

Smart Trolley System

by

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BONAFIDE CERTIFICATE

Certified that this project report entitled “**Smart Trolley System**” is a bonafide work of **VIGHNESH M 18BEC1223, N.T. SRIHARI 18BEC1180, SUSHIL KUMAR B 18BEC1227, ANDREW JOHN 18BEC1278, R VIGNESH 18BEC1064, ABINESH VEL S 18BEC1340, and PRAMOD K 18BEC1257** who carried out the project work under my supervision and guidance for **ECE3999 - Technical Answers for Real World Problems.**

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ABSTRACT

This past year has been severe for everyone. With the pandemic meddling with our lives, we have all faced so many issues all around, But most of it zeroes down to one particular issue- Everyday requirements for sustainability. We have struggled so much to get common commodities like food and grocery, required to stay alive.

The Solution that we are planning to implement is a smart shopping system which can be of great use in supermarkets and other shopping centres. It also comes in very handy during tough times, as it doesn't involve many human interactions. It also reduces the difficulties faced by the customers.

Waiting in long queues at the payment counter, calculating the total cost of the items taken, etc. That's a lot of hassle to deal with for purchasing groceries. We, thereby with this project, provide a swift and secure shopping experience. The customers can quickly scan the items via the RFID. And the scanned product is automatically displayed on a webpage, allowing the customer to edit or delete the product from their cart.

At the end of their shopping, the customer can pay the total expense by following through with the checkout option on the web page using a secure payment gateway that provides various types of payment options. Thereby, Providing an ample solution to the woes of both the shopkeeper and the customer.

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We also take this opportunity to thank all the faculty of the School for their support and their wisdom imparted to us throughout the course.

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VIGNESH M



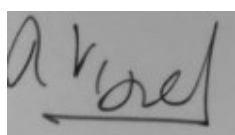
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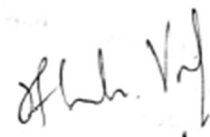
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ANDREW



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CHAPTER I

Introduction

Malls and supermarkets are a big corner for customers to purchase the daily requirement like branded food items, cloth materials, electric and electronic devices etc. We can see a huge crowd in these places especially during weekends. The major problem faced by the customers is the need to wait in a long queue for payment in these supermarkets regardless of what product they buy and how much they buy. This is because the cashier scans each product using a barcode reader only at the bill counter which is a time consuming process and leads to customer dissatisfaction.

To overcome these problems, we provide a technical solution by building a smart shopping cart with an automatic billing system that not only reduces the waiting time of the customers but also makes the process very smooth and easy.

We have built a smart trolley using Internet of Things (IOT) technology. Here we use RFID tags to scan the products the customer purchases and NodeMCU controller to calculate the bill amount. We have created a user interactive website through which the customers check what products they purchase and also automatically pay the bill through Razorpay which ensures safe payment.

This eliminates the traditional scanning of products at the counter and in turn speeds up the entire process of shopping, also with this system the customer shall know the total amount to be paid and hence can accordingly plan his shopping only buying the essential commodities resulting in enhanced savings. Also the system has a feature to delete the scanned products by customer to further optimize the shopping experience. Since the entire process of billing is automated it reduces the possibility of human error substantially.

CHAPTER II

Literature Survey

In *Smart Trolley in Mega Mall*, Awati *et al.* [1], there was no need to pull heavy trolleys, no necessity to wait in the billing queue and no requirement to think about the budget. The microcontroller based trolley automatically follows the customer. Also it maintains safe distance between the customer and itself. It gives the number of products in the trolley and total cost of the products on the spot. It has facilities like trolley stopping, turning right or left. Overall, it could successfully implement the concept of Automatic trolley effortlessly. Moving on to *Automated Shopping Trolley for Super Market Billing System* done by Sainath *et al.* [2] their proposed system was an Automated Shopping Trolley which is a Smart Trolley that integrates a Raspberry Pi Embedded Chip with two Bar code Scanners and a Battery kit to allow users to self checkout at Super Markets. The main objective of the proposed system was to reduce and eliminate the time taken in billing counters in supermarkets by designing an Intelligent Shopping Basket which uses Barcode scanners to allow users to self-checkout and increase productivity time. In *RFID Based Smart Trolley for Automatic Billing System*, Rachana *et al.* [3] proposed a system that has RFID based shopping and billing system. Each and every product in the shop will have an RFID tag attached to it. Each Cart will be fitted with the RFID reader, LCD display, and Zig-Bee trans-receiver implemented on it. There was a Centralized Server System. After the payment of cash, the Cart must get reset. If the product is removed, it gets deleted from the bill too. When a customer with the cart enters a shopping aisle, the cart is brought in range of the IR Receiver and the microcontroller checks for the aisle information code. The aisle information code is transmitted over the Transmitter and Receiver wireless from the cart to the server. The received information is stored in the EEPROM present on the cart. Every product has an RFID tag which contains a Unique ID. These ID's are fed in the database assigned to the corresponding products. If there needs to be a purchase done, then that product can be dropped in the cart where the RFID reader reads the tag. The information of the product is extracted and displayed on the LCD screen. At the same time billing information is also updated. Upon exit of the aisle, the aisle info is sent to the server along with details of purchase. Server will store the required information in the database. These steps are repeated until and unless the shopping button is pressed at the end. Once the "Complete" button was pressed there's an option provided to end the shopping with the same products or to delete

some of the products from the cart. This all processes the customer choice. At the end of shopping, the customer can straight away pay the bill and leave. Inventory status of the products is also updated at the end of shopping.

Nextly, the system proposed by Anjali *et al.* [4] in *RFID Based Smart Trolley for Supermarket Automation* has an automated shopping cart system that integrates a shopping cart with 2 sets of barcode scanners placed at 2 different checkpoints – the entry and exit points respectively. It facilitates the user to self-scan the barcode of the purchased products which he intends to purchase. Wrongful entries can be corrected by making use of a keypad that changes the functionality of the machine from addition of products to removal of products and activates the other barcode scanner at the opposite end. A wireless smart-device makes note of all the scanned commodities of the particular trolley (with allotment number); and is linked with the Supermarket's backend database which contains details of the products such as cost price and available stock. The scanned products are automatically billed in the wireless smart device for their purchases, thereby significantly reducing turnaround time and reducing and transmitted to the shop's central billing program. In *Smart Shopping Trolley Using RFID*, proposed by Sivagurunathan *et al.* [5], where after a customer takes a trolley, every last trolley is joined with a scanner tag per user and a RFID per user. When the customer buys a thing, the customer must be examining the thing first with the help of standardized tags available in each item using the RFID per user. An IR sensor checks for the items coming inside and going outside of the trolley. If an item is removed from the trolley, it reduces its price from the aggregate price. The total price is sent to the billing system. The customer just types the name of the product he/she wants to purchase on an android device. The trolley will automatically guide them to the location of the product.

Moving on to *Robust low-cost passive UHF RFID based smart shopping trolleys* done by Juan Carlos Lugo Marin *et al* [6] . This paper talks about the successful use of the UHF RFID system for the smart shopping trolley. In this project UHF RFID tags are used in both near field or far field applications which is useful in reading items close to the antenna and also from a considerable distance. The product allows the customer to scan and detect the items irrespective of its tag orientation, size and shape. It is very cost effective as it makes use of UHF RFID which is much cheaper than a barcode scanner.

Following with *Smart Trolley Shopping System* done by Chavan *et al.* [7], The proposed system uses RFID technology which is way more effective than the already existing barcode ones. This was implemented efficiently by using the smart shopping trolley system that has two parts. One, the trolley in itself. Two, a master server. The server contains all the information about the products present in the shop and information about the customers who are using the trolley. The trolley has an LCD that displays all the information about the product that they are scanning. And this product can be anything since the RFID tag is compatible with anything. This information is shown on the server as well. At the end of their shopping, the customers can check their total bill with the server after the admin verifies the bill. So this becomes a win-win situation for both the customer and the shopkeeper. This ensures safety and also reduces time significantly. Next, the system proposed by Sahana *et al.* [8] in *Smart Trolley System for Automated Billing using RFID and IoT*. In this proposed paper, a secure smart shopping system utilizing RFID technology is employed in enhancing shopping experiences and security issues. The smart shelves are able to monitor the items on the shelves by reading the RFID signals from the tags. The smart carts are able to read and retrieve information of the items inside the carts and finally, the checkout points can validate the purchase made by a customer.

Moving on to *Sensor based integrated smart trolley systems using Zigbee-experimental analysis* by N. Divya *et al* [9]. In this project they have designed a smart trolley which is used to automate the billing process using RFID technology. The trolley consists of an electronic display and RFID reader which scans and displays the products purchased and calculates the bill amount. Then the bill amount is transferred to the cashier at the bill counter through the zigbee wifi module. This reduces the time of the billing process as no item needs to be scanned. the customer just has to pay the amount and depart.

