QR BASED SMART CART

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Abstract:

The rapid growth of the world's population has resulted in a wide spectrum of demand from various industries. Planning a shopping excursion requires patience and preparation for consumers who need to visit retailers or markets for a variety of items. We must make smart use of technology in order to solve this issue. Numerous technological advances have led to an increasing mechanization of the world. Grocery stores and other establishments can implement a similar design to enhance the shopping experience for customers. Such a structure automates the payment process, saving customers from waiting in line to complete their purchases. The products describe above can be located on several Walmart racks, and our suggested strategy provides the quickest way to get them. To implement our strategy, we require AI-Thinker ESP camera, Liquid Crystal Display (LCD), Stepper motor, I2C module. By doing so, the leadership team will be able to allocate stock according to continuous customer demands and forecast the sales pace for each specific product. Overall employing this will method guarantee that regular Walmart customers have the finest shopping experience possible. By offering a computer tracking and payment system, smart grocery carts increase customer satisfaction and maintenance costs. However, current cooperation techniques demand high costs from startups in the food selling company because they require monthly shop layout changes or cloud service decisions. In this project, we have developed a low-cost, userfriendly technology that integrates the advantages of smart supermarket carts into conventional shopping carts.

Key words: AI-Thinker ESP camera, Liquid Crystal Display (LCD), Stepper motor, I2C module

Introduction:

Traditional manual checkout and invoicing procedures in retail establishments can frequently be laborious and error-prone. The smart billing carts is a novel technological approach that uses the scanning of QR codes technology to overcome these problems. Customers will have a more effective and flawless shopping experience which seeks to improve the product administration and invoicing process. Incorporating a number of technologies, the intelligent billing cart places a major emphasis on QR code scanning. Each item in the store has a distinct QR code that provides useful data, like the product's specifications, price, and stock level. With their smartphones or special scanning equipment built right into the cart, customers may quickly and easily scan the QR code.

When the QR code is scanned, the Smart billing a cart is able to retrieve product data from a centralized database by detecting the QR code. Manual pricing searches and catalogue browsing are no longer necessary as a result of this. Customers can view information about the products that have been scanned, including pricing and any discounts or special offers, on the built-in display of the cart. The ESP32 microcontroller module is a powerful and adaptable tool. It is the replacement for the well-known ESP8266 module and provides more advanced features and capabilities. There are numerous development frameworks and coding languages that can be used to code the ESP32. An Arduino IDE, which offers a simple platform for developing and publishing code to the module, is the frame work that is most frequently used. Customers won't have to wait in lengthy billing lines thanks to the proposed technology, which also lets them pay instantly for their purchases. The product information is directly accessed by the consumer. Customers tastes for the product and use of the product influenced by this information, which also enables them to choose the finest possible product. A customers current shopping list can display items from their current shopping list can display items from their current shopping list can display items for their purchases and organized based on necessity or budget. Additionally, its aids in reminding the consumer to buy the remaining goods.

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The ability to extract information wirelessly allows customers to walk around the store freely and engage with product information with ease. The integration of these technologies planned to best amuse the customer. Customers can obtain the highest- quality product by employing the suggested technology. A proposed method to support the shopping process using shopping cart automation can be simply deployed in real-world circumstances as a lesson.

Literature review:

Existing method:

Customers frequently find themselves standing in long queues, losing valuable time it could be used for other important tasks. These prolonged wait times not only make us frustrated but also reduce our daily productivity. Our project intends to address these issues by bringing creative solutions that optimise all aspects of shopping since we recognise the need for a more effective and simplified approach to supermarket shopping. We seek to drastically cut wait times, improve customer satisfaction, and increase revenue by utilising technology and implementing clever methods. People often find confused perched in front of their electronic devices, unsure of the true cost of a product. The experience of shopping online can be hampered by this lack of transparency, which can cause uncertainty and reluctance.

Proposed method:

Our project focuses on the innovative concept of implementing a smart cart system to enhance the traditional shopping experience. The retail sector has recently experienced considerable technological breakthroughs, which have sparked the emergence of clever solutions geared at enhancing many parts of the shopping experience. Smart carts, which do away with the requirement for customers to wait in long lines to buy their preferred products, are one such option. Through the use of clear and simple pricing details on each product, smart carts allow customers to easily add things to their cart. We want to tell customers about the overall amount they will pay. By doing this, we hope to increase consumer happiness and produce a purchasing experience that is easier and more informed. In order to improve the overall purchasing experience for customers, we want to identify the gaps in the existing literature and suggest a reliable strategy of our own smart cart implementation.

