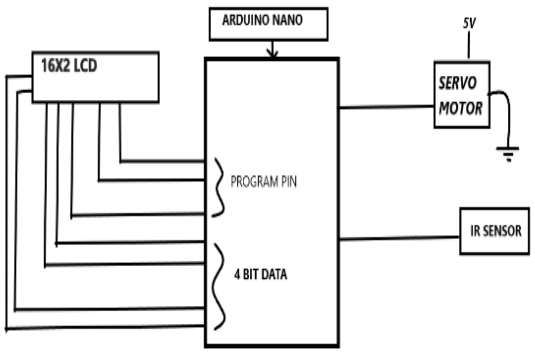
• In this plan, the RFID card is used as a protective input to purchase basic products in the shopping mall. If the product has been placed in the shopping cart, the price of the product will be displayed, so the total amount will be displayed. If we want to delete the product from the shopping cart, we can extract the product and the quantity of the specific product. It is deducted from the total amount.

• In this regard, the technology used is to obtain products, thereby promoting the safety and speed of shopping mall purchases. The technical goal of the problem we posed in the commercial complex is to apply RFID technology to instinctively identify the goods in the shopping cart and eliminate buyers who interfere with the purchase of goods and payment tasks.

• The main point of the proposed framework is to provide effortlessly oriented, effectively customized, and effective and feasible innovations to help people buy. With this help, you will save a lot of time at the check-in counter.

3. BLOCK DIAGRAM





3.1 Electronic Components

a. **ESP 8266 Module:** The Wi-Fi module is a standalone SOC with a built-in TCP / IP protocol stack, allowing any microcontroller to access your

Wi-Fi network. The module has sufficient onboard storage and processing capabilities to allow it to integrate with sensors and other application-specific devices via its GPIO, with minimal pre-development and minimal runtime burden. Its high degree of on-chip integration allows for a minimum of external circuitry, including front-end modules, which are designed to occupy the smallest PCB area. ESP8266 complies with APSD standards and is suitable for VoIP applications and Bluetooth coexistence interfaces. It includes a self-calibrating radio frequency that enables it to operate under all working conditions and does not require external radio frequency components.

b. **Arduino**: Arduino: Arduino Nano is a small, complete and compatible breadboard based on ATmega328 (Arduino Nano 3.x) or ATmega168 (Arduino Nano 2.x). It has more or less the same functions as Arduino Demilunes but in a different package. It just doesn't have a DC power connector, and you can use a Mini-USB cable instead of a standard cable. Nano is designed and produced by Gravitech.

c. **8-Bit Microcontroller**: This is a microcomputer. Like any computer, it has internal CPU, RAM, and IO interfaces. It is used for data analysis and control purposes.
Manufacturers include Microchip, Atmel, Intel, and analogue devices.

d. **LCD- 16X2**: 16X2 LCD-LCD screen is an electronic display module that uses liquid crystals to produce visible images. The 16×2 LCD screen is a very basic module commonly used in DIY and circuits. 16 × 2 is converted to display 16 characters on each of 2 lines. On this LCD screen, each character is displayed in a matrix of 5 × 7 pixels.

e. **RFID Tags**: RFID tags provide storage space for storing data. We use passive RFID tags and do not require any battery to provide any power. This is why passive RFID tags are much more efficient than active tags. When a passive RFID tag enters a series of electromagnetic waves generated by an RFID reader, the induction generates flux. Due to this flux in the coil, energy is generated in the chip.

f. **RFID Reader**: The RFID module can read and write Mifare tags and sell them in various online stores. The Microcontroller and card reader use SPI to communicate. The reader and the tag use a 13.56 MHz electromagnetic field for communication, and the working principle of the RFID reader is electromagnetic wave induction. The RFID reader emits electromagnetic waves through its built-in antenna to read RFID tag readings within a specific range of 060mm. As long as the product's RFID tag is within the range of the RFID reader, it reads the data stored in the RFID tags.

g. **Bluetooth**: The Bluetooth module can easily realize serial wireless data transmission. Its operating frequency is one of the most popular 2.4 GHz ISM frequency bands. Adopt the Bluetooth 2.0 + EDR standard. In Bluetooth 2.0, the signal transmission time of different devices is within 0.5 seconds, which can greatly reduce the workload of the Bluetooth chip and save more standby time for Bluetooth. The module is equipped with a serial interface, which is easy to use and simplifies the overall design/development cycle. When the module receives wireless data, it will send it through the serial interface exactly as it was received. HC06 will operate under a power supply voltage of 3.6VDC to 6VDC, but the logic level of the RDX pin is 3.3V and cannot withstand 5V. If you connect the sensor to 5V devices such as Arduino Uno, nano and Arduino Mega, it is recommended to use a logic level converter to protect the sensor.

