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Automated Scanner Service in India

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Abstract: ***The introduction of automated billing systems in shopping trolleys can simplify the arduous process of waiting on the bill counter during rush hours in supermarkets. The system consists of an RFID reader controlled by Arduino and a database linked to the supermarket's backend that provides product information. The trolley has a barcode scanner, Raspberry Pi, LCD display, load cell, buzzer, and a touch screen interface for self-scanning and managing products. The wireless smart device records all scanned products and connects to the supermarket's database. The shopper is informed of the total bill at any point during shopping, and the button pressed at the end displays the total amount to be paid. The technology aims to provide self-service checkout trolleys and identify cost-effective replacements for checkout counters. The focus is on modern and efficient operations that save time and reduce manpower, contributing to a better shopping experience for customers.***

I. INTRODUCTION

SWAYAM is a company which helps in solving the arduous process of waiting on the bill counter while shopping is simplified by introducing an automated billing system that may be installed within the shopping trolley, as it is typical to encounter a large amount of rush while cashier producing the bill with barcode scanner.

The produced bill can also be paid online using a variety of payment options such as Net-banking, UPI, Debit/Credit card, and so on. The shopkeeper can use his master card to check the things he has purchased. This technology is excellent for usage in locations such as supermarkets because it helps to reduce personnel while also providing a better shopping experience.

In recent years, the fast expansion of supermarkets and hypermarkets in India has propelled the use of shopping carts even more than in the past. Customers opt to buy household products, clothes, utilities, and other commodities from these businesses as their disposable income rises. As a result, the global shopping trolley market is expanding. Despite the fact that local retailers account for up to 90% of retail sales in India, supermarkets and hypermarkets are rapidly increasing.

Over the last seven years, over 13050 supermarkets have opened their doors. This depicts how popular shopping carts are in India. The elimination of the time-consuming billing process while long lines form during rush hours. Billing has become an unpleasant element of the buying experience now that the covid-related lockdowns and limits have been removed and customers are returning to live mode of purchasing. Bill counters have recently been inundated with crowds at all hours of the day. As a result, electronic intervention in the retail billing operation has become necessary. This billing method's automatic payment system comprises of an RFID reader controlled by Arduino. The automated shopping trolley maintains track of all the scanned products in the trolley and assigns them a number. It is linked to the supermarket's backend database, which gives product information such as cost, price, quantity, and location. The automated shopping trolley system includes a barcode scanner, Raspberry Pi, LCD display, load cell, buzzer and database. Customers can scan items they want to purchase themselves. So, anytime a shopper places a goods in the trolley, the RFID module detects it and displays the price of the object on the LCD. As the shopper continues to add products, the module detects all of them and adjusts the pricing accordingly. If a consumer changes his or her mind and does not want a product added to the trolley, he or she can delete it and the money added will be automatically deducted. If the consumer wishes to make changes to the product detail after purchasing or self-scanning it, he can do it fast by using the touch screen, which features add, remove, update, and delete buttons.

A wireless smart device records all scan products in a certain trolley and connects to the supermarket backend database, which contains product information such as pricing and stock levels. We have provided a self-scan option as well as wireless smart devices that save all scanned products and are linked to the supermarket database for the consumer. While acquiring the merchandise, the buyer is informed of the total bill. As a result, at the end of the shopping experience, the shopper will push the button, which when pressed, sums all of the products along with their prices and displays the total amount to be paid. The shopkeeper can use a master card to check the things purchased at the exit for verification.

1) To assist the intended consumers, i.e., shopping malls, in better and more time-efficient crowd management.
2) To provide self-service checkout trolleys across India by altering customers' customary shopping experiences.
3) To identify a cost-effective replacement for the check out counters.

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The vision statement states that the company will be able to self-evolve in order to stay up with disruption and future improvements, allowing the company to move beyond efficiency and adapt to change.

The business's focus can be stated by evaluating the company's aim to accomplish modern, efficient (i.e., less time consuming and less manpower demanding) operations in the near future.

Saves time when shopping for household necessities, Customers can update their shopping lists and remove items from their carts items with each, the trolley's gadgets are programmable based on the store inventory.