Finally, we come to the system proposed by Sunil Kumar *et al* in *Smart Trolley using Smart Phone and Arduino* [10]. In this project, a RFID tag is attached to the membership card of the customer which is provided by the supermarket to their regular customers. There is a RFID Reader attached to the shopping trolley which detects the presence of regular customers. Then the customer is required to scan the products through the barcode scanner present in the smartphone. The prices of each product is displayed in the LCD unit attached to the trolley as and when the customer scans the product on the phone. Then after pressing the exit button present in the trolley the final bill is transferred to the computer through

the wifi module to the bill counter where the customer just pays off the bill and exits.

CHAPTER III

Field Survey

➤ Questionnaire for the Customer

SMART TROLLEY WITH IoT - Customer

Smart Trolley System comes in with an input scanner with which you can automatically scan your items then and there. And finally, once you are done with shopping, you'll be redirected to a webpage that'll display all the items that you have bought, there you can edit the list, either adding stuff or decreasing stuff. Also you can pay your bill directly through card or through other possible payment options. Therefore reducing the hassle of standing in queues and wasting time.

What do you think about this project if it is about to be practically implemented? Please share your views so that we can build the product with educated moves that caters the practical needs.

* Required

63 responses



Accepting responses ☒

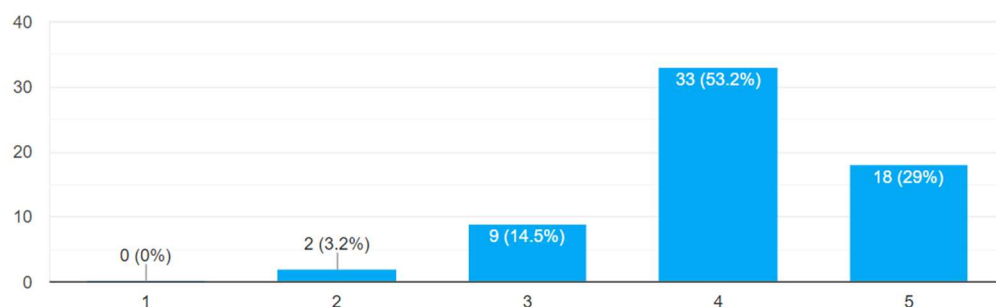
Summary

Question

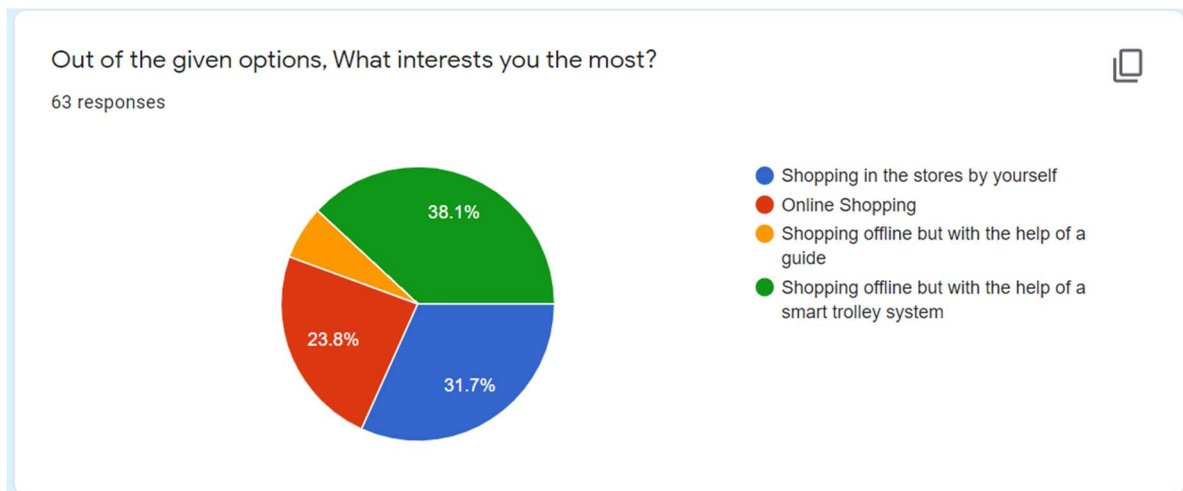
Individual

On a scale of 1-5, How necessary is smart and swift shopping is for you?

62 responses



We can clearly infer that a really good amount of people welcome smart and swift shopping in this current fast moving world and there is a scope for the smart trolley we propose in this project.

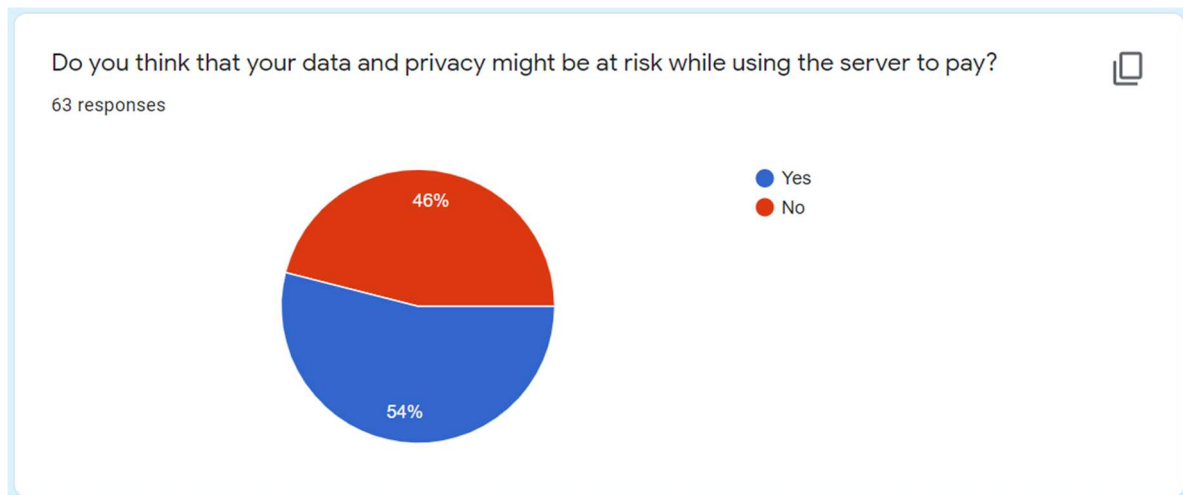


Out of the given pie chart, it is evident that people in general prefer offline shopping and more than half of the replies received reflect that where either they prefer shopping by themselves or with the help of a smart trolley. The rest of the chart contains about a little more than fifth for online shopping and the little bit is left off for the shopping experience aided by a guide at the shop.

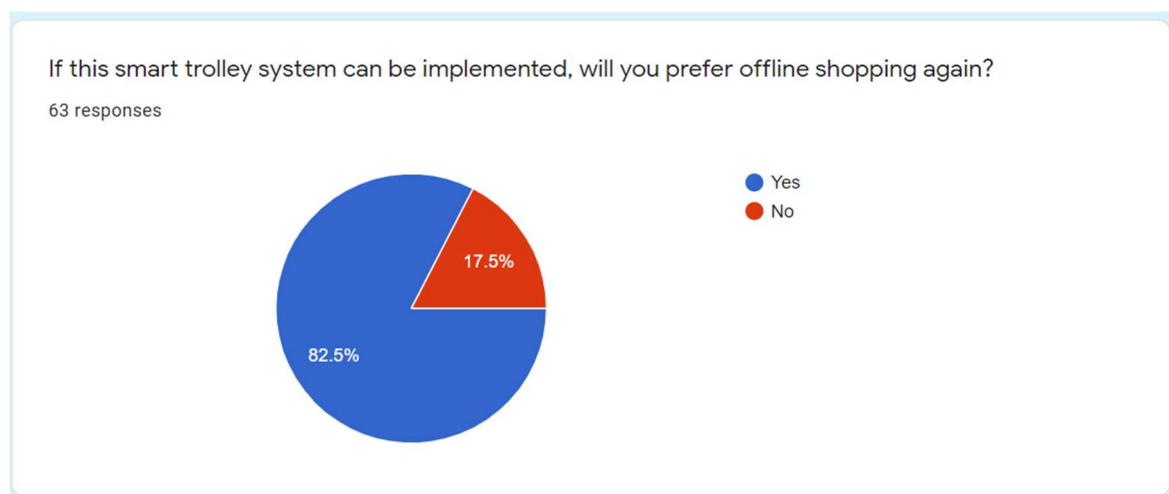


We can see that people do prefer online shopping where if we sum the 4th and 5th category and compare that to the 1st and 2nd category, there is a significant amount of difference of people who prefer online shopping and the

3rd category shows that people want a bit of online as well as offline shopping experience.



