SMART SHOPPING TROLLEY WITH AUTOMATED BILLING

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Abstract—**It is very important issue with people all over India to stand in a long queue to shop particular products from shopping malls. It consumes a lot of time for people to shop products from shopping malls during billing and checkout of products. During situations like COVID pandemic people suffered a lot due to overcrowd in supermarkets during billing and checkout. The proposed system will consist of an Arduino UNO and RFID scanner is used to scan the RFID tags from the product and an Infrared (IR) sensor for theft control purpose and a LCD to display the item purchased and the total cost of the items purchased and a WIFI module to communicate with the shop owners with an app. Through that app the owners will come to know the items purchased in a particular trolley number and the amount to be paid. Through this the customer can pay through online/physical payment and checkout the product with less waste of time and can experience contactless and safe shopping.**

Keywords—**Queue avoider, Arduino UNO, IR Sensor, Billing, Shopping mall.**

I. INTRODUCTION

Weekends and holidays will see a significant increase in traffic at retail centres in metro areas. This worsens when there are large discounts and deals. Nowadays, individuals buy a wide range of things and load them into the cart. Customers should come to the counter to pay after making their entire transaction. The cashier creates a bill using a laborious process involving a barcode scanner [1].
As a result, there are lengthy lines at the billing counters. To solve the aforementioned issue, this project proposes to design and create a smart cart for use in malls. To do this, every item in the mall needs RFID tags, and every trolley needs an IR sensor, an RFID reader, an LCD screen, and an Arduino [2]. An item's code is immediately recognised when it is placed in the smart cart, the product details are shown on LCD, and the price is subsequently applied to the final bill. If a consumer wants to take a product out of the smart cart, they can do so, and the cost of that particular product is removed from the total cost.IOT works well for this process [3]. The mobile application displays the items purchased and total cost.The customer can pay the bill amount through offline or online payment methods. Online communication necessitates user network connectivity, and the controller will build bridges between users [4]. The proposed concept creates a solution for improved IOT shopping experiences in malls [5-8].
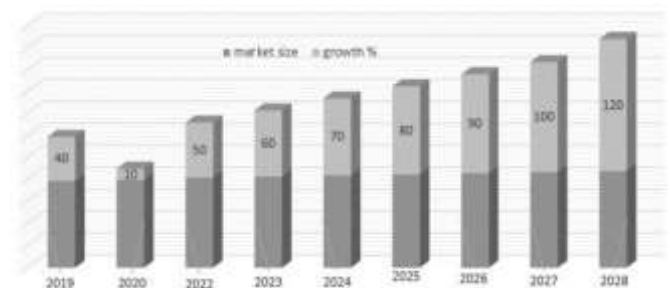

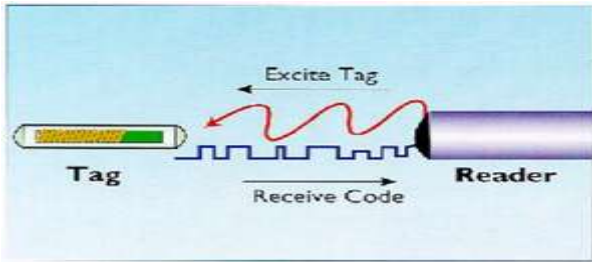**Fig. 1.** Global market research on growth of smart shopping cart

Fig.2. Interaction between RFID tag and RFID scanner

Independence day sale in Big Bazzar made crowd at bill Counter

Fig.3. News from Indiatimes

II.TECHNICAL SPECIFICATIONS

The objectives of this prototype smart shopping cart are
1. To offer a technologically advanced, inexpensive, and easily expandable RFID scanner solution for retail.
2. To accelerate the purchasing process.
3. To provide easy shopping experience.
4. To reduce the time consumption while standing in the long queue for billing the product.
5. Improving the payment mode which can be done through either physical or online payment

The full hardware implementation of this model is divided into four categories. They are
- Connection between Arduino to RFID scanner
- Connection between Wi-fi module to Arduino
- Implement the connection between Arduino to LCD
- Connection between IR sensor to Buzzer.

