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Smart Shopping

Y.Alexander Jeevanantham[a], M.Aparna Raji[b], A.Gayathri[c], K.Kaushalya[d], V.Keerthana[e]

[a]Assistant Professor, Department of EEE, R.M.K. Engineering College, ajm.eee@rmkec.ac.in
[b,c,d,e]UG Scholars, Department of EEE, R.M.K. Engineering College

Abstract

Today, people in the world are highly dependent on technology and our inventions are made with an idea 'instant'. But there are still some situations that waste our valuable time. One of them is our shopping time. The major drawback is the time we spend in the queue for billing as it consumes customer's time and also makes them frustrated. This situation is the source for our project. To avoid this queue issue, we try to develop a system that instantly shows the bill for products that the customer has taken. This can be done by using a barcode reader. It scans the products and increments the bill amount accordingly. Also, the product is counted using an IR sensor. The IR count is checked with the barcode reader count to ensure integrity and if not matched, a buzzer alerts the customer. There may be situations where a consumer wishes to remove some products and it can also be done by a similar process. The bill amount will be displayed on the trolley through an LCD and also on the consumer's mobile using an IOT application. Thereby, after purchasing, consumers can just pay their bill to the shop and leave. Thus, we have eliminated the time which the consumers spend standing in a queue. This can be implemented for smart shopping.

Keywords: LCD, IOT Server, Barcode Reader, IR sensor

1. Introduction

Technology drives the economy, which, in turn, fosters technology. The two are closely associated with one another during the event history of the citizenry. Economic activities have also been a key point for human social activities, and therefore the retail sector has been playing a dominant role within the economic activities of humans. It's a strategic industry of the economy. the entire volume of retail sales of China increased from 9.4 trillion yuan 5 years ago to 21 trillion yuan in 2016.

Compared with other traditional retail sectors, the supermarket boasts the following advantages:

(1) The structure and specification of various types of supermarkets are uniforms. The commodities sold in the markets are said to be packed and placed in various locations depending on their specification and weight. Customers can able to choose the items without help.

(2) The supermarkets use advanced devices such as computers, barcode, and POS machines, to allow the supermarket management to grasp the sales information from real-time, facilitate storage and packaging of commodities, and reduce monotonousness and fallibility. Also, to the working efficiency of workers is improved, sales volume boosted.

(3) The supermarkets are said to be large-scale and complete commodity types. Generally, the row operation development model is adopted. This way, stock can be replenished in large amounts, thus lowering the purchase cost of commodities, which are shared by several chain stores. This can also dynamically maintain the demand balance of each store. The customers can buy most of their commodities needed in their daily life in the supermarket. The large-scale and scientific management method of the supermarket greatly reduces the rate of

commodities. That’s why supermarkets are so popular among customers. They also function as a beloved consumption platform.

Many of the customers are used to buying articles of daily use in the supermarket. However, the market efficiency at present is not high. Customers experience the following two frustrations when shopping in the supermarket:

(1) A long queue at the check-out counter: After a detailed investigation, it was found that the reason for such a long queue is that the bar code scanning takes a long time. The commodities need to be taken out from the shopping bag one by one and scanned one by one. Even scanning alone takes some time.

(2) The missing customers: Many customers turn to the shopping guide when people are trying to find what they wish to buy but there are not many shopping guides available and many of them will promote commodities not desired. Also, many supermarkets are very big. Customers may easily get lost in an unfamiliar environment, and are unable to find the exit after shopping.

Based on an investigation into the above issues, the following conclusion is drawn:

Various technologies are said to be introduced in smart shopping. A supermarket may be a point where customers purchase products that are used in a periodic routine. Generally, for shopping of daily used products or special occasions customers require at least 30 minutes. After collection of all products, it's a hectic problem to face at a billing counter with a trolley.