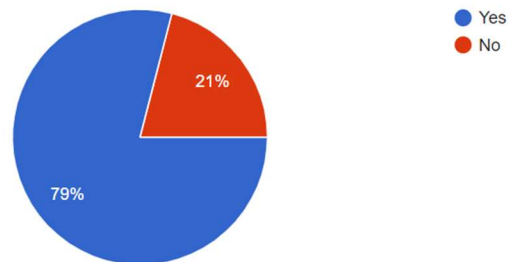
People are concerned about the data security and privacy risks, but that is natural and sometimes a local area network used at a supermarket or an intranet used over the place will reduce the risks by a significant amount. So the customers needn't worry about security risks and we could see that the 46% will also go down once security is assured.



We have got an overwhelming response to this particular snippet of the form where people do want to shop offline and 2 of the reasons might be, one, staying at their homes because of the Covid-19's pandemic amongst us and two, to explore something new at their shopping centers, which gives a real thrill.

Do you think that your shopping experience might change, that is, will you spend more time browsing through products using this smart trolley system?

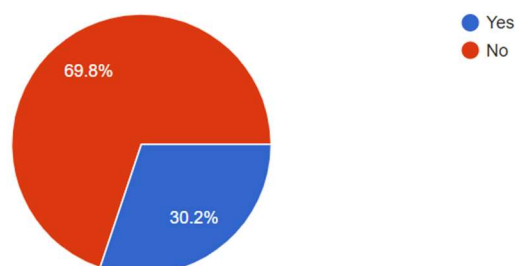
62 responses



Similarly, we have also got an overwhelming response to this particular snippet of the form too. where people will use the smart trolley's UI that helps them to purchase their products more efficiently knowing the basic information of their product, expiration date etc.

Do you prefer a guide to help you with your shopping experience?

63 responses



While wrapping up the google form, this question had to be asked and as we can see people do not really prefer a guide to whatever personal reasons they might have. But this breeds the doubt as to what happens to the livelihoods of those guides and what happens to their job?

Yes, and for this we have got an answer which address their importance of their job and not losing it over something smart and that is, the same guide can move over to the service and maintenance department of the smart trolley and keep in check of the wellbeing of the smart trolley and thus the guide has to learn a couple of extra things for which they will be compensated. Hence, from the above questionnaire, the customers welcome a smart shopping experience that is brought by the Smart Trolley proposed in this project.

➤ Questionnaire for the Shopkeeper

SMART TROLLEY WITH IoT - Shopkeeper

What do you think about this project if it were product? Please share your views so that we can build the product with educated moves that caters the practical needs.

* Required

12 responses



Accepting responses



Summary

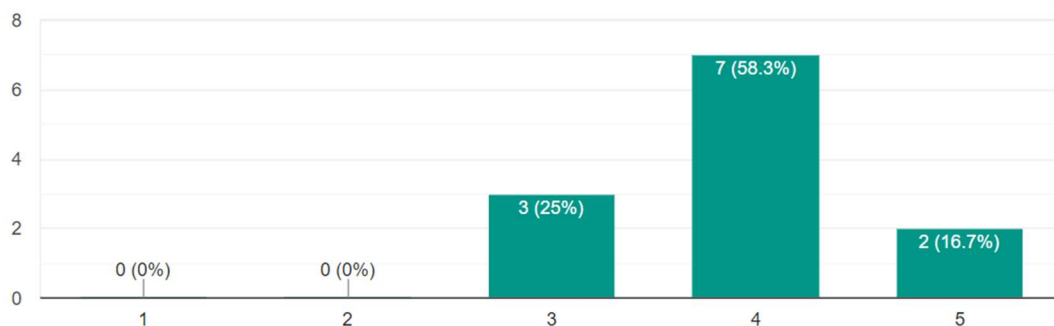
Question

Individual

Have you ever wished for all your works to be done laborless?



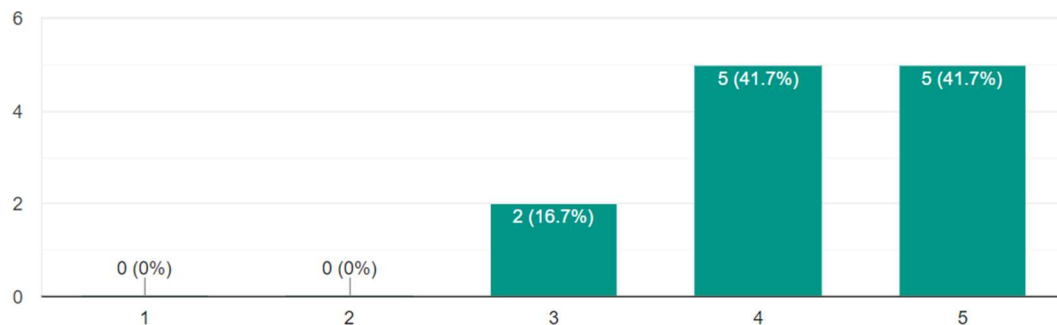
12 responses



Most of us would like automation in today's world . This gets reflected in our survey where we notice that around 58.3 % of the shopkeepers wish their work to be done laborless which saves time and human effort also.

How assertive are you that this smart shopping system will attract your customer and make him/her visit your shop more regularly?

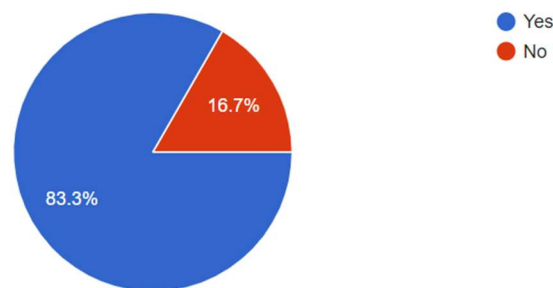
12 responses



We can notice that around 80 % of shopkeepers believe that any new innovation which improves the experience of shopping would definitely attract customers and increase their profits as well. They are ready to adapt to the smart trolley system and increase the standards of shopping.

Do you think the trolley acquisition cost is easily manageable than your labor acquisition cost given that the electronic products might require frequent servicing?

12 responses

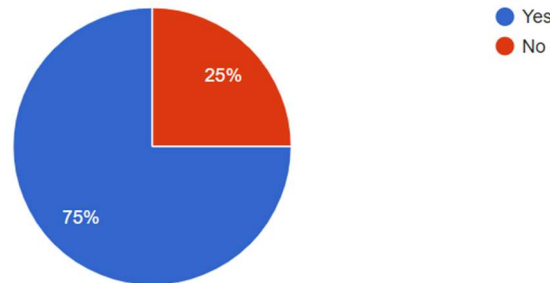


From the graph we infer that the majority of the shopkeepers believe that the maintenance of our smart trolley is cheaper than labor acquisition cost. Hence our smart trolley reduces the human effort in a cost effective manner.

Do you think that all your customers will be able to catch up with the technical aspects involved in these trolleys?



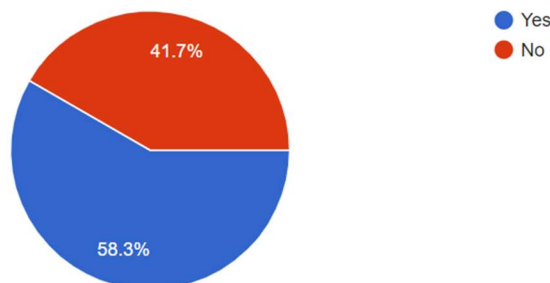
12 responses



Nowadays since everyone is easily accessible to smartphones and android applications, coping up with the technical aspects involved in these smart trolleys would not be a big problem. As we can see from the graph this is the perception of 75% of the shopkeepers towards smart shopping and they are ready to invest in our product .

Do you think if the smart trolleys are in use, will the livelihood of laborers be affected?

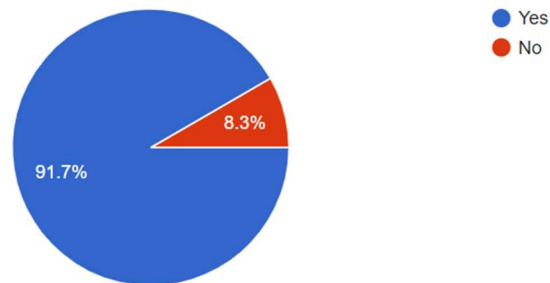
12 responses



As we can notice from the above graph, there are two sides of opinion towards the impact of smart trolleys on the livelihood of the labourers. Around 42 % of the shopkeepers believe that smart shopping can increase unemployment and also affect the livelihood of the labourers who are currently working in their shops whereas the other side of the shopkeepers believe that they still need workers to arrange the products, to maintain a record on the stocks of every product etc.. They believe that the introduction of smart trolleys would not affect the employment of labourers in the shop.