Smart shopping trolleys with automatic billing are developed to improve the shopping experience of customers. The tedious process of waiting on the bill counter while shopping is simplified by incorporating a technology of automated billing system that can be placed within the shopping trolley, as it is common to encounter a large amount of rush while cashier preparing the bill with barcode scanner. The produced bill can also be paid online using a variety of payment options such as Net banking, UPI, debit/credit card, and so on. The shopkeeper can use his master card to check the things he has purchased. This strategy is excellent for usage in locations such as supermarkets, as it will aid in the reduction of waste manpower and contributes to a better shopping experience for clients. A shopping trolley or a shopping cart is required for purchasing in supermarkets. It is traditionally used by consumers inside the store to bring things to the cashier while shopping and is not intended to exit the business. Customers who want to find the desired goods in the store using the usual shopping cart are inconvenienced and waste time. To remedy the problem, we want to create an autonomous moving trolley equipped with smart shopping equipment. Our smart shopping cart is built around a two-wheeled mobile robot developed in prior research. This paper describes the hardware and software design of a smart thermostat.

The tram system. As sensors and controllers, our smart trolley made use of an IOIO microcontroller and an Android smartphone. The tram is designed to resemble a two-wheeled mobile robot. The Android smartphone will drive the robot by sending a signal to an IOIO microcontroller linked with a robot's actuator, while the smartphone camera will monitor the scenario. In addition, we used the smartphone compass to guide the robot. This system also includes an indoor positioning system for detecting user position.

The goal of this project is to develop a smart shopping cart using RFID technology to optimise the purchase. Is to employ RFID-related cart implementation practise.

II. MARKETING IDEAS

A. Market Analysis

India's retail industry has been growing at a rapid pace in recent years, with the emergence of modern retail formats such as supermarkets, hypermarkets, and malls. This growth has increased the demand for smart shopping trolleys in India, which offer convenience and ease of use to customers. One of the key drivers of the smart shopping trolley market in India is the increasing adoption of technology in the retail industry. Retailers are leveraging technology to provide a seamless shopping experience to customers, and smart shopping trolleys are an important part of this strategy. Smart shopping trolleys are equipped with sensors, cameras, and other advanced features that enable customers to scan items, check prices, and even make payments without the need for a cashier. Another factor driving the market is the increasing disposable income of consumers in India. With rising incomes, consumers are willing to pay more for convenience and a better shopping experience. Smart shopping trolleys offer a hassle-free shopping experience, which appeals to these consumers.

B. Market Segmentation

Geographical Segmentation	Region: Metropolitan and Tier A cities Cities: Bangalore, Mumbai, Delhi, Chennai, Pune
Demographic Segmentation	Elderly shoppers: Will include features like easy-to-read displays, larger font sizes, and audio instructions. Families with young children will include features like built-in seats or entertainment systems
Psychological Segmentation	Psychological segmentation can be done based on factors like personality, lifestyle, values, and attitudes. For instance, some shoppers may prefer smart shopping trolleys that offer personalized recommendations based on their previous purchases, while others may prefer trolleys that allow them to browse and choose products on their own without any assistance.

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Behavioural Segmentation	Done based on factors like shopping frequency, brand loyalty, and purchase behaviour. Smart shopping trolleys that target frequent shoppers may offer loyalty rewards or discounts on bulk purchases. Similarly, trolleys designed for shoppers who prefer organic or eco-friendly products may highlight such products and provide information on their environmental impact

C. Technology

The technology used in a smart shopping trolley manufactured using Raspberry Pi and other components includes:

1) *Raspberry Pi:* The Raspberry Pi is a small, low-cost computer that serves as the brain of the smart shopping trolley. It runs the software that controls the trolley's features and connects it to other devices.
2) *Barcode Scanner Connected with Raspberry Pi and LCD:* The barcode scanner is used to scan the barcodes of products as they are placed in the trolley. The Raspberry Pi is connected to an LCD display that shows the scanned items and their prices.
3) *POS Thermal Printer:* The point of sale (POS) thermal printer is used to print out the customer's receipt. It receives information from the Raspberry Pi, including a list of items purchased and their prices, and prints out a detailed receipt for the customer.
4) *Barcode Reader with Camera:* The barcode reader with a camera is used to capture images of products and their barcodes. This information can be used to update the trolley's inventory and assist with stock management.
5) *HX711 Weighing Module:* The HX711 weighing module is used to accurately measure the weight of items placed in the trolley. This information is used to calculate the price of items sold by weight, such as fresh produce or meat.
6) *Buzzer:* The buzzer is used to provide audio feedback to the customer when an item is scanned or when the trolley's weight limit is reached. It can also be used to alert store personnel of any issues or problems with the trolley.

