

AI SHOPPING SOLUTION - The Smartest All-in-One Shopping Solution

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Abstract: In today's world, purchasing and shopping at supermarkets and malls are becoming part and parcel of urban life. We notice the huge rush in the markets and malls on holiday as well as in the weekends. The problem occurs at the customer end to find their likely products and to pay the bills standing at long queue; both of these are time consuming and tiring. In this paper, we discuss about an all new complete AI (Artificial Intelligence) SHOPPING SOLUTION which will make our marketing experience completely smart and hassle free. Especially during and after the COVID-19 situation, social distancing and human health will become the foremost priority of the modern civilization. This is the ideal situation to make use of this all new technology in which the customer can purchase his/her needful products at one's fingertips by visiting the nearby market or getting the things delivered comfortably to his/her place by self-sanitizing drones. This entire shopping system will be controlled by our own indigenous developed mobile app or website.

Keywords: Social Distancing, Mobile App, Website, Smart trolley, RFID Tag, RFID Reader, NODE MCU, Online Payment, Self- Sanitizing Drone, Cash back

1. Introduction

Innovation and technology is changing the world in leaps and bounds. In today's hectic schedule, a large gathering in the shopping malls creates a more annoying picture in the shopper's mind and then the long queue in the billing section adds some extra bit of exhaustion to their minds. To make life more comfortable **AI SHOPPING SOLUTION** is here to serve a delicious recipe in front of shoppers' taste buds. A customer can just open our app [10] or log into one's account to create the shopping list and can enjoy a hassle free shopping experience with stunning rewards and offers. This paper presents not only a shopping element but a total digital platform of each and every shopping brands ranging from the food products-fashion wares-grocery-electronic goods food court items-baby products to every shopping items guided by smart shopping trolley[4] (if one visits the mall) or at his/her doorsteps within a couple of hours.

The issues addressed or faced along with our solutions are as follows: -

- Customers' dissatisfaction because of hours of waiting for checkout or billing process[2] and [7]- our smart shopping solution is designed in a way to accept payment in all forms that is Cash, E-wallet or the Smart Card depending upon user's convenience as soon as it is through with its shopping.



- Involvement of huge man-power, which is expensive- we have come with a design or a system that automates the checkout procedure by billing the products simultaneously as soon as we add the product in the Smart shopping trolley.
- Dishonest behaviour of customers- we all know that everything has its own advantages as well as disadvantages. Automation has its own worries. Absence of human operators can lead to forgery. We propose a solution that handles all the cases of deception, if any so that it is an attractive option for both the buyers as well as the sellers too.

2. Problem Statement and Working Procedure

The AI SHOPPING SOLUTION is based on four major systems which are as follows:-

- Smart billing system: - To develop RFID based billing system for supermarkets in order to expedite billing process and avoid crowd [2].
- Smart management:-Getting product information is easy and no extra time needed to update entry or sell.
- Hassle-free payment:-Use RFID TAG for billing instead of barcode scan, need of any staff for billing [6] and [7].
- Easy product handling and tracking:-User and admin of manager can easily track the product position and quantity.

2.1 Working Procedure

- Customer sign in to his or her account of our app [10]
- Customer create his or her shopping list as required
- The list is saved into the account and the availability is checked through the database
- In case of unavailability. Alternate suggestions are made
- Then after saving the final list the customer gets option for home delivery or can visit the mall
- on entering the mall a small trolley can be unlocked through the shopping kart ID and the listed product will transfer to it
- The AI trolley will guide the customer to the required stores and the eventually to their Precise locations in the shelf
- Every product has an RFID tag which contains a Unique ID. These ID's are fed in the database assigned to the corresponding products [1].
- There will be another option provided to get the location of required product.
- If there needs to be a purchase done, then that product can be dropped in the cart where the RFID reader reads the tag [1]. The information of the product is extracted and displayed on the Web Application. At the same time billing information is also updated.
- When a customer wants to remove any product from the trolley, then that product needs to be scanned again.
- At the same time the billing information is updated. The total amount of purchases is also displayed on Application.
- These steps are repeated until the end of shopping button or send bill button is pressed. This generated bill is sent to billing side computer to get the computerized bill [7].
- The customer can straight away pay the bill and leave.
- Inventory status of the products is also updated at the end of shopping. Simultaneously the temporary data present in microcontroller is reset, so that it can be reused.
- If the customer has registered user card, the payment can be done.
- If the customer opts for home-delivery option then the package will be delivered to the required location by our Logistic drone.