Will you be able to manage an equilibrium between your working labor and the smart trolley system

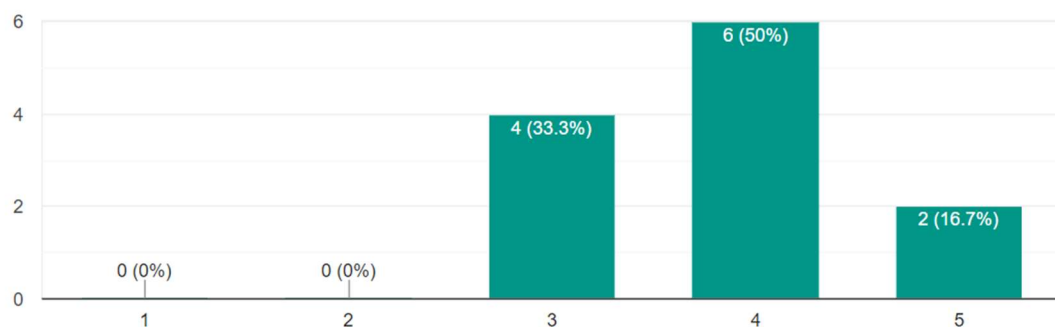
12 responses



Yes, maintaining equilibrium between the working labour and the smart trolley system is quite easy and 90% of the shopkeepers strongly agree with this.

On a scale of 1-5, How profitable do you think this smart trolley system is?

12 responses



After analyzing several aspects of the implementation of the smart trolley system in real time, we are able to see that around 40% of the shopkeepers are quite not satisfied with some aspects of the smart trolley and they find it less profitable whereas around 60 % of the shopkeepers find it more profitable and are ready to launch this soon in their shops

CHAPTER IV

Methodologies and Implementation

4.1 Hardware Components used:

ESP8266 NodeMCU x 1 -

NodeMCU is an open-source Lua based firmware and development board specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. controlling unit which contains the information regarding the products, calculates the bill amount and sends to LCD for display

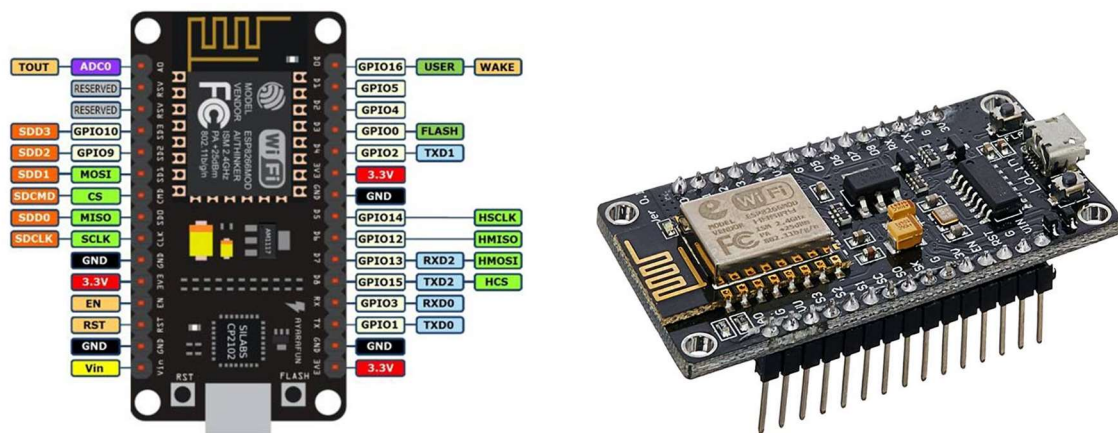


Fig-1: NodeMCU ESP9266

Specification and Features of ESP8266 NodeMCU:

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1, SPIs: 1 & I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CP2102 is included onboard, Enabling Plug n Play
- PCB Antenna

EM18 RFID Reader Module x 1 & RFID Tags -

To transmit and receive radio waves in order to communicate with RFID tags
Used to read RFID tags. EM18 RFID Reader is a module which reads the ID information stored in RFID TAGS. This ID information is unique for every TAG which cannot be copied.

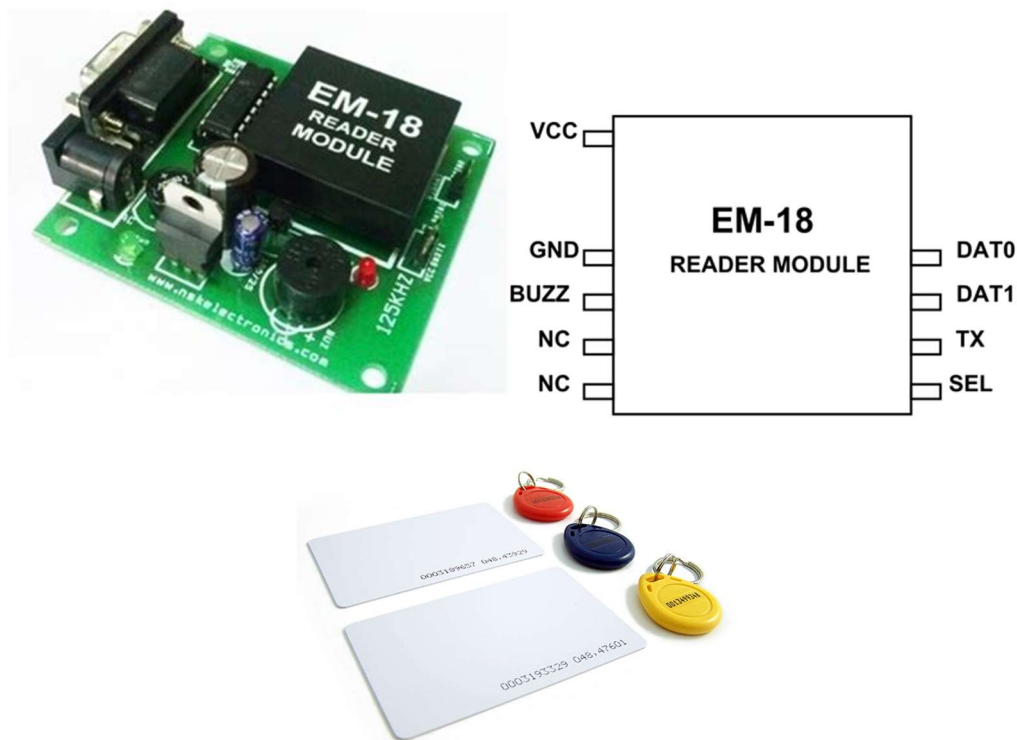


Fig-2: EM-18 Reader Module and RFID Tags

Specification and Features of ESP8266 NodeMCU:

- Operating voltage of EM-18: +4.5V to +5.5V
- Current consumption: 50mA
- Can operate on LOW power
- Operating temperature: 0°C to +80°C
- Operating frequency: 125KHz
- Communication parameter: 9600bps
- Reading distance: 10cm, depending on TAG
- Integrated Antenna

4.2 Software Components / OS used:

XAMPP - Modules : Apache and MySQL -

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.



Arduino IDE for Hardware -

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.



IDE - Visual Studio and Studio Code -

Visual Studio Code is a freeware source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git.



Language (Website) :

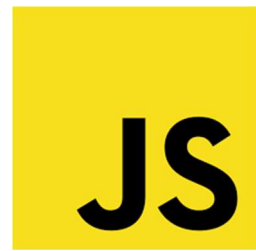
1) HTML (Hypertext Markup Language) - The language for building web pages, The HyperText Markup Language, or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets and scripting languages such as JavaScript.



2) CSS (Cascading Style Sheets) - The language for styling web pages, Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.



3) JS (JavaScript) - The language for programming web pages, JavaScript, often abbreviated as JS, is a programming language that conforms to the ECMAScript specification. JavaScript is high-level, often just-in-time compiled, and multi-paradigm. It has curly-bracket syntax, dynamic typing, prototype-based object-orientation, and first-class functions.



4) PHP (Hypertext Preprocessor) - A web server programming language, PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, and even build entire e-commerce sites. It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.



Language (Hardware) : C++ - C++ is a general-purpose programming language created by Bjarne Stroustrup as an extension of the C programming language, or "C with Classes".



