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Automatic Billing Trolley

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ABSTRACT: The advancement of technology has brought about many conveniences in our daily lives, including in the supermarket where customers often have to wait in long queues during peak hours, especially during discount offers or weekends. This has led to the need for a contactless system, which is not only more time-efficient but also beneficial for public health. To address this issue, a project has been developed to create a contactless shopping experience using a Raspberry Pi-based system. The system is equipped with load cells, sensors, and motors integrated into the shopping trolley, which also features a barcode scanner. Once the shopping is complete, the system generates a bill and sends it to a designated app. The user can then make payment using the app's wallet, and once payment is confirmed, the trolley door will unlock, and the user can collect their purchases. This innovative solution aims to improve the supermarket shopping experience by reducing wait times and minimizing contact between individuals, thus promoting public health and safety.

KEYWORDS: Smart shopping Trolley, Barcode Scanner, Raspberry Pi, LCD Display, Android Studio, Weight Sensor, Python.

I. INTRODUCTION

The electronic technology of today is mainly based on embedded systems, with the aim of making life easier for people. Shopping malls are a popular destination for people to purchase their daily necessities. However, the traditional shopping method of using a trolley and standing in long queues for billing is time-consuming, which is not ideal for the busy lifestyle of today's generation. Hence, it is necessary to develop a smart shopping trolley system that can provide real-time status updates of the trolley and its contents. The system can be monitored using sensors, such as weight sensors, that are capable of transmitting data via the Internet of Things (IoT) network. This makes the monitoring process more efficient, faster and decisions can be made in less time. The smart trolley also features a barcode scanner to eliminate the need for manual scanning of each item during billing, saving time for both customers and retailers. The system is reliable, user-friendly, and helps to avoid standing in long billing queues. The use of an LCD display makes it easier for users to view the values of present and maximum capacity. The paper's aim is to provide a smart shopping trolley system that is efficient and user-friendly, enhancing the overall shopping experience for customers.

II. RELATED WORK

In [1] authors: Result obtained from the above system: This is the database of the products in which the decoded value of the barcode is compared with the database. In the database, we have stored every detail of the product like barcode value, its name, weight of the product and also its price. Depending on that the details are displayed on the LCD. Developing a platform for checking the cross weight of products for security purposes at the exit of the mall. II. Applying the IOT concept to the billing counter so that the total amount of purchases made in the mall is sent to the head office for accounting.

In [2] authors: The modern age of technology where most of the customers have to wait at the supermarket for shopping as it is a very time consuming process. The barcode-based billing process makes waiting in long queues a hassle during discount offers or when supermarkets are crowded during weekends. In this context, an Internet of Things (IOT) based smart shopping cart is proposed which includes radio frequency identification (RFID) sensors, Arduino, micro-controller, Bluetooth module and mobile application. RFID sensors rely on wireless communication. One part is the RFID tag attached to each product and the other is the RFID reader that efficiently reads the product information. After this, information about each product is displayed in the mobile application. The customer easily manages the shopping list in the mobile application according to their preferences. The purchase information is then sent wirelessly to the server and billing is automatically generated. This pilot model is designed to eliminate time-consuming

procurement processes and service quality issues. In the future, the proposed system can be easily implemented and tested on a commercial scale under real conditions. Hence the proposed model is more competitive than others.

In [3] authors: With the improvement of Wi-Fi generation there are many areas in which we can use generation and currently it is beneficial to use Wi-Fi generation. In this paper we present our approach to an automated shopping trolley using a Raspberry Pi tool combined with a bar code scanner and LCD display. We know that during income and holidays we see rush in supermarket and this billing method takes more time and customer can't stand in long queue for billing reason, so we can use automatic shopping trolley here. It has a bar-code reader, a Raspberry Pi device and an LCD display. Using this trolley the client will self-use the product with the help of self-use and keep the invoice together. So, there can be no long queue inside the grocery store at the billing counter for billing purpose.

III. PROPOSED METHODOLOGY AND DISCUSSION

Problem Definition

Nowadays, billing process is done either manually or using barcode readers the problem with such system is that it can scan only a single product at a time and it is very lengthy process, this consumes a lot of time during the billing process. So to overcome this problem we are developing a automatic billing trolley.