h. **Servo Motor**: The servo motor has three wires: power, ground and signal. The power cord is usually red and should be connected to the 5V pin on the Arduino board. The ground wire is usually black or brown and must be connected to the ground pin on the board. These are used in the project to implement gesture control

3.2 Software Components

a) Android mobile application

Android application is a software application, it can only run on the Android operating system because the operating system Android is for mobile Equipment developed. A typical Android application is developed for a smartphone or tablet running on the Android operating system. The application is

installed on a device compatible with Android, which integrates the electronic circuit of the shopping cart.

b) Web-Based Supermarket Management System
A web-based application is also developed to control the data manipulation process at the cashier or admin side known as the Supermarket management system.

c) Arduino IDE
The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

4. WORKING METHODOLOGY

The customer places a product in the shopping basket at any time while shopping. The embedded electrical circuit, which includes an RFID reader, Arduino Uno, and Bluetooth modules, collects product information from RFID tags and transfers it to an Android mobile application. Customers can quickly interact with product details on mobile applications while also finishing their buying using Gesture control.

4.1 Algorithm

Step 1: Begin
Step 2: Begin the Procedure
Step 3: With the help of Gesture Control using Bluetooth and servo motor, the trolley begins to move alongside the passenger to the specified product location.
Step 4: Scanning the product with an RFID reader to determine the pricing.
Step 5: Using an LCD, show the additional price of the purchased items.
Step 6: A bill is generated for you automatically on the Remote XY mobile app.
Step 7: Pay the bill using multiple payment gateways.
Step 8: Now the products are ready for delivery.
Step 9: Stop

4.2 Implementation
Here we shall discuss, step by step, how we implemented our system:

1) Circuit Design
We utilized Dip Trace, a circuit design software, to create the circuit. Dip Trace is an open-source program that allows us to construct circuits quickly and easily.

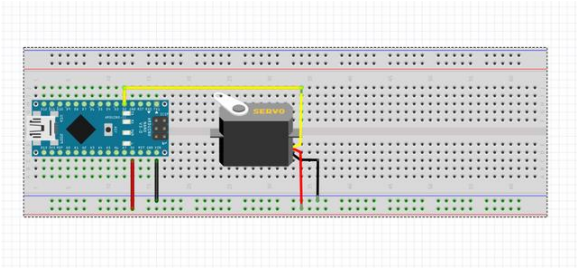
2) Construction of the Trolley Section
The LCD, Arduino, RFID reader, capacitors, buzzers, and other necessary components were utilized in this project. The Dip Trace design must next be turned into a physical circuit. The consumer will operate this trolley part, which will be put on the shopping cart or basket.

4.3 Arduino Setup

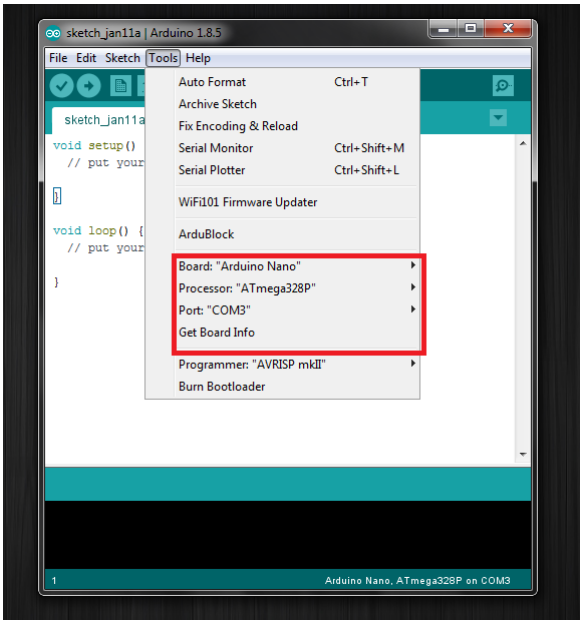
1) Motor (Gesture Control)

Step 1: Physical connection of the Servo Motor to Arduino Nano. Connect the following:

- Servo motor (GND) to Arduino nano (GND)
- Servo motor (VCC) to Arduino nano (VCC/+5v)
- Servo motor (Data In) to Arduino nano (Digital Pin 2)
- Arduino Nano to your laptop/pc



Step 2: Software connection for Arduino to Servo Motors: Open your Arduino IDE. Go to Tools and change your Board to Arduino Nano. Go to Port and select a port where your Arduino Nano is connected.