4.3 Block Diagram of Complete System:

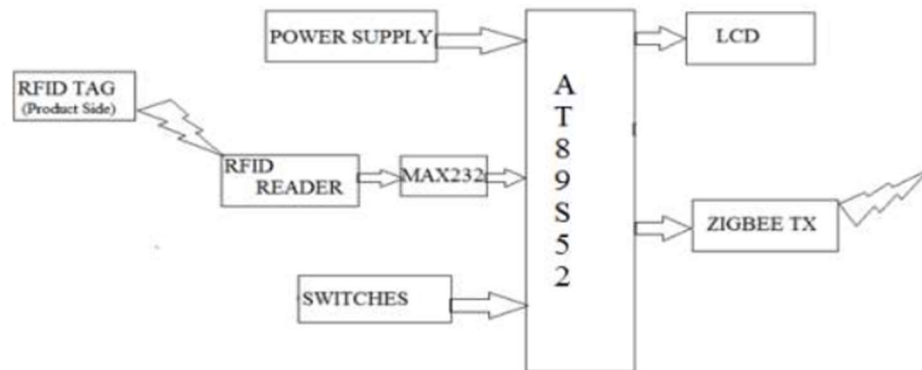


Fig-3: Block Diagram of Prototype Implementation

4.4 Flow Chart of the Software:

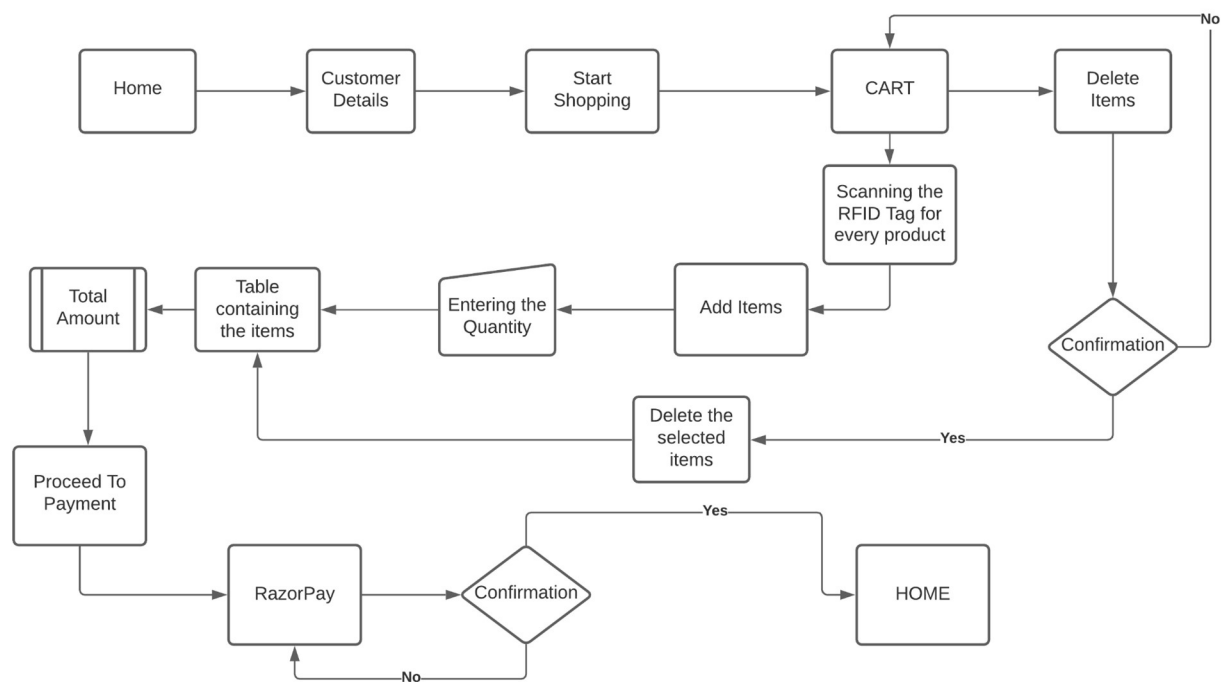


Fig-4: Complete Flowchart of the Software System

4.5 Front End Implementation:

Frontend is the side where the user interacts with the UI. We made sure in every step whether the user interface is intuitive enough and has ease of use for both our young shoppers who are well versed with technology and the older generation who are not much well versed with technology. We made sure that the shopping experience is rich and interactive so that the customer shop with ease and checkout easier. Welcome to RansomeWhere Shoppe.

For the front-end development of our project, we have designed a website from scratch using HTML, CSS and Javascript. Every file has PHP elements and the CSS files are linked to the respective HTML files.

The first page that the user sees is the welcome page that has a carousel of pictures about the shop and has a navigation bar that has links to different pages including a link to start shopping. The navigation bar is common to all the pages.

If the customer wants to start shopping, he/she clicks on the **Start Shopping** button and it takes them to a form. The customer must fill the form in order to proceed to the shopping cart. The customer can add the items that he/she wants to add and proceed to checkout by paying with **Razorpay**. Once the shopping is done, the administrator (the shop owner), can click on the admin button to give in their credentials in order to reset the cart.

Clicking on the **RW** button redirects to the same homepage. Clicking on the **About** button goes to the about us page that has a brief description of our shop and a link that redirects to the shopping cart. The page also has our contact details and the shop location for the customer to reach out to us if there are any discrepancies.

4.6 Back End Implementation:

As far as back-end development is concerned, we have decided on the back-end operations using PHP and Mysql. We designed several PHP files for various functions, we will discuss them here.

As a shopkeeper, he/she is required to keep a record of who purchases from his/her store, just in case of larceny or if one of the customers doesn't pay for a certain product, he will have the facility to contact the customer. Thus, we engendered a form for the customer to enter their contact details like mobile number and email, along with their name afore accessing the cart page of the website.

Our main goal is to update the cart utilizing RFID tags and scanner readings, the database will have all the products listed in the store, it can be updated only by the admin or the shopkeeper. So, once the database is yare, the utilizer will be allotted a separate table, so that other customer's products don't get mix-matched. Once the utilizer scans the RFID Tag utilizing the RFID scanner, the node-MCU receives the reading of the RFID tag, then transfers the RFID key to the PHP script through POST method HTTP protocol. The RFID key is sent every 5 secs, as the utilizer will scan more than 1 RFID tag in less than 1 min. It was designed to ascertain, we don't miss any tag that the utilizer scans.

The PHP script received the RFID key along with an API key, API key is to identify the right database table in which the item needs to be recorded, additionally to engender a secure connection between Arduino and the website. The RFID key is cross-checked with the shopkeeper's products list; this list already has pre-defined RFID keys for each product. If the RFID Key, we received matches with one of the RFID keys in the shopkeeper's products table. We extract all the data from that table and replicate the whole row of data to the customer's products table which is exhibited on the website for the utilizer to view.

Cart is designed in such a way that it updates itself only when the utilizer presses the refresh button present in the cart. What precisely the button does is, It refreshes the cart.php page again, the PHP is scripted in such a way that, when the cart is refreshed, the PHP file will connect with the SQL database and optically discern if it contains any extra data or any changes that occurred in the customer's products table. It will print the new customer's products table in the website table.

Instead of asking the user to scan the card again and again to increase the quantity of the products. We have created a button for the user to add the number of the

quantity they need for a certain product by just entering the number on the website through a text box, thus making it a really easy process, as everyone is aware of how exactly text box works, once they hit confirm, the customer's product table will be updated with the quantity they enter and it will be shown in the cart page of the website.

A dedicated delete button is created by use, to simplify the process of deleting a specific product they don't require in their cart. This button is present beside every row so that users need to choose which row they want to delete and press the button which is present beside it. Once they press it, this will initiate a process to delete that specific row from the customer's products table and will refresh the table for the user to see their updated cart.

Once the customer completes the shopping, the page will show the total amount they need to pay to the shopkeeper for the products they purchased for. So for this, instead of standing in a line for paying the amount, we have integrated the Razorpay payment gateway. The user can use any mode of transaction method from credit and debit cards, UPI, and bank transactions to pay the amount to the shopkeeper. Once the payment is successful, the user will get a receipt for their payment in their mail. Thus, we believe this will facilitate the customer to have the interest to purchase in a shop in a peaceful manner. All the payment processes and refund processes will be taken care of by the Razorpay portal.

All the shopping process and payment process is done, then the customer needs to show the list and get it verified by one of the shop attendees to make sure they have paid for all the products they have purchased for. Once it is done, the shop attendees will enter the admin's username and password to clear the whole customer's table before leaving the shop.