- At the time of home delivery, a programmed call will be made to the customer informing about the approach of the delivery item exact 10 minutes prior to the arrival of the drone using GPS location of the drone.
- The customer needs not to wait for the delivery. On arrival of the logistic drone an OTP will be sent to the customer’s registered mobile number.
- The customer has to enter this OTP into the drone’s number panel using registered number and the product will get unlocked and the customer can collect his/her item.

The total working is shown in the flowchart given in the Figure 1.

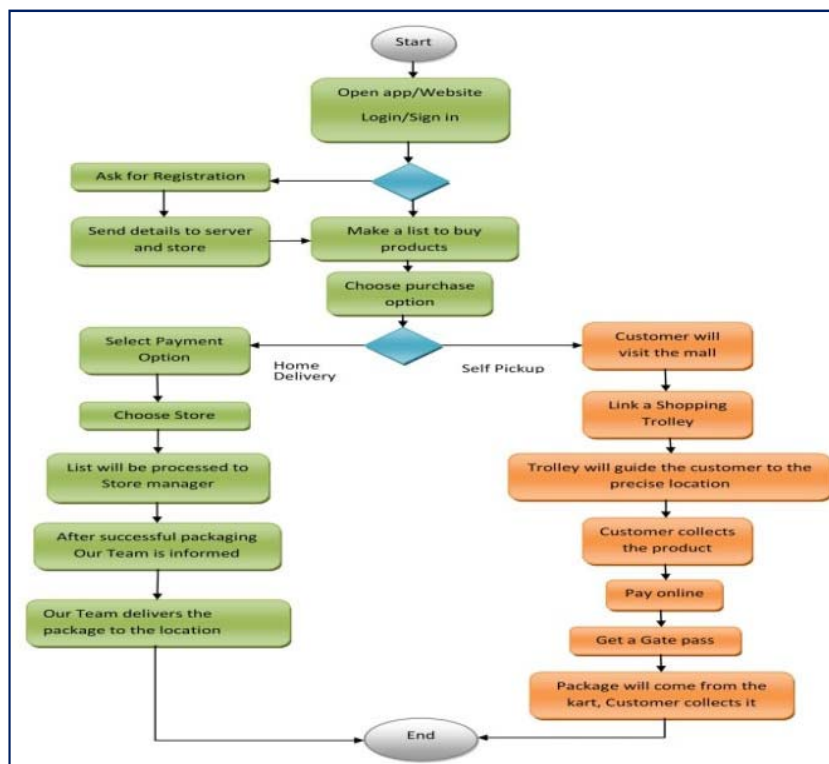


Figure 1: Flowchart of the entire AI SHOPPING SOLUTION

2.2. Working of the App: MechITEasy

The working of the app is shown in the Figures 2(App Icon), 3(Customer Account Details), 4(Navigation), 5(Browsing through the shopping items), 6(Adding to cart before proceeding for payment), 7(Various sections of App)