Once done programming your Arduino, click the Upload button to upload the codes to your Arduino Nano.

2) RFID automated billing system on a mobile app (RemoteXY in our case)

Step 1: RemoteXY select connection mode and include the library.

Step 2: Set Remote XY connection settings (such as wi-fi password, port, SSID, etc.)

Step 3: Configure a 'struct' inside RemoteXY. This structure defines all the variables of your control interface.

Step 4: End RemoteXY include

Step 5: Include the RFID library

Step 6: include the library code & create an instance of the RFID library

Step 7: initialize the library with the numbers of the interface pins for the LCD

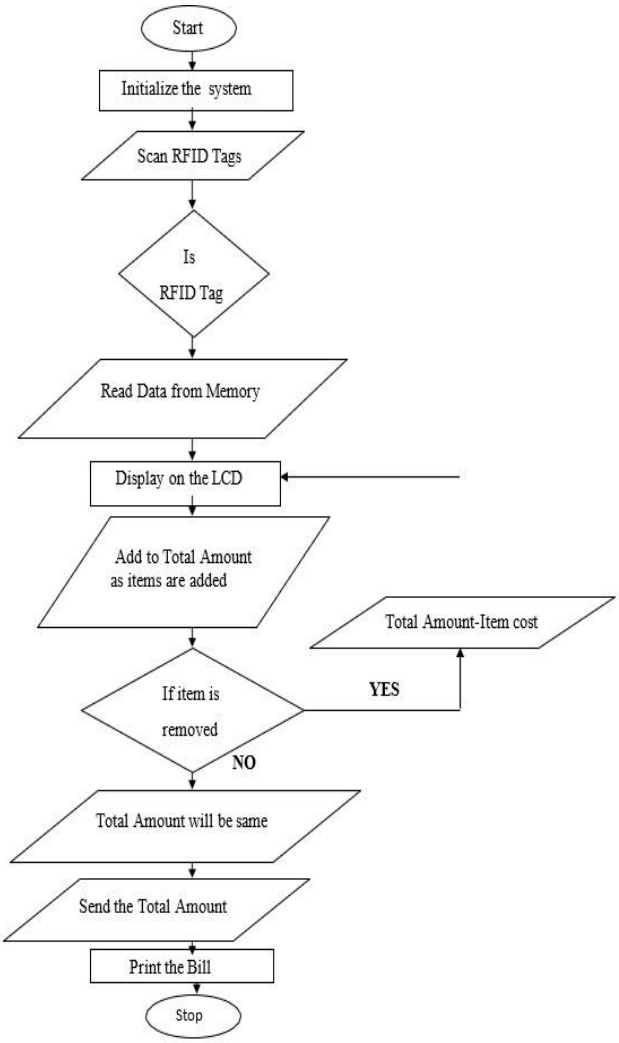
Step 8: Inside the void setup() setup todo code by enabling the SPI interface & initialize the RFID reader

Step 9: Inside the void loop() enter the serial print for products added

Step 10: Add an if condition to check and delete the product if the same RFID tag is pressed against the reader.

Step 11: Final step is using the RemoteXY structure for data transfer

5. FLOWCHART



6. RESULTS

After successful implementation of our Arduino code, we can see that our smart basket is ready to be deployed with working gesture controls using the servo motor and automatic addition, deletion and billing of items purchased using RFID reader, tags and RemoteXY app.