We have also designed a form for the customer to use for contacting the shopkeepers if any disputes occurred during or after shopping in the store. All the queries can be entered along with the name and contact details in that form, those details will be sent to the shopkeeper's mail id or phone, they will get back to the customer within 48 hours, to resolve those queries.

4.7 Arduino Implementation for Hardware:

We have used Embedded C programming for Node-MCU. We have coded the Node MCU to connect to the WiFi immediately once the power supply is given. Then read the RFID tag every 5 secs and We have also used the HTTP library in the code. Which is used for initiating the HTTP protocol and uses one of the Methods, called POST. Which is a Method under HTTP protocol.

We have coded in such a way that whenever a transfer happens it sends a unique API key which is used to identify which Node-MCU the website is talking to. We made an acknowledgement system so that we can do error analysis if anything goes wrong. We get HTTP prebuilt error codes and success codes like 200, -1,-2, etc. These are the functions of the Node-MCU we are using in this specific project.

CHAPTER V

Results

Prototype Hardware of RFID Scanner and Receiver:

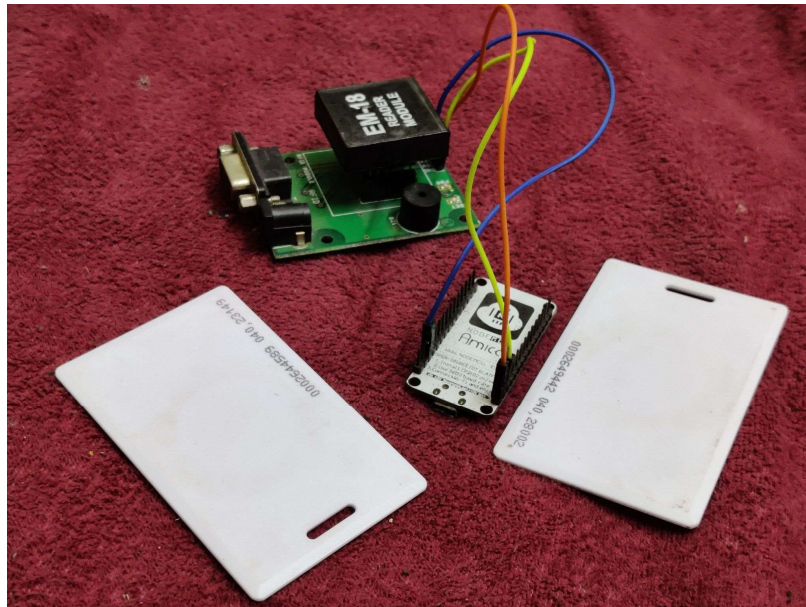


Fig-5: RFID EM-18 Module

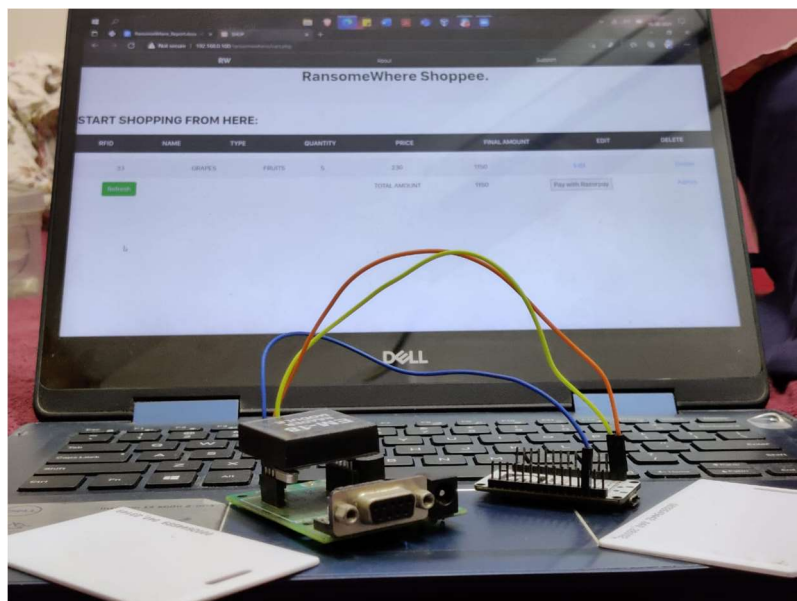


Fig-6: Prototype of RFID along with UI Interface

Complete Website Implementation (Front - End):