Methodology

Block Diagram



Fig 1. Block Diagram at customer cart



Fig 2. Block diagram at owner mart

Hardware Specifications 1. ESP32 camera

2. I2C LCD driver module



Fig 3.1 ESP32 camera



Fig 3.2 I2C LCD driver module



Fig 3.3 LCD Display



Fig 3.4 ESP8266



Fig 3.5 Stepper motor

4. ESP8266

3. LCD display

5. Stepper motor

6. Tactile Buttons



Fig 3.6 BC547 Transistor

7. DC-DC Buck module



Fig 3.7 DC-DC Buck module



Fig 3.8 ADC Module



Fig 3.9 Multiplexer



Fig 3.10 Resistors



Fig 3.11 Capacitors

8. ADC Module

9. Multiplexer

10. Resistors

11. Capacitors

12. Buzzer



Fig 3.12 Buzzer



Fig 3.13 LCD display

Working and it's Principle

The main goal of our project is to create an intelligent online billing platform that makes use of the capabilities of many components to speed up the purchasing process. The ESP32-CAM module, which is integrated into the system and effectively reads QR codes and recognizes the products they refer to, is the brain of the system and ESP32-CAM module, which depends on the microcontroller known as ESP32, adheres to fundamental principles to provide an effective and adaptable camera module for embedded devices and Internet of Things (IoT) applications. It enables developers to quickly incorporate camera features into their projects by combining and the dual-core processing strength and low-power operation of the ESP32 with a camera module. It enables developers to quickly incorporate camera features into their projects by combining the dual-core processing strength and low-power operation of the ESP32 with a camera module. It enables smooth wireless interaction and transfer of data due to its integrated Wi-Fi and Bluetooth connectivity. Additionally, the ESP32-CAM offers flexibility because to its open-source ethos, enabling programmers to use the SDK and a variety of libraries for personalization and quick prototyping. The ESP32-CAM is a great option because of these principles for applications including surveillance systems, visual data processing, and image and video capturing. The ESP32-Cam module collects and interprets QR codes using cutting-edge computer vision techniques, enabling precise product identification. Afterward, using crystals of liquid that can be controlled by an electric field, the LCD (Liquid Crystalline Display) works. It is made up of layers that include electrodes, polarizing filters, crystals of liquid and a backlight. A black pixel results when no voltage is provided because the liquid crystals bend the polarized light and prevent it from passing through the second polarizing filter. The liquid crystals, however, align themselves when a current is provided, permitting light to flow through before producing a bright pixel. The LCD regulates the alignment of fluid crystal to produce patterns of dark and light pixels, generating text and images on the display by carefully applying voltages to various electrodes and 16x2 LCD screen shows the item's price, giving customers access to real time pricing data. Users can push system-integrated tactile buttons to increase the system's total worth by adding the displayed cost and the principle. The operation of tactile buttons, commonly referred to as pressing them or transient switches, is based on the straightforward electrical contact theory. In order to initiate an action or response, the primary operating concept entails physically pressing the button, which briefly completes an electrical circuit. The spring mechanism and the metal contacts are the two major parts of a tactile button. A circuit is open when a button is not depresses because the spring maintains the contacts apart. The spring contracts when a button is pressed, pushing the metal connections together and closing the circuit. A seamless and simple experience is guaranteed if customers opt not to hit the button because the system **Copyright @ 2023 Author** Page | 58

13. Jumper wires

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automatically ignores the input. Continuously increasing is the total cumulative price giving users a thorough breakdown of their spending, updated and shown on the LCD screen. Our project uses the ESP32-CAM module in addition to other parts like the ESP8266 module for smooth communication, the stepper motor for effective product handling, and the DC-DC buck module for ideal power management. To improve the system's usability and user experience, we also make use of an ADC module, multiplexer, buzzer and jumper wires. The project is created using the Arduino IDE a user-friendly interface for programming and downloading code to the Arduino microcontroller boards is provided by the Integrated Development Environment (IDE) for Arduino, which is a software platform.

But novice and expert users can easily construct applications using its streamlined interface and collection of resources. The Arduino IDE is an attractive option for prototyping and designing an extensive selection of projects, from straightforward blinking LED demonstrations to intricate robotics and Internet of Things applications. This is due to its user-friendly interface and robust community support, and for quick program uploading, an AI Thinker module intelligent machines (AI) and the Internet of Things (IOT) are two fields in which AI Thinker, a well-known technological business, specializes in the creation and development. The modules and products produced by AI Thinker, which places a major emphasis on development and research, are of the highest caliber. They provide an extensive selection of cutting-edge technologies, such as communications modules, microcontrollers, sensor parts and intelligent hardware stacks. Our project seeks to offer an all-encompassing smart online billing system that transforms the purchasing experience through the integration of all these components.

Results







Fig 5.2 Working model at Customer cart



Fig 5.3 Sample products



Fig 5.4 Product when switch is pressed

Description-

Working model at Owner mart: Owner mart mainly comprises of ESP8266 and stepper motor. Here stepper motor is used to push the products out of rack when switch is pressed which is interfaced with ESP8266.

Working model at Customer cart: Customer cart mainly comprises of ESP32-CAM and LCD, the customer has to place the product in front of the cam to scan the QR code. The price and name of the product will be displayed on the LCD.

Sample products: Here two sample products are taken, Product A and Product B which are placed in the racks.

Product when switch is pressed: When the customers need a product, he has to press the switch, the product comes out from the rack with the help of stepper motor interfaced with ESP8266.

Conclusion

After reading several articles on intelligent shopping systems, this essay was written. To summarize, it can be said that smart shopping systems, which combine different technologies including

ESP8266, AI Thinker Camera, and web applications, can make shopping simple and quick. A lowcost intelligent cart system has been created that can be incorporated into already existing enterprises without requiring extensive remodeling or a cloud service subscription. We created a low-cost, simple-to-use gadget that gives average shoppers access to smart cart benefits. The solution not only enhances the client experience, but it also gives business owners useful data such as consumer purchasing trends. It will undoubtedly transcend peoples' purchasing preferences and routines. This can increase sales for malls while also giving customers a top-notch interactive experience and helping them understand what kinds of things they wish to buy.

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