[1] Benjamin Lewandowski, Tim Wengefeld & Sabine Muller [2020] presented a complete literature review on Socially Compliant Human-Robot Interaction for Autonomous Scanning Tasks in Supermarket Environments, a system for socially aware robot navigation for an honest range of service tasks in supermarkets. [2] Wenqian Hu, Jie Qiu&Fan Zhang [2019] presented a complete literature review on Control and Fetching Strategy of Goods-Picking Robot in the Self-service Supermarket, this involves the picking path of a six-degree-of-freedom (6 DOF) manipulator that was planned according to the order requirement for the problem such as small working space and various goods in self-service supermarkets. [3] Ning Jia [2017] presented a complete literature review on the Design of Rapid Supermarket Shopping Based on the IoT application. In this document, RFID and two-dimensional code technology are used to solve these problems. All these systems are cost-inefficient for a developing country like India. Some systems which are mentioned above employ RFID technology which may sometimes lead to inaccurate results.

So, we are defining a replacement idea for smart shopping which is understood as a smart trolley. After buying a product, the name and price of that product will display on the LCD Display. The system will also tell the user about the ingredients added to the purchased product. When a customer places a product within the smart trolley the Universal Product Code Reader will read the merchandise ID and knowledge associated with it. The cost of eachpurchased product will get automatically counted to the previous one. After total billing at the trolley, the IoT module is used to transfer all the data to the main billing section.

2. Proposed System

Block diagram:

In a world where technology is evolving day by day in different fields like artificial intelligence, machine learning, virtual 1 reality, touch commerce, internet of things, and so on. The main objective is to concentrate on the customer's needs and purpose because time is more important to everyone in the real world. But people spend more time in supermarkets. For example, customers purchase the items using a trolley. After purchasing people face many problems like waiting in a long queue for billing and without knowing the bill amount of purchased items. So, we implement a set-up using IOT application which consists of barcode Reader and LCD, when the consumer takes an item and put inside the trolley, that time barcode scanner scans the item and the price of the product are incremented to the bill through IoT Server and it will be modified to the billing session through IoT server and consumer also knows the value of money they spend on the items before billing itself. So they can add or remove according to convenience.