Figure 2: App Icon

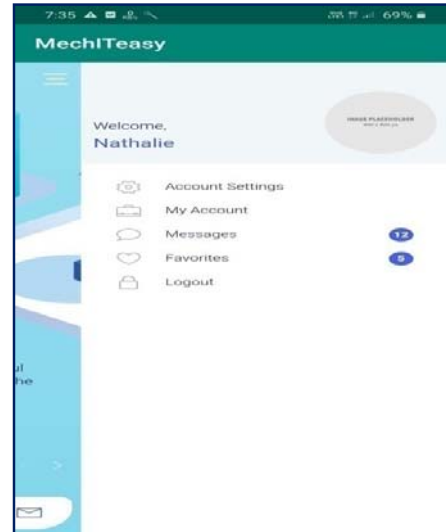


Figure 3: Customer Account Details

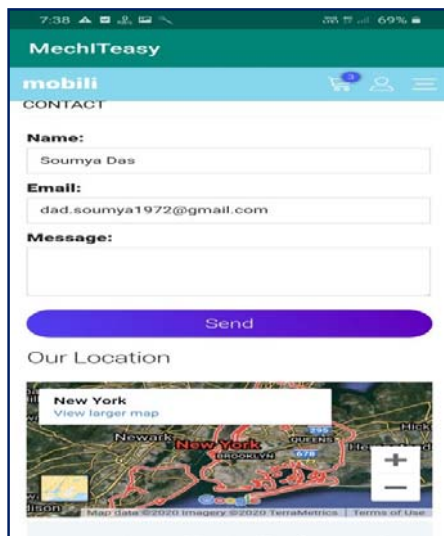


Figure 4: Navigation

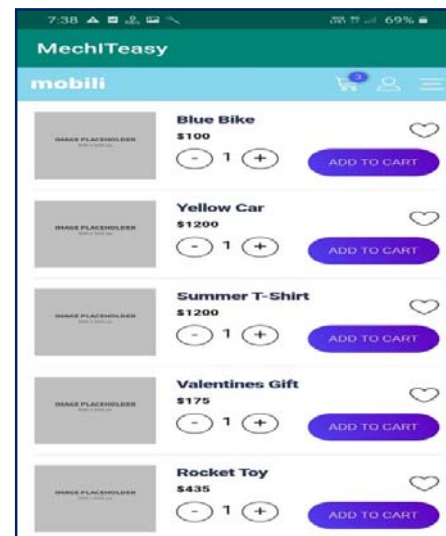


Figure 5: Browsing through the shopping items

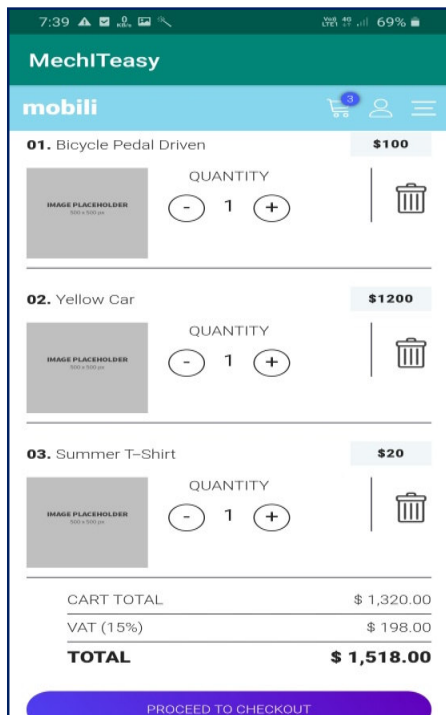


Figure 6: Adding to cart before proceeding for payment

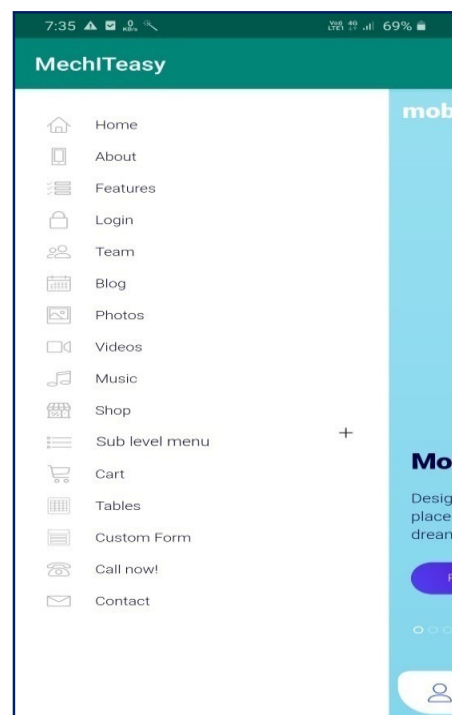


Figure 7: Various sections of App

We are using Node MCU as an IoT (Internet of Things) device. The Node MCU is always connected to the given Wi-Fi network SSID and password defined in code. Then the he connected RFID reader or BARCODE scanner scan the product. The product ID will be processed by Node MCU (IoT Device).

Node MCU send all the data to a given link. When the link is triggered, the product will be added to cart of the mobile app. Hence, we repeat this process to continue the shopping.