Together, these technologies make up the smart shopping trolley, providing customers with a convenient and efficient shopping experience while also helping retailers manage their inventory and sales.

D. Target Market

The target market for a smart shopping trolley manufacturing company would be retailers, supermarkets, and grocery stores that are looking to enhance the shopping experience for their customers and improve their operations. The company would target both small and large retailers, as the benefits of using smart shopping trolleys apply to stores of all sizes.

Additionally, the company may also target online grocery delivery services that could use the smart shopping trolleys in their operations. This would allow customers to easily and efficiently shop for groceries online, while also providing the delivery service with accurate weight and inventory information.

In terms of demographics, the target market would be primarily urban and suburban areas with a higher population density and a demand for more advanced shopping technology. The company may also target environmentally conscious consumers who appreciate the sustainability benefits of using a smart shopping trolley, such as reduced paper waste from receipts and the ability to track food waste.

Finally, the company may also target international markets where there is a growing demand for advanced shopping technology, such as Asia and Europe. These markets may have different cultural and technological requirements, so the company would need to adapt their product and marketing strategies accordingly.

E. Market Strategies

1) *Product Positioning:* The company will focus on positioning its smart shopping trolleys as an innovative and convenient solution for customers' shopping needs. The trolleys will be marketed as an efficient way to save time and make shopping more enjoyable.
2) *Promotional Campaigns:* The company will launch promotional campaigns to create awareness about the benefits of smart shopping trolleys. It plans on collaborating with supermarkets, malls, and other retailers to showcase the trolleys in action and educate customers about their features.
3) *Online Presence:* The company will have a a strong online presence by developing a website, social media pages, and e-commerce platforms. These can be used to showcase the product, provide information, and allow customers to purchase the trolleys.

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4) *Partnerships:* The company can partner with leading retail chains to integrate its smart shopping trolleys in their stores. This can provide a greater exposure to potential customers, and the company can also offer discounts or other promotional offers to increase the adoption of the trolleys.
5) *Pricing Strategy:* The company will aim on adopting a competitive pricing strategy by offering the trolleys at a reasonable price to attract customers. The pricing can be based on the features and functionalities offered by the trolley.
6) *Customer Service:* The company should focus on providing excellent customer service by offering prompt and efficient technical support and assistance to customers. This can help in building a strong customer base and enhance the brand image of the company.

F. Pricing Strategy

1) Cost based Pricing strategy must be followed, Cost-based pricing first analyzes what the actual product costs are, and then based on that cost level the business increases the pricing a certain percentage.
2) Economic pricing should also be applied as our product is a sensitive and a new of a kind product in the market hence the buyers will be skeptical and would want to buy at a lower price.
3) Tiered Pricing model of pricing must be followed. Tiered pricing is selling your product or service at different price points depending on the features included at each level. The lowest cost typically consists of the least amount of features, while the highest includes the most.

G. Industry Analysis

1) Strengths

One of the primary strengths of this product is its innovative nature as a new concept, which has the potential to achieve massive success.
The technological features of the Smart Shopping Trolley are unique and efficient, making it highly desirable and increasing its popularity in the market.
The Smart Shopping Trolley's ability to meet customer shopping demands by speeding up the checkout process can lead to the success of companies that retail this product.

2) Weaknesses

Customers may face difficulty in using the trolley, which is a weakness of the product.
Pricing is a crucial aspect, and if the price of the product is too high, retailers may not be willing to buy it, despite its effectiveness.
The product's biggest weakness is related to servicing and mishandling.

3) Opportunities

There is enormous growth potential for the Smart Shopping Trolley due to the increase in India's population and the rise of super and hypermarkets due to the growing number of shoppers.
Emerging technologies offer various opportunities for the Smart Shopping Trolley, including potential multiple uses, improved speed, efficiency, and effectiveness of the shopping experience.
The Smart Shopping Trolley can integrate several technological applications, such as a scanner, smartphone charging port, and phone clip.
The same system can be incorporated into many other places, such as a self-parking payment system.

4) Threats

The electronic market is so dynamic that it may not be possible to predict the future, any shortage of chips as we have seen in the past 2 years may have a huge impact on the product. Additionally, product improvement and development requires a lot of financial and human resources to conduct research to come up with new superior upgrades.
If more pandemics arises like the past 2 years, people would prefer online shopping rather than going out to super markets, this is a huge threat to the industry.