The following components are used to build this proposed prototype model.
1. Arduino UNO
2. IR sensor
3. ESP 8266
4. RFID reader
5. RFID tag
6. LCD
7. Buzzer
8. MCB board
9. Software application

III.DESIGN IMPLEMENTATION

The RFID reader or scanner which is connected to the microcontroller reads the RFID tags on the products to give information about the products and its prices. Once the tag is read by the reader, it transmits the data to the microcontroller which is displayed in the LCD [9]. The microcontroller then sends the information to ESP8266 which is a Wi-Fi module used to send information to other devices that is connected through Internet The other device in this instance is an application that displays the total cost of the product when it is added to the cart [10-11]. On the LCD built within the cart as well as on the app, the item added to the cart and its price will be shown. When the product is removed it automatically it detects the amount shows on the LCD as well the in the app [12].
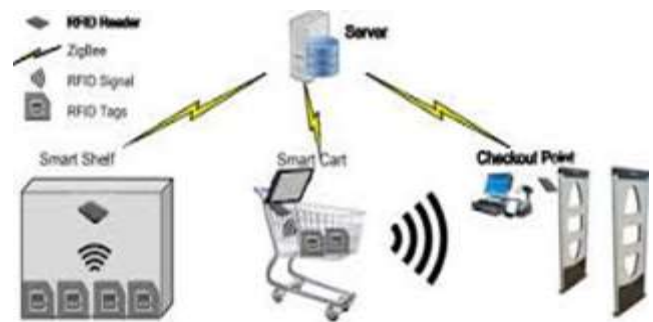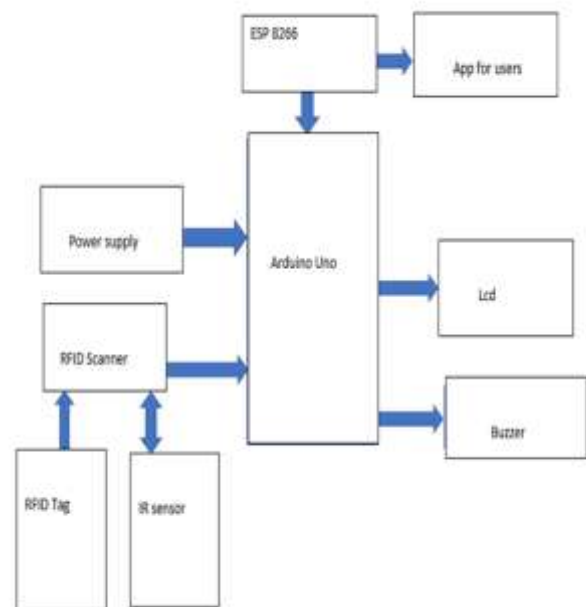

Fig.4. Working of smart cart

Fig.5. Block Diagram

IR Sensor is used for the detection of theft cases like adding products into the cart without being read by the RFID reader. Once IR Sensor detects if a product is put into cart without being read in the reader. it passes the sensed output value to the microcontroller. If the product is read by reader and then on IR sensor then it confirms that the product is taken into account for billing process. Otherwise, only if IR sensor is read then it is considered as theft as the product is not taken for the billing process which placed into the cart. This will alert the shopkeeper that the product is taken without being in the billing process [13-14].

IV. RESULTS AND DISCUSSION

When the product placed in the cart it shown in LCD displays the results as shown in the Fig 5. When the power supply is given to scanner, it is in searching stage. when no product is placed it shows it Waiting for the card as shown in the Fig.6.Once the RFID scanner detects the product is placed. And the product should be placed horizontally because should cover both IR sensor and RFID scanner otherwise will send an alert message to the App handled by the user which shows theft detected as shown in the Fig.7.