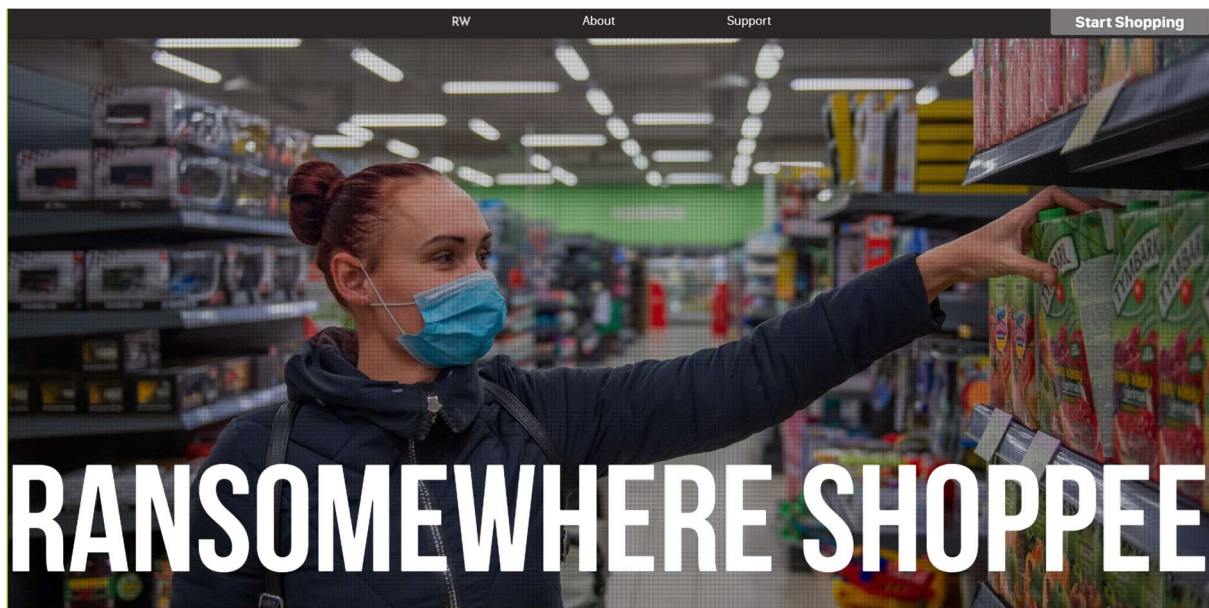


Fig-7: Homepage of RansomWhere Shoppe

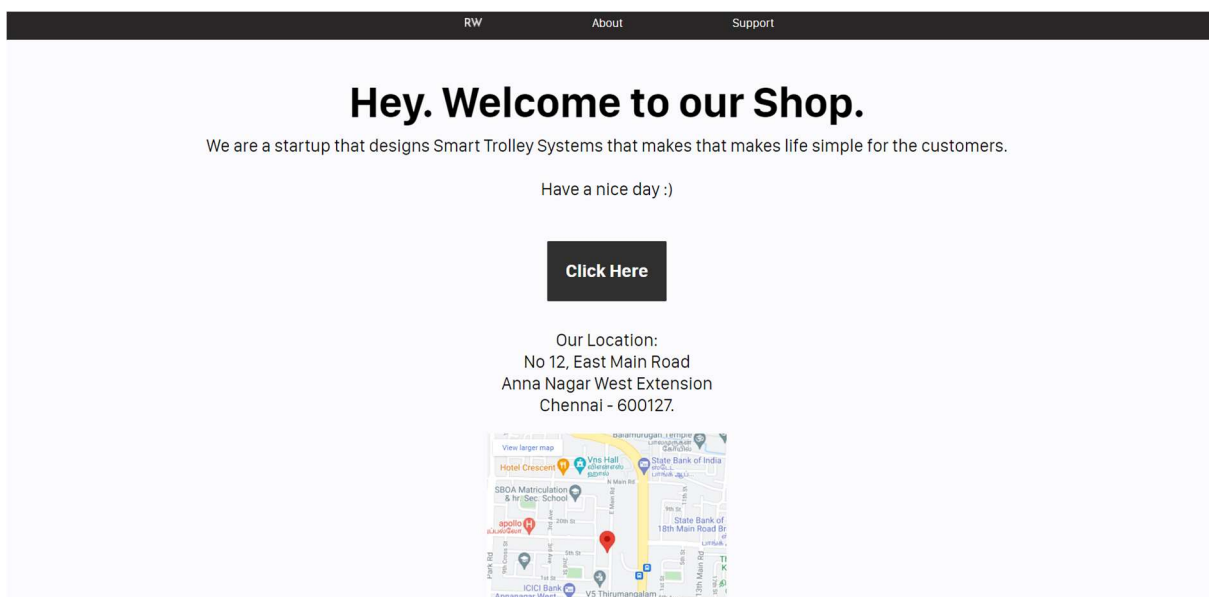
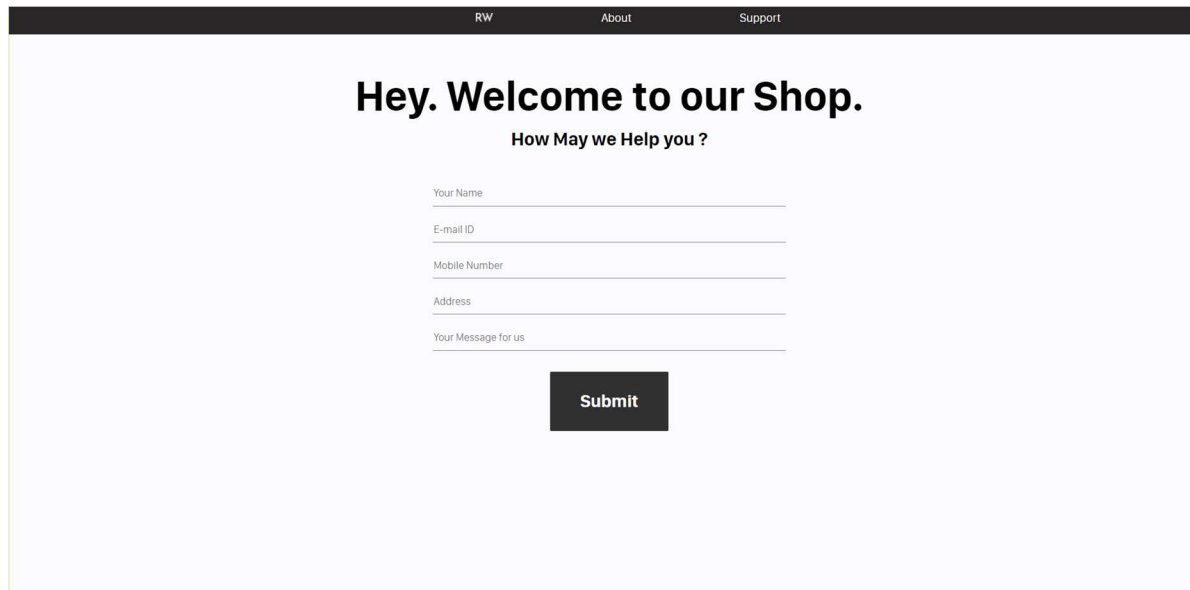
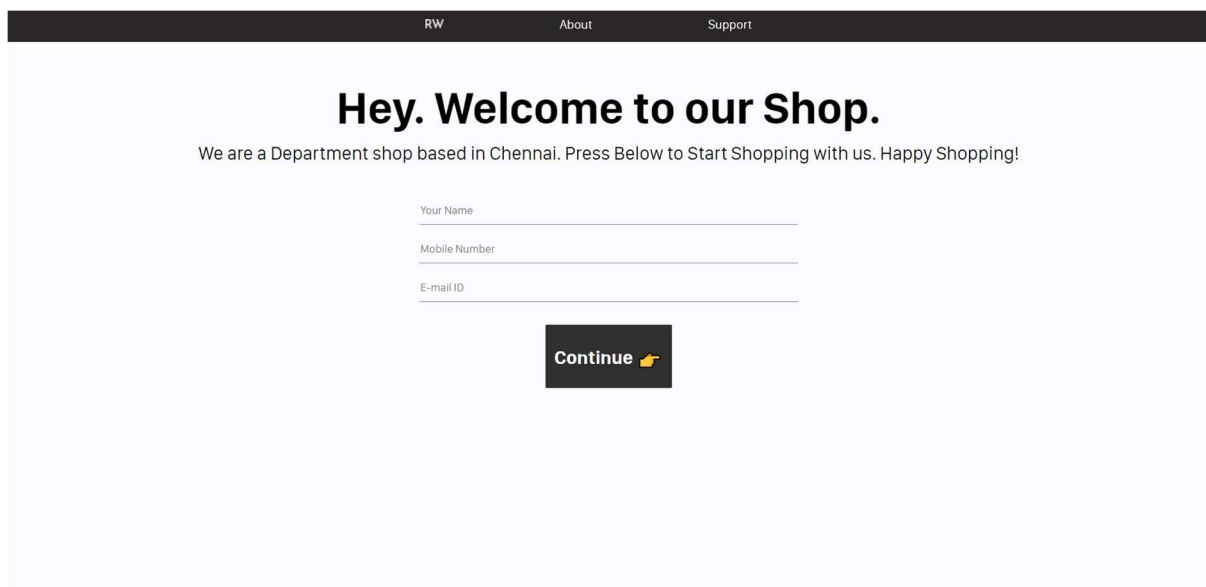


Fig-8: About Page and Location of RansomWhere Shoppe



The image shows a web page with a dark header containing links for 'RW', 'About', and 'Support'. The main content area has a light purple background. It features a large heading 'Hey. Welcome to our Shop.' followed by the subheading 'How May we Help you ?'. Below this, there are five input fields labeled 'Your Name', 'E-mail ID', 'Mobile Number', 'Address', and 'Your Message for us'. A dark 'Submit' button is positioned at the bottom of the form.

Fig-9: Help Page of the Customer who uses the Smart Trolley



The image shows a web page with a dark header containing links for 'RW', 'About', and 'Support'. The main content area has a light purple background. It features a large heading 'Hey. Welcome to our Shop.' followed by the text 'We are a Department shop based in Chennai. Press Below to Start Shopping with us. Happy Shopping!'. Below this, there are three input fields labeled 'Your Name', 'Mobile Number', and 'E-mail ID'. A dark 'Continue' button with a yellow arrow icon is positioned at the bottom of the form.

Fig-10: Login Page of the Customer who uses the Smart Trolley

RansomeWhere Shoppee.								
START SHOPPING FROM HERE:								
RFID	NAME	TYPE	QUANTITY	PRICE	FINAL AMOUNT	EDIT		DELETE
33	GRAPES	FRUITS	5	230	1150	Edit		Delete
55	BINGO	FOOD	12	20	240	Edit		Delete
44	GLOVES	LEATHER	0	2500	0	Edit		Delete
				TOTAL AMOUNT	1390	Pay with Razorpay		Admin