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III. FINANCIAL PROJECTIONS AND ESTIMATIONS

Profit and Loss Statement of the Company				
S. No.	Particulars	Amount (Dr.)	Particulars	Amount (Cr.)
1	Raw Materials	₹ 11,335.00	B2B	₹ 7,49,700.00
2	Rent	₹ 3,00,000.00	Rental	₹ 3,59,700.00
3	Salaries	₹ 6,00,000.00	Order based	₹ 10,49,700.00
4	Wages	₹ 2,40,000.00		
5	Freight	₹ 1,80,000.00		
6	Electricity	₹ 72,000.00		
7	Website	₹ 30,000.00		
8	SEM	₹ 50,000.00		
9	Sales	₹ 1,00,000.00		
10	Advertisement	₹ 50,000.00		
11	Gross Profit	₹ 5,25,765.00		
Total		₹ 21,59,100.00	Total	₹ 21,59,100.00

Cashflow Statement					
Particulars	Amount (INR)				
		1st	2nd	3rd	4th
			10%	12%	15%
			₹2,15,910.00	₹2,85,001.20	₹42,750.18
Operations					
Cash Receipts					
Revenue		₹21,59,100.00	₹23,75,010.00	₹26,60,011.20	₹27,02,761.38
Cash Paid					
Inventory purchase		₹11,335.00	₹12,468.50	₹13,964.72	₹16,059.43
General operations and administration					
Freight	₹1,80,000.00				
Electricity	₹72,000.00				
Rent	₹3,00,000.00				
Wages	₹2,40,000.00	₹7,92,000.00	₹8,71,200.00	₹9,75,744.00	₹11,22,105.60
Marketing & Advertising					
Website	₹30,000.00				
SEM	₹50,000.00				

Advertisement	₹50,000.00	₹1,30,000.00	₹1,43,000.00	₹1,60,160.00	₹1,84,184.00
Sales		₹1,00,000.00	₹1,10,000.00	₹1,23,200.00	₹1,41,680.00
Salaries		₹6,00,000.00	₹6,60,000.00	₹7,39,200.00	₹8,50,080.00
Total		₹16,22,000.00	₹17,84,200.00	₹19,98,304.00	₹22,98,049.60
Net Cashflow from operations		₹5,37,100.00	₹5,90,810.00	₹6,61,707.20	₹7,60,963.28
Investing		-			
Cash receipts		-			
Sale of PPE		-			
Cash Paid		-			
Purchase of PPE		-			
Making Loans into entities		-			
Total		-			
Net Cashflow from investing		-			
Financing					
Cash receipts					
Capital					
Investors*Capital raised	6*1,66,666.667	₹10,00,000.00	₹11,00,000.00	₹12,32,000.00	₹14,16,800.00
Cash Paid					
Repayment of loans					
Issuance of Profit		₹5,25,765.00	₹5,78,341.50	₹6,47,742.48	₹7,44,903.85
Total					
Net Cashflow from financing		₹4,74,235.00	₹5,21,658.50	₹5,84,257.52	₹6,71,896.15