Proposed Experiment Work

Our Automatic Billing Trolley using Raspberry Pi is based on real time data that is gathered by the variety of hardwares such as camera, IR sensor, aplifier, load cell, servo motor etc, and by real time barcode or QR code. We can scan both QR code and Barcode. Scanning QR code or Barcode which will display the data on mobile application like price, product name.

Description

To start shopping, the customer must scan the unique QR code on the trolley using a specially developed app for billing and payment. The app checks the database for the trolley number and grants permission for that particular customer to shop if there's a match. During shopping, the customer must press a button to add the product and cost. Removing an item from the trolley is only possible using another button, and it can only remove the last added product. The camera captures the barcode ID of the product, and a buzzer indicates that it's been added to the trolley. The image is transferred to the Raspberry Pi for authentication and comparison with the product database. The database stores all product information, including the name, price, and weight. The price of each product added to the trolley updates on the LCD display, and the total cost updates with every addition. The app displays the list of billed products and the total amount. Weight checking serves a security purpose, ensuring that no one can remove the barcode or ID and add an item to the trolley. At the end of shopping, the customer selects "pay bill" on the app, and the final amount displays on the app. Payment can be made through the app wallet, and once successful, the trolley deregisters the user and sends a notification to open it for the customer to collect their products.

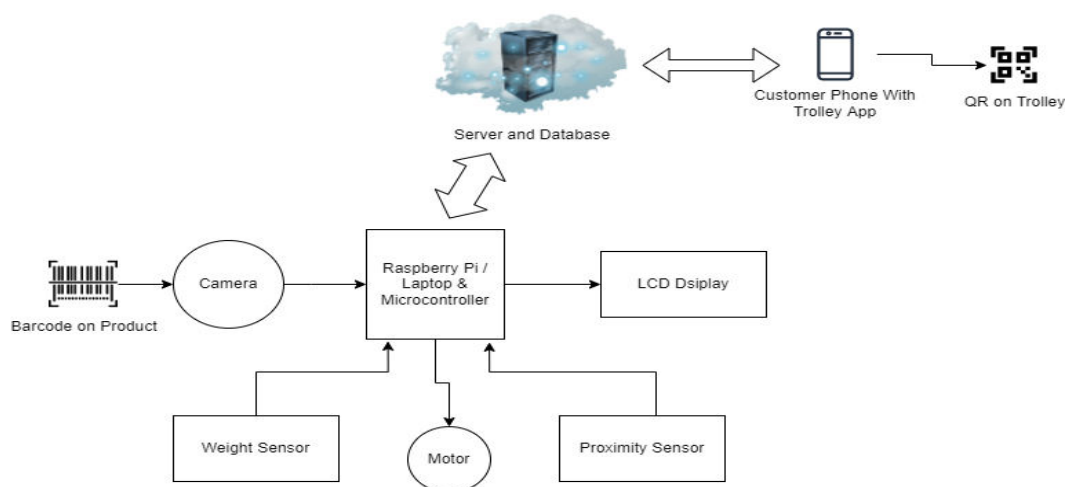


Fig. Block Diagram

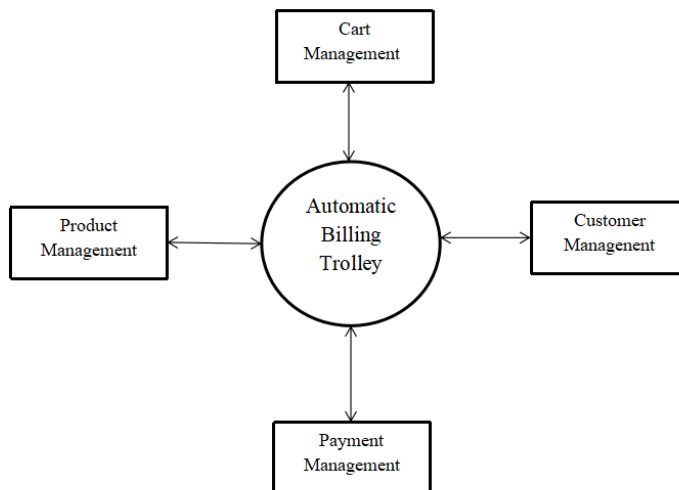


Fig. 0 Level DFD

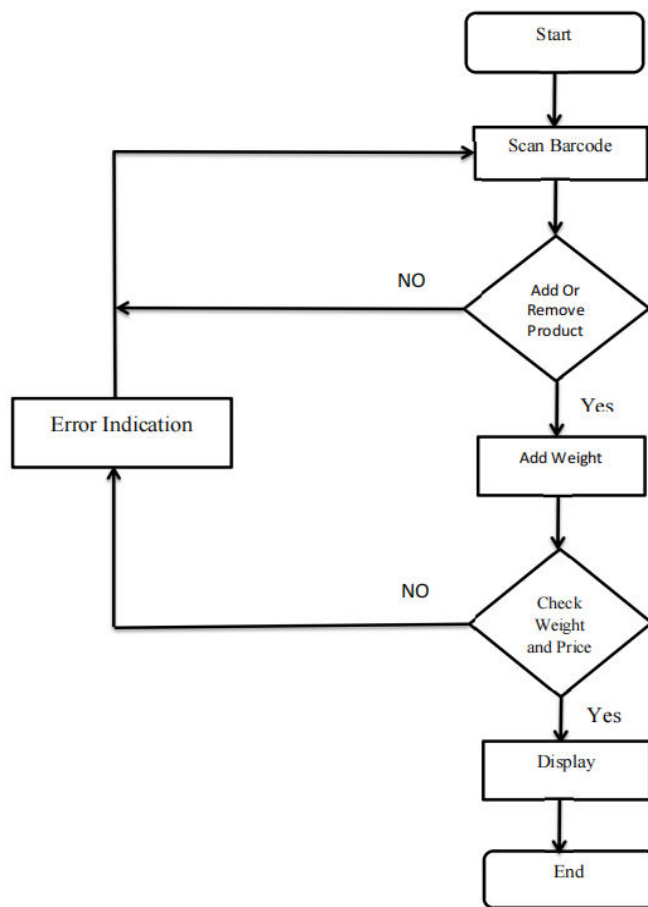


Fig. 1 levelDFD

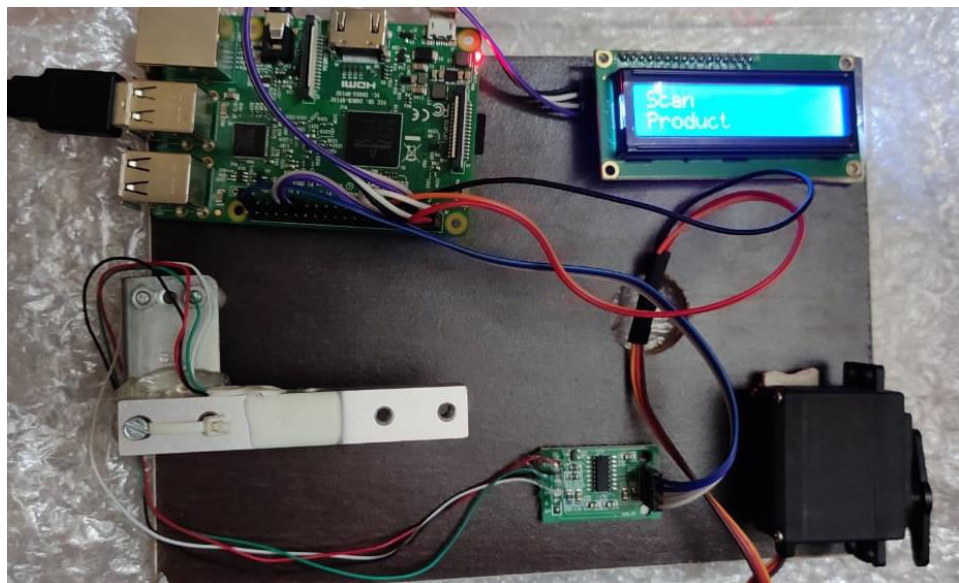
Barcode and QR Code Detection-



Status displayed on LCD-



Circuit Image-





IV. CONCLUSION

This innovative project idea can be used to purchase products in places like shopping complexes, supermarkets and malls. The product is scanned and placed in the cart, all the necessary details of the product will be displayed on the LCD screen. Hence, this project will help improve security and also reduce procurement time. It also provides customers with an enjoyable and user-friendly shopping experience.

V. FUTURE WORK

With the help of optical sensors, motors and motor drivers, we will design the trolley in such a way that it follows the customer buying the item and maintains a safe distance between the customer and itself. The movement of the cart can be automated using sensors. This way there is no need to pull a heavy trolley.

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