Fig. 6. Cart showing the products

Fig. 7. After placing a product in cart

In this proposed project, we implement the connections between the Arduino, LCD, Wi-fi module, Buzzer and thus we created an overall outcome of the project. The operation of this model is initialized with the given program and the RFID scanner starts to detects the product which are placed or not. The output is shown in the LCD display and now it is in a searching condition.
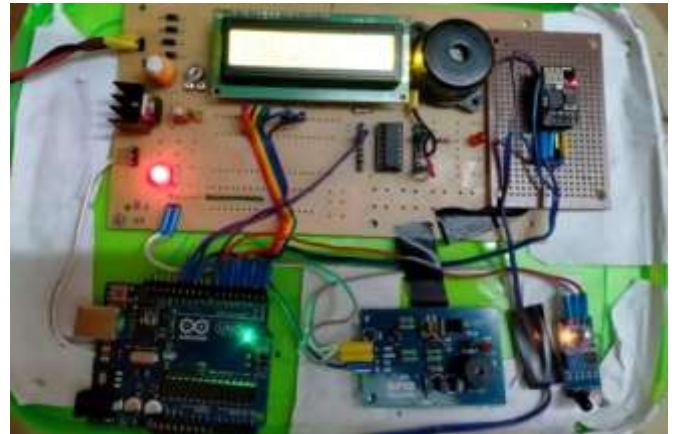

Fig. 8. Top view of project

This work not only proposed for easy shopping but it also ensures the time spent by the customers are reduced. And providing great experience by using IOT and RFID technology. This project focused on the just displaying total cost in the app by replacing them using a mobile application.
The Mobile application which allows the customer to pay the amount directly through the internet by setting Passcode which shows complete detail about purchase like product cost and their quantity and now the payment option improved like the customer either they can choose its online or offline mode of payment by using Zigbee technology. Indoor Navigation can also be implemented which allow user to finds the product easily in the supermarket.
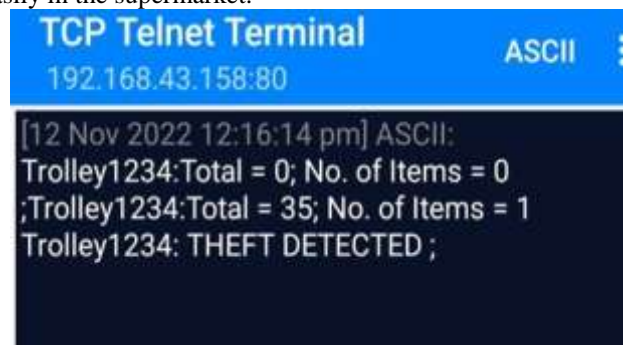

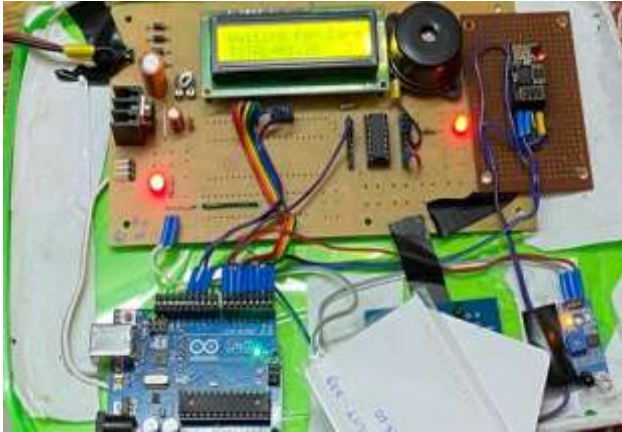**Fig.9.**Products displaying in the app

Fig. 10. Project when buzzer is turned ON

V.CONCLUSION

Mostly in supermarkets being queued for billing is a major issue for the customers as their time is wasted lining in the queue. Hence, to overcome this issue, the designed prototype reduces the time for standing in the queue as the product billing process is half done in the cart itself. This paper's major goal is to stop people from wasting time waiting in lines. The wi-fi module is used to communicate the customer's alert message and the product billing information via an app. The designed prototype will help to make the billing process easier and time saving for the customers.

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