IV. OPERATION DESIGN

A. Human Resource

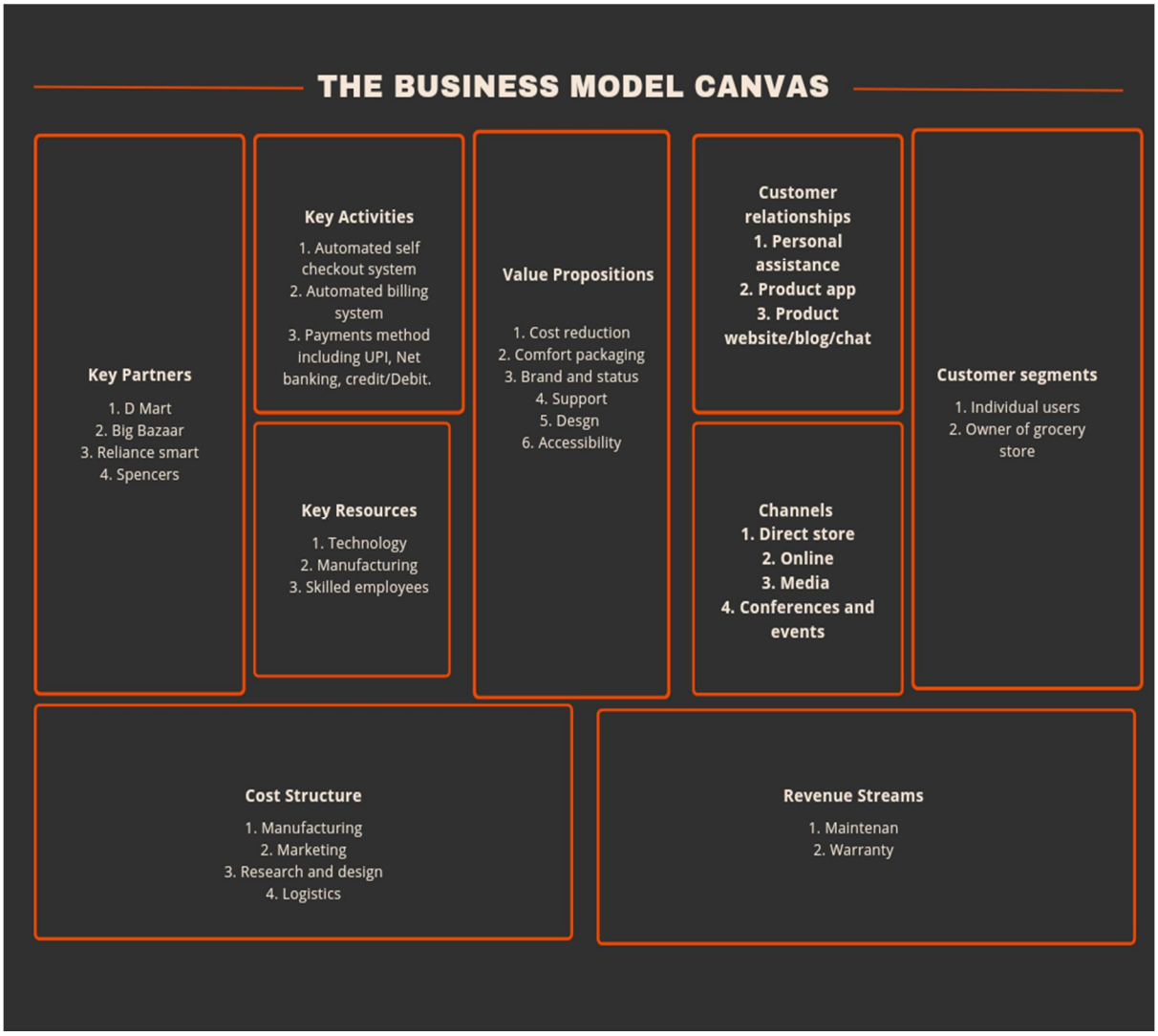
1) Chief Executive Officer – CEO
2) Head, TechnicalServices
3) Human Resources and Admin Manager
4) Sales and Marketing Manager
5) Accountant/Cashier
6) Computer Repair and Maintenance Engineers and Technicians
7) Client Service Executive

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B. Facilities and Technology

1) *Manufacturing Unit:* A facility where the manufacturing process of smart shopping trolleys can be carried out.
2) *Designing and Engineering Tools:* Software tools such as Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) software can be used for designing and engineering smart shopping trolleys.
3) *Raw Materials:* The company will need various raw materials such as metal, plastic, and electronics components, which are necessary for building the trolley.
4) *Robotic Equipment:* Automated equipment such as robotic arms can be used for the production of the trolleys.
5) *Raspberry Pi and Related Technology:* The company would require Raspberry Pi and other related technology such as barcode scanner, LCD, thermal printer, camera, weighing module, and buzzer for manufacturing the smart shopping trolleys.
6) *Testing and Quality Control:* To ensure the quality of the smart shopping trolleys, the company would require equipment for testing, such as testing software and quality control tools.
7) *Logistics:* To manage the distribution and delivery of the smart shopping trolleys, the company would require a logistics department with suitable infrastructure, such as warehouses and transportation vehicles.
8) *Skilled Workforce:* To operate and manage the above facilities and technologies, the company would require a skilled workforce, including engineers, technicians, and other professionals.