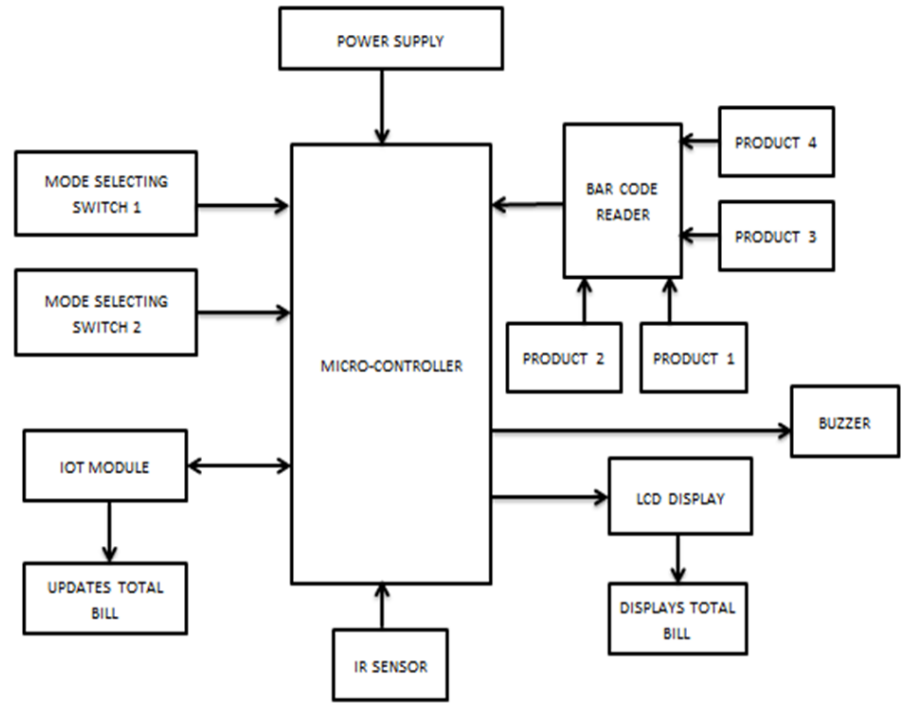

Fig. 1 Block diagram

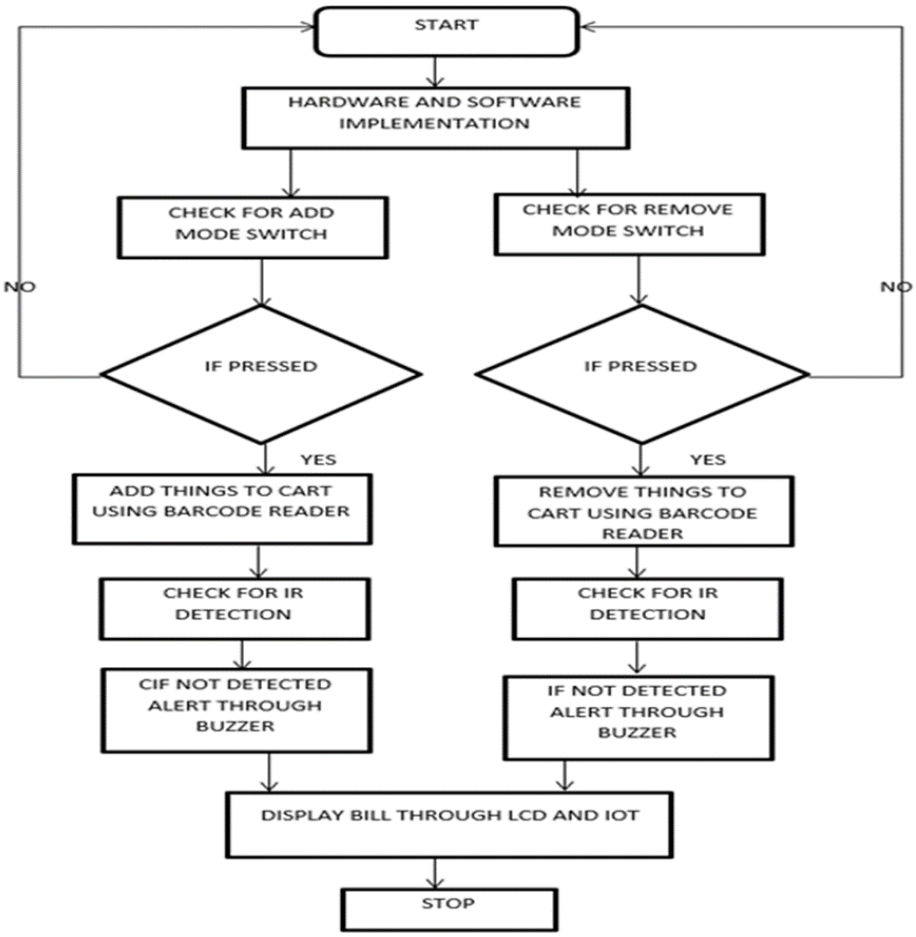

Fig.2 Flowchart

The process begins by adding the products to the trolley. For that purpose, two-mode selecting switches are used. One is adding mode and the other one is remove mode. When add mode is pressed, the products can be added after undergoing the scanning process (using barcode reader) and IR detection (using IR sensor for counting the products). In case, if the number of products scanned is not equal to the IR count, the buzzer will alert the customer. The amount of the products scanned will be displayed on the LCD and simultaneously on the customer's mobile through an IoT application.

There may be situations where the customer wants to remove the products he added, in that case, the remove mode can be pressed (after releasing the add mode). Now the products can be removed from the trolley following the similar procedure carried out for adding. The cost of the removed products will be subtracted and the new bill amount will be shown on the LCD and also on the IoT application.