2.3. The Application of the Softwares:-

- **Arduino IDE, Python-** To program Node MCU
- **Android IDE-** To develop the android app
- **HTML5, CSS3, JavaScript-** To design and develop the application
- **PHP-** To make the application dynamic
- **Json-** To send the value from Node MCU to server
- **MySQL-** To store the details in database
- **jQuery-** For the development of the application

The hardware interface components are listed in Table -1

A. Hardware Interface

Sl. No	Components	Quantity
1	Shopping Trolley	1
2	Node MCU	1
3	Arduino UNO	1
4	RFID Reader	1
5	Barcode Scanner	1
6	RFID tag	3
7	Buzzer	1
8	LED	2
9	DC Motor (for rack and pinion mechanism) and DC Motor driver	1
10	Logistic Drone	1
11	Battery (12V)	1

Table 1: Hardware Components

B. Software Interface

➤ Programming Language

1. Python
2. PHP
3. HTML5, CSS3
4. JavaScript
5. jQuery
6. Json
7. Arduino IDE
8. Android IDE

➤ Database

9. MySQL

App link: - <https://webingoinfotechsolutions.in/spice.apk>

3. Result and Discussion

This all new AI Shopping Solution is developed to improve the quality of services to the customer and save time and man power thereby reducing maintenance cost and maximizes profit. The proposed system provides customer a choice whether he/she wants to shop by going to a smart mall or chooses to get the required items through home delivery.

The customer opens the app/website; he/she is required to login/signup. Then one has to make a list to buy products and choose the store and then one has to decide the purchase option (home delivery/self-pickup). If one chose for home delivery then the purchase list will be processed to the store manager who will do the needful. Once the items are ready then the information will pass on to our team who will do the required packaging and will deliver to the given address. If the distance is within a short range then the package will be delivered by the self-sanitizing logistic drone as shown in Figure 11. If one chooses for the self-pickup option, then one has to visit the mall/store, and then has to link a smart trolley to his account. The smart trolley will guide the customer to recognised row and column and the

customer has to just collect the product and the trolley will get locked. After the shopping is over, the customer has to pay the billing amount online (customers will get added discounts and rewards, if they use our payment gateway system). Lastly a gate pass will be generated and the package will come from the kart which ends the system.

The system will make use of a shopping trolley, node MCU, Arduino UNO, RFID Reader, Barcode Scanner, RFID tag [1] ,Buzzer, LED, DC Motor (for rack and pinion mechanism), DC Motor driver, Battery. The softwares which we are using are Arduino IDE, C, Python, Json, PHP and HTML. The mechanism and architecture of the Trolley is shown in Figure 8 and the working of the entire solution is depicted in Figure 9.