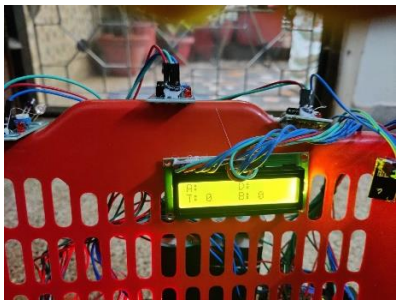
The output Screenshots are displayed below:

6.1 Hardware

(ICs with photodiodes, wi-fi module, Arduino nano powered by 3 batteries)

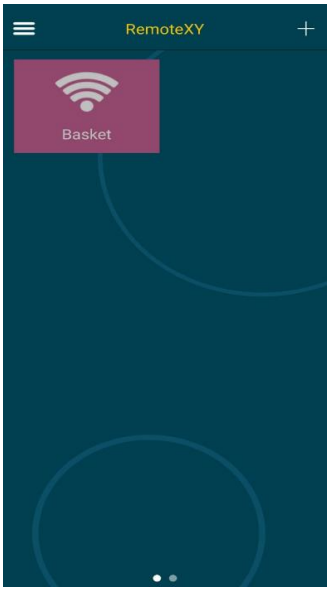
(RFID Tag reader)

(RFID Tags for various products)

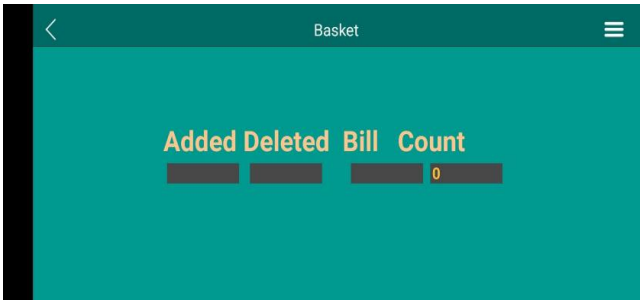


(LCD Display for bill connected to RFID)

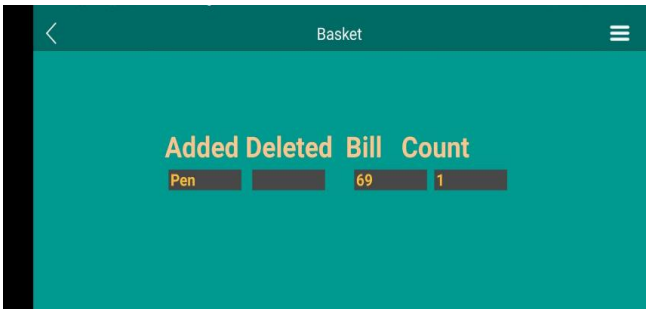
6.2 Software



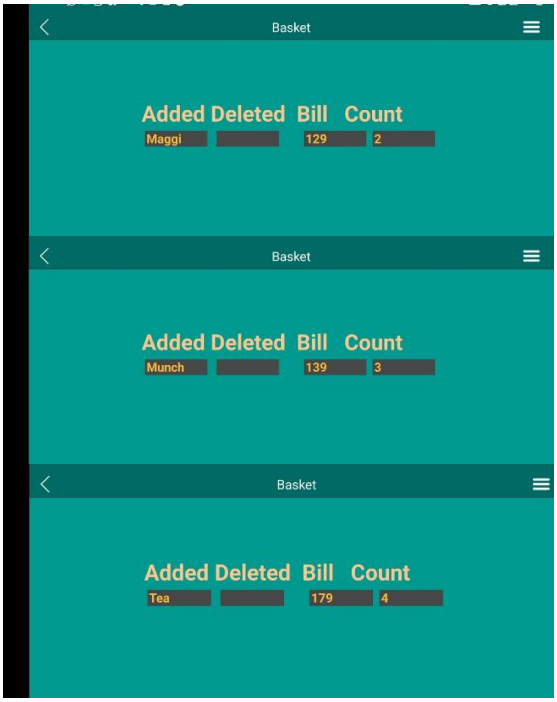
(Mobile App Interface)



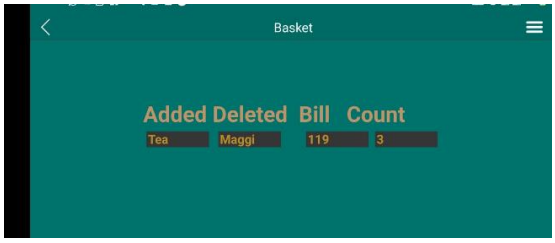
(Bill page interface before any item is added to cart)