Fig-11: Consolidated Billing Page of the Customer who purchased

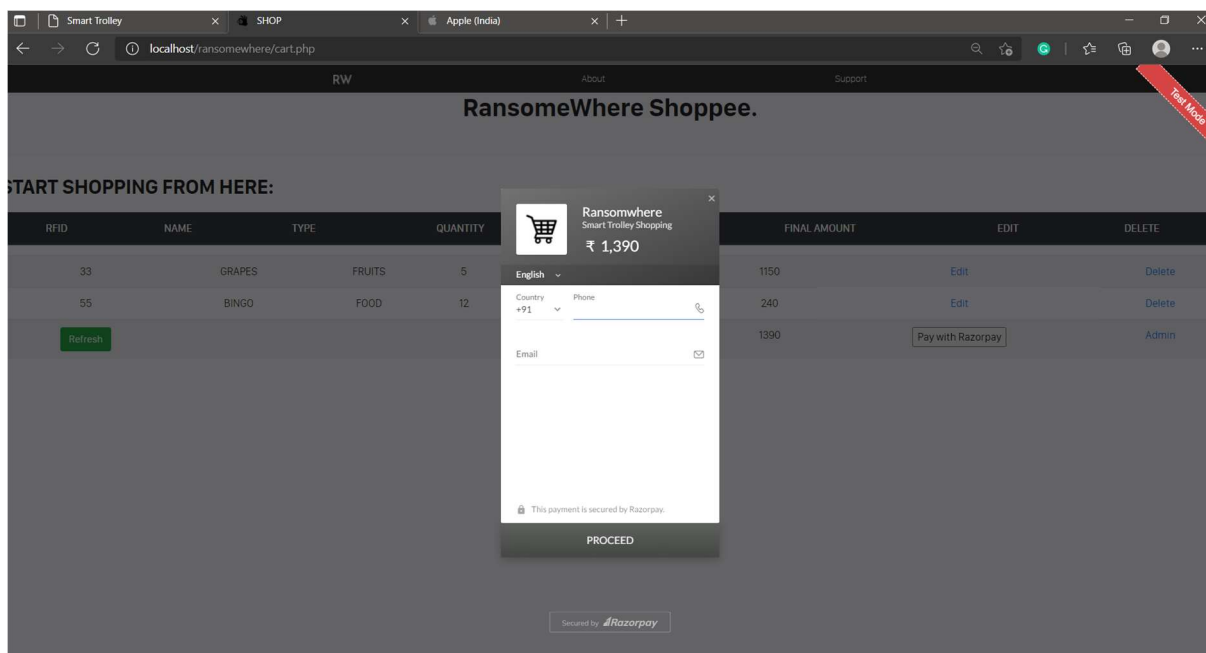


Fig-12: Razorpay implemented for customer payment

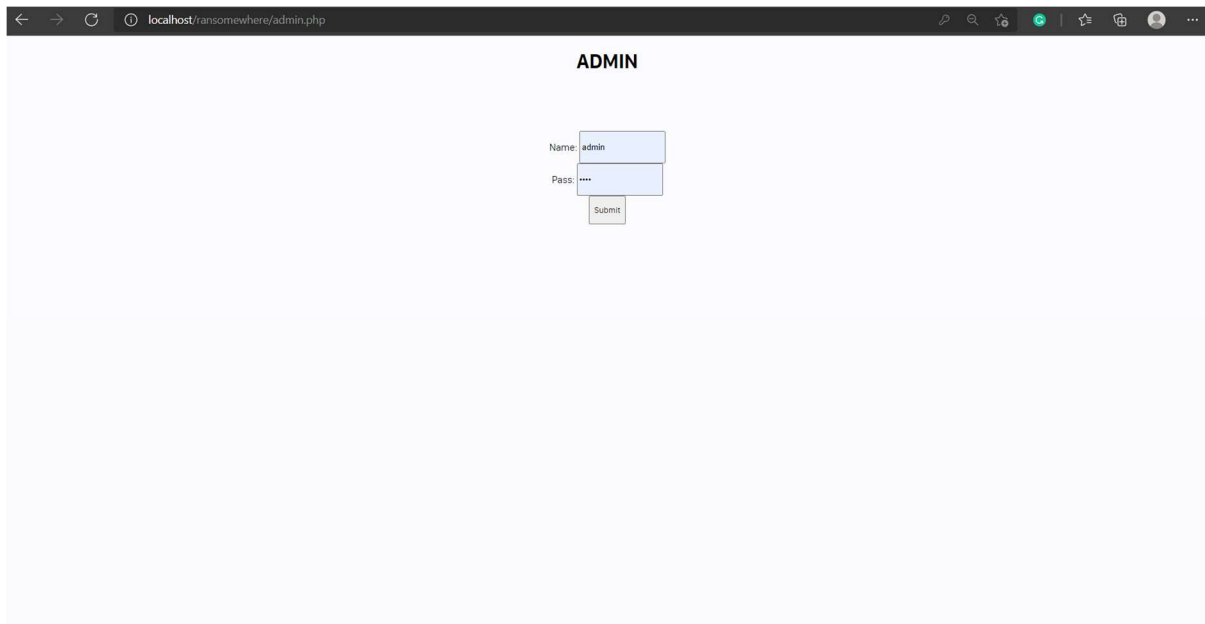


Fig-13: Admin login for accessing the backend Database and Management of Database

Database Implementation:

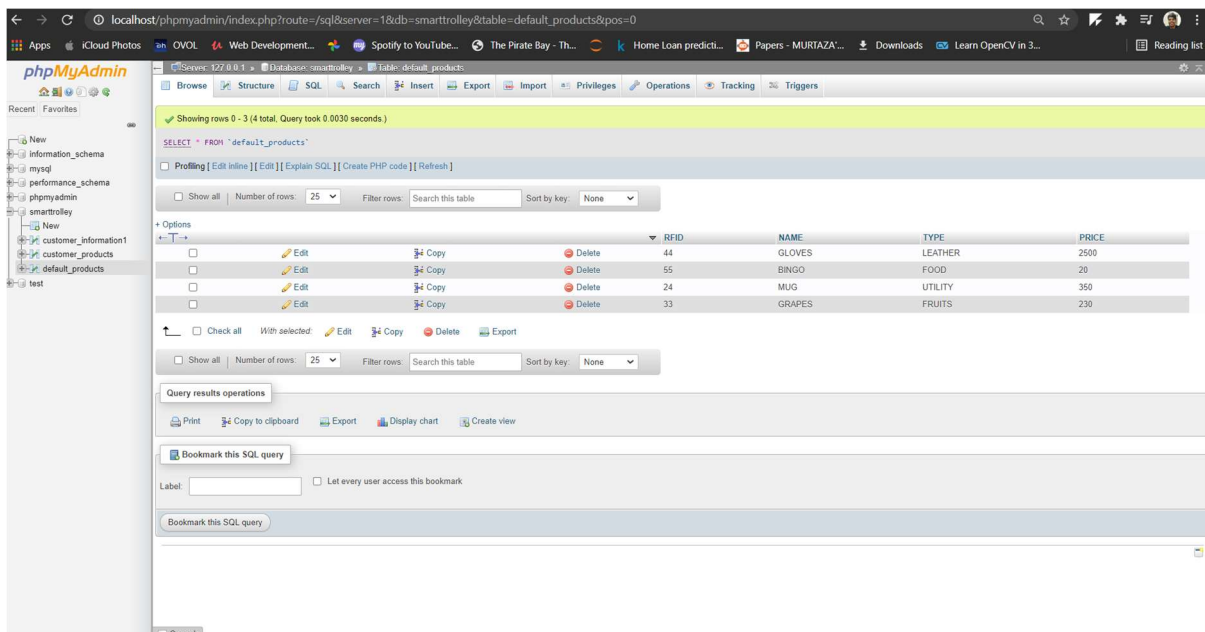


Fig-14: Customer Product list ready to be billed once the purchase is over

The screenshot shows the phpMyAdmin interface with the following details:

- Database:** smartrolley
- Table:** customer_information1
- Query:** `SELECT * FROM `customer_information1``
- Results:** 17 rows displayed. The table has columns: NAME, EMAILID, and PHONENO.
- Data Rows:**

NAME	EMAILID	PHONENO
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
VIGHNESH M	vighnesh1209@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
Vighnesh	vighneshminda@gmail.com	2147483647
jsdd	tyyy	0
Vel	av@gmail.com	906789234
NT	Nt_Tisha@gmail.com	999999999
99	sff	466
- Operations:** Print, Copy to clipboard, Export, Display table, Create view.
- Bookmarking:** Option to bookmark the query and control access.

Fig-16: Customer Information and their contact details

CHAPTER VI

Conclusions

The Smart Trolley was designed to function as a mobile self-checkout system providing users the flexibility to make transactions from it within the retail store. It is designed to be highly efficient and fully synchronised with the retailer's current system. It is more reliable and provides ease for shopping. Here we conclude that the proposed system is time saving i.e. faster check out process. This system reduces the number of salesmen at the counter.

CHAPTER VII

Future Scope

This pandemic and continuous lockdowns have clearly proven how difficult it is to actually do shopping. Be it groceries or vegetables, or electronics and computers, or clothing, it has never been easy to shop. There is no cash in half of the existing ATMs and most of the small scale shops do not accept online payment. In the future, we hope for people to finish their payment by scanning the QR code at the venue. We also hope to save people's time by reducing the crowd at the particular shop. All the product details are stored in a cloud so the people can see the details of the products from anywhere.

We also hope to be eco-friendly by saving paper as the soft copy of the customer's bills will be sent to their respective mobile phone then and there. We hope to employ more engineers to program and make our device, thus increasing employment opportunities. We finally aim to move one step closer to a Digital India. If multiple supermarkets implement our technology, we will also be able to tell our customers the nearest venue from their current location where a particular product is available, if in case it isn't available in one shop

Last, but not the least, we are proud to announce that the source code and all the working details of our technology is available in our GIT repository for free. So if any freelancer is willing to collaborate with us with ways to improve the overall product, we'd be extremely delighted to do so.

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PRESENTATION AND DEMO LINK

Presentation Video Link:

<https://drive.google.com/file/d/1B8l3C4UwU5Ba2V4y4AWPxUX-frPYF0zT/view?usp=sharing>

Demonstration Video Link:

<https://youtu.be/qYTMHUHJL94>

Powerpoint Presentation Link:

https://docs.google.com/presentation/d/18b98tlwsPQ5Z8dx_cdPzFzkCt-aZon6kQvIOjK-kef0/edit?usp=sharing