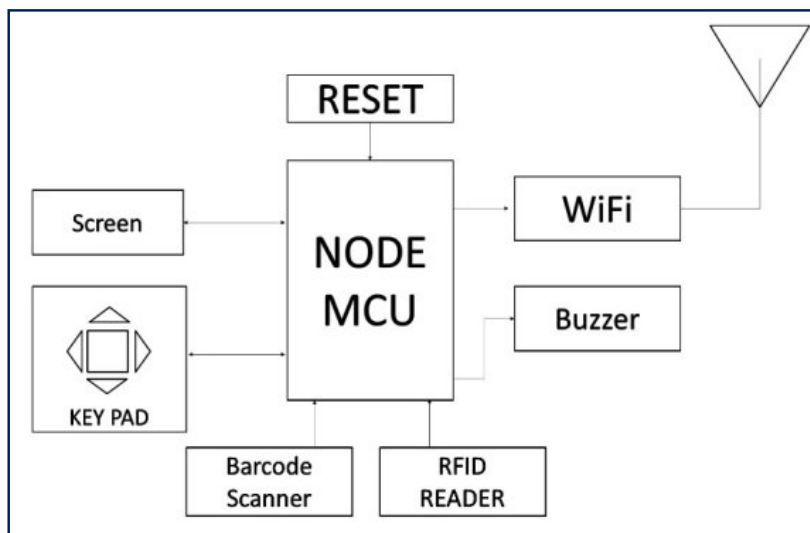


Figure 8: System Architecture of Trolley

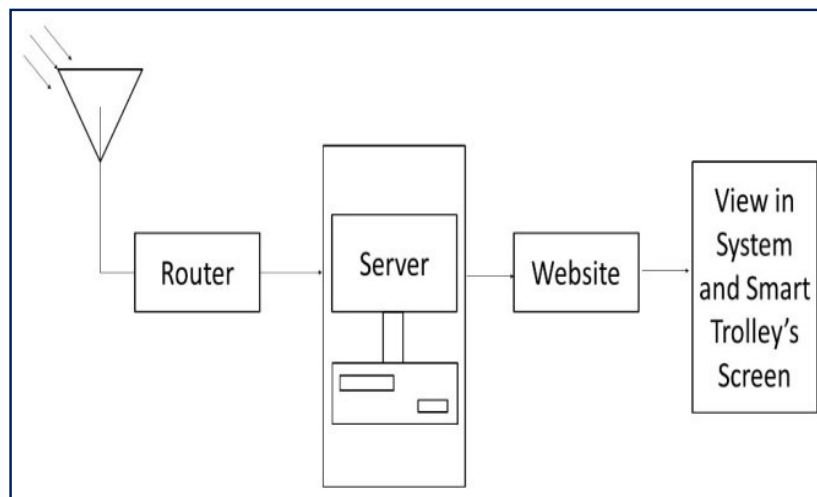


Figure 9: Block Diagram of the AI SHOPPING SOLUTION

The experimental set-up is tested for various test cases, with various test products. The system gives the customer an option to make his/her choice for shopping (home-delivery/self-pickup).The system guides the customer through his/her choice to get the required outcome. This makes the shoppers life easy going avoiding long queues or getting everything in ones homely comfort. The entire shopping system is maintained by our team with full proof security of the customers and their payment gateway. On paying through our gateway the customer will receive attractive offers and discounts and also cash back offers. This entire system is server based and also reduces man power and related problems. The system is cost-effective for large scale implementation and strengthens the idea of smart mall and smart shopping solution in developing countries like India.



Figure 10: Graphic Representation of Smart Shopping Mall



Figure 11: The Logistic Drone

3.1. Cost of the project

HARDWARE REQUIREMENT

1. Shopping Trolley	Rs. 2500
2. Node MCU	Rs. 450
3. Arduino UNO	Rs. 400
4. RFID Reader	Rs. 300
5. Barcode scanner	Rs. 1500
6. RFID tag	Rs. 100
7. Buzzer	Rs. 30
8. LED	Rs. 10
9. DC Motor (for rack and pinion mechanism)	Rs. 100
10. DC Motor driver	Rs. 250
11. Battery (12)	Rs. 700

Total-	Rs. 5984
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Cost of logistic drone (Maximum Capacity-1Kg, Average Runtime-20mins)	Rs. 19500
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Total cost of the project	Rs. 25484
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3.2. Advantages of MECHITEASY Shopping Solution

The success of MECHITEASY Shopping Solution lies in the satisfaction of customer. The all new technology and simple working grabs customer attention. The following advantages of this shopping solution which keeps us ahead of the currently existing shopping websites:-

- This project introduces the idea of smart shopping mall which is still not being initialized in India as shown in Figure 10.
- The brightest feature of this MECHITEASY Shopping Solution is a new feature has been added which will serve people during the time of need to save one's life. A feature is all set to be introduced which will play a vital role in the time of medical emergency. If a customer orders for some first aid or supporting medicines even at the remote areas, our drone or delivery team will reach the location within 20 minutes to serve.
- This project provides a golden opportunity for the employment of younger generation in software, hardware and management sectors.
- Generation of high revenue which will strengthen the associated business chain.
- This AI Shopping Solution utilises highly automated infrastructure with easy working which provides a hassle free shopping experience.

- Boundless offers, discounts and rewards have a magnetic effect on the customers.

4. Conclusion

This project successfully demonstrates the idea of Smart Shopping Solution which makes the life of a shopper more exciting. The system which is developed by MechITEasy is highly reliable, secured and cost effective. The all new AI Shopping Solution gives a complete new vision to the global direct investment in India. The smart shopping solution will brighten up the prospect of Smart Mall. The concept of digital shopping will no longer be an obscure dream but reality in the developing countries like India. The implementation of the AI Shopping Solution will provide huge employment which will brighten up the future of our young generation. This concept can be hired or implemented by any world class global online shopping platform which will enhance their impact over the competitors and will also increase the revenue. This solution has its brightest of future even in the darkest post COVID-19 phase. The mixture of Indigenous idea along with world class facility will strengthen the foundation of ATMANIRBHAR BHARAT.

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