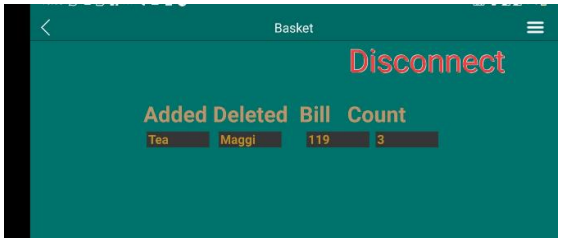
(Bill page interface after addition of a single item 'PEN' by touching RFID Pen tag to the RFID reader)



(Bill page interface after successful addition of 4 items)



(Bill page interface after successful deletion of one item 'Maggi')



(Bill interface If phone if RemoteXY is not connected to baskets wi-fi module)

6.3 Final Bill Display

(Final bill displayed on the LCD)

7. CONCLUSION

The progress of science and technology is a continuous process. The latest equipment and latest technology are being designed and developed. This application is used in shopping malls to help customers by saving a lot of time to buy basic products. In this project, RFID is used for secure access to items, which improves monitoring performance. This implementation launched an automated central billing system in shopping malls and supermarkets. With this, the buyer no longer needs to wait for the bill to be paid near the counter because the information of the purchased item is transmitted to the central billing unit. With this billing process, the speed has increased and it has become much simpler. In addition to this capability, the mechanism also ensures the identification of thefts caused by fraudulent consumers, which makes the system more reliable and attractive to both customers and sellers. This will make the shopping experience to a new level. The automatic weighing mechanism will reduce long lines and help maintain social distancing. Different variables such as item cost and item name are continuously displayed on the LCD screen installed on the trolley. Therefore, we can say that in the coming days, automatic billing of products through the use of RFID technology will be a more feasible option, thereby making the operation more concise and systematic.

8. RECOMMENDATIONS

Based on the research, the recommendations for further research are as follows:

• It can also be expanded by using more powerful RFID readers with a larger capacity to prevent more products in the car.

• More powerful and water-sensitive labels with more advanced features such as metal resistance and temperature resistance are being studied, which will be very useful in the future.

9. REFERENCES

[1] Suraj.S, Vishal Guruprasad, Udayagiri R Pranava, Preetham S Nag, "RFID Based Wireless Intelligent Cart Using ARM7," International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 8, 2016.

[2] Suryaprasad J, Praveen Kumar B O, Roopa D & Arjun A K, " A Novel Low-Cost Intelligent Shopping Cart," IEEE, 2014.

[3] Komal Ambekar, Vinayak Dhole, Supriya Sharma, "Smart Shopping Trolley Using RFID," International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume 4 Issue 10, 2015.

[4] K. Gogila Devi, T.A. Karthik, N. Kalai Selvi, K. Nandhini, S. Priya, "Smart Shopping Trolley Using RFID Based on IoT," International Journal of Innovative Research in Computer and Communication Engineering. Vol. 5, Issue 3, 2017.

[5] Amine Karmouche, Yassine Salih-Alj, "Aisle-level Scanning for Pervasive RFID based Shopping Applications" IEEE.

[6] Satish Kamble, Sachin Meshram, Rahul Thokal & Roshan Gakre, "Developing a Multitasking Shopping Trolley based on RFID Technology," International Journal of Soft Computing and Engineering (IJSCE), ISSN: 2231-2307, Volume-3, Issue-6, 2014.

[7] Chandrasekar. P, Ms T. Sangeetha, "Smart Shopping Cart with Automatic Central Billing System through RFID and ZigBee," IEEE, 2014.

[8] Tuneer Guha, Sarthak Kataria, Shivam Goel, Netra Patil (Autonomous Vehicle with Monocular Vision for Object Detection Using Haar-cascade Classifiers)

http://www.ijcst.com/vol8/8.2/ver2/38-tuneer-guha.pdf

[9] Netra Patil, Dr. Naveen Kumar Jayakumar (A Model for Predicting Type-II Diabetes Using Machine Learning Approach)
https://www.jetir.org/view?paper=JETIR1908657

[10] Netra S. Patil, Tanvir Panesar, Parth Shinde, Krati Saxena, Suraj U Rasal (Augmented Reality Based Construction Module for Floor Capacity Estimation) http://www.ijcstjournal.org/volume-5/issue-2/IJCST-V5I2P64.pdf

[11] Pritish Arora, Pratik Mali, Syed Ausaf Haider, Noor Mohammad Shaikh (Establishing Control using Hand Gestures) https://www.irjet.net/archives/V7/i5/IRJET-V7I51079.pdf