V. BUSINESS MODEL CANVAS



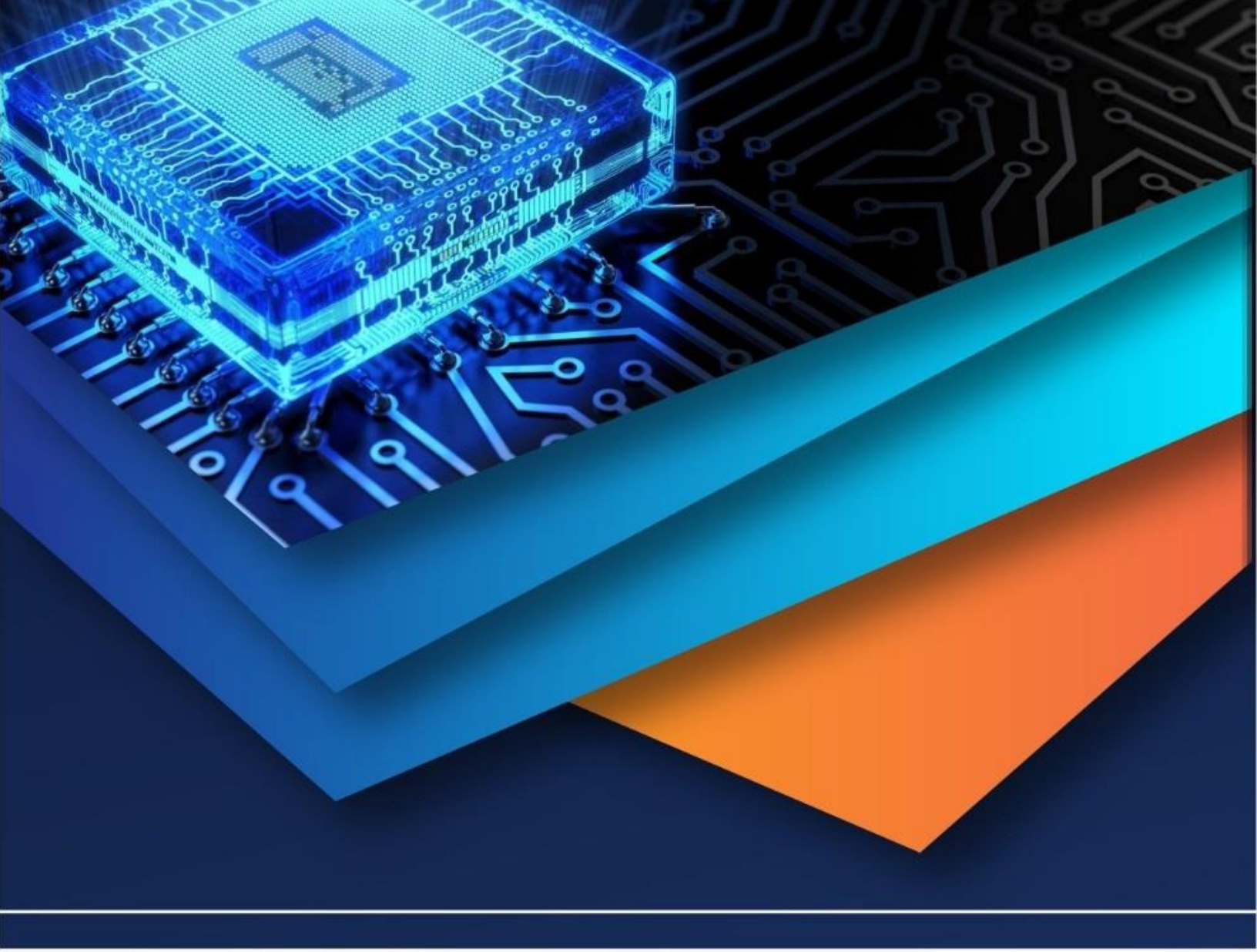
VI. CONCLUSION

In conclusion, smart trolley manufacturing is a promising and innovative concept in the retail industry that can revolutionize the shopping experience. The market for smart trolleys in India is growing, and there is a huge potential for the product to be successful in the market. The key strengths of the smart shopping trolley include its innovative nature, technological efficiency, and ability to meet customer demands. However, there are some weaknesses that need to be addressed, such as pricing, servicing, and usability. The opportunities for growth are immense, especially with the increasing population of India and the emergence of new technologies. In order to succeed, the smart trolley manufacturing company should invest in the necessary facilities and technologies, such as Raspberry Pi, barcode scanner, LCD, POS thermal printer, and buzzer. They should also focus on market segmentation and targeting the right customers, as well as developing an effective marketing strategy. By addressing these factors, the smart trolley manufacturing company can achieve great success in the market.

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