3. Output

Initially, the mode selecting switches(Fig.3) is in a released state i.e., no process can be carried out. Depending on the requirement we can select the mode. The right side switch is pushed and then the left side switch is released to add the items to the trolley. The left-hand side switch is pushed and then the right side switch is released to remove the items from the trolley.

Fig. 3

Now the system(fig 4) is in 'add' mode. The customers can add their products to their trolleys after scanning their items. The scanning process involves both IR detection and barcode reading of the product. The IR sensor is used to detect the number of items added/ removed.

Fig.4

Now a product (e.g. Paste) is getting added to the trolley (fig 5).The count is incremented and the process continues unless there is any mismatch between the barcode and IR count.

Fig.5

Now a product (e.g. Medimix) is getting added to the trolley(fig 6).The count is incremented. The process can be continued as per the customer's needs.

Fig.6

Here the system is in remove mode hence products can be removed from the trolley as per the customer requirement following the similar procedure of adding.(fig 7)

Fig.7

After purchasing, the bill amount and the count will be displayed in LCD(Fig.8) as well as it will be updated on our mobile through an IOT application (Fig.9).

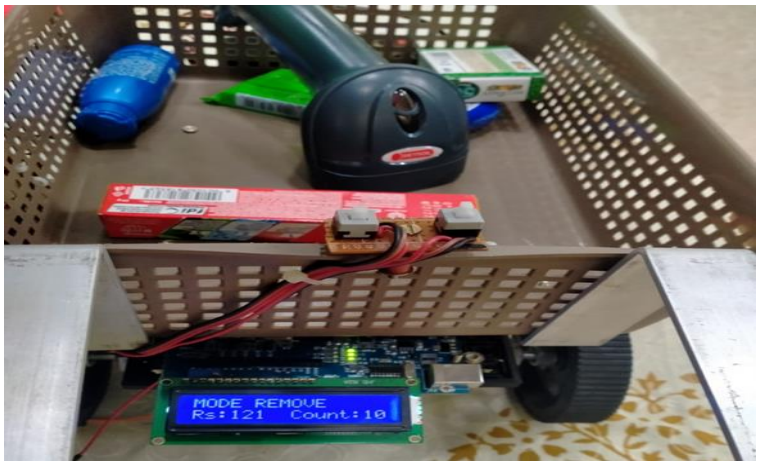

Fig.8

sensor_id	user_id	sensor1	sensor2	sensor3	sensor4	sensor5	sensor6	sensor7	sensor8
8687	44	TOTAL RS:	20	TOTAL COUNT:	1	0	null	null	null
8688	44	TOTAL RS:	28	TOTAL COUNT:	2	0	null	null	null
8689	44	TOTAL RS:	38	TOTAL COUNT:	3	0	null	null	null
8691	44	TOTAL RS:	10	TOTAL COUNT:	1	0	null	null	null
8692	44	TOTAL RS:	25	TOTAL COUNT:	2	0	null	null	null
8694	44	TOTAL RS:	30	TOTAL COUNT:	3	0	null	null	null
8695	44	TOTAL RS:	50	TOTAL COUNT:	4	0	null	null	null
8696	44	TOTAL RS:	58	TOTAL COUNT:	5	0	null	null	null
8697	44	TOTAL RS:	50	TOTAL COUNT:	4	0	null	null	null
8698	44	TOTAL RS:	30	TOTAL COUNT:	3	0	null	null	null
8699	44	TOTAL RS:	25	TOTAL COUNT:	2	0	null	null	null

Fig.9

4. Conclusion

This project's “Smart Shopping” name suggests that the billing technique is modified and made simple. It is a less time-consuming process when compared to the usual billing technique. It is highly reliable and provides ease for shopping as we don't need to stand in a lengthy queue. We conclude that the proposed system is time-saving and helpful i.e., faster check out process. This system reduces the required number of salesmen at the counter.

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