RFID Based Smart Trolley for Automatic Billing System

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***Abstract*—Nowadays the shopping has become a huge trend in urban or metropolitan cities, more at weekends. Due to this the super markets, big bazaar etc., has named very well because of availability of all the things at one place. Trolley is used to make shopping easy and simple. It is problem for consumers to stand in long queue for belling and very difficult to follow covid rules at covid-19 time. As day-by-day technology is improving in all fields, the smart trolly based on IoT with advanced billing system, Smart trolly is installed with RFID tag, LED display, barcode scanner and raspberry-pi. The list of the items and cost of items is displayed on the LED display. The payment can be done through online. Consumer can do shopping within adequate time and can have profit for the retailers.**

Iot based on trolley is very easy to shop and secured, using Bluetooth customer connected with the mobile application which will show purchase items in the display of the mobile then pay the bills through the mobile application.

***Keywords*— *IoT – Internet of Things, LCD – Liquid Crystal Display, RFID – Radio Frequency Identification*.**

I. INTRODUCTION

Humans are constantly trying to invent something new. The main motivation behind this reform or This has been done with the aim of limiting the development of new technology and make daily tasks less demanding, stressful and saving Time, can be accessed independently of different domain. The app helps customers find items in the right stock by giving them new insight, along with a grocery store course guide, as well as data on things on the rundown. It contains information background on the items purchased by the customer. It empowers customers to use the information for the next purchase. The general store can perceive the pattern and then collect stock or advance offers as needed [11].

Nowadays, shopping is one of the most important functions that people invest in an impressive amount of energy and time. In general, the vast majority of the general population shop for an hour or more every day. Customers have a lot of trouble during shopping, one of them is waiting in queue to bill for products and most of the customers are budget shoppers. Most of the time they will know that the bill is more useful than the budget value and there will be problems with removing the products [1]. Sometimes, shoppers are unable to buy all the products they need and lose some. Second, shoppers nowadays are more comfortable buying from home than going to the store. Then, the next difficulty is to locate the products here. Above all, it is a completely time-consuming process. So overcome this problem a smart trolley with an automated billing system is proposed. With these trolleys Customer can do their shopping comfortably and pay close attention to their shopping list without needing to drive around in their shopping cart. This type of advanced system used in various application such as big-bazars, demarts in a shopping center present existing billing system are operated manually. When after the total purchase the person as go to the payment billing center there is a long queue at the billing center. The upcoming days remove the existing billing system to install the RFID based smart trolley with automatic billing system. This smart trolley having number of components such as RFID reader, RFID tags Arduino, LCD, HC-12 wireless module etc., [10]

II. LITERATURE SURVEY

In this paper we are trying to talk about our project ideas. In this project we using an Arduino UNO board, LCD display, EM- 18 Reader, RFID tags, Bluetooth and wirings. When the customer starts shopping, each product we are attached a unique code RFID tag. The unique code of RFID tag scanned by the EM-18 Reader and amount of the product displayed on the LCD display. Currently, due to covid-19 pandemic government was order to maintain the social distance in the public places but it is no going practically. To overcome this challenge, a smart trolley based on the IOT with an advanced billing system that makes shopping easier and fast and also maintain the social distance as possible as and also avoids standing in the long queue.

Dhavale Shraddha (2016) - RFID is used for scanning purchased items and the information is stored online or in a central bill to be collected in the database. It uses a web application to do the whole shopping. It requires the management of a web application server. Customers have not taken any necessary steps for accidentally falling trolley products. IoT based intelligent trolley for shopping mall by Dhavale Shraddha (2016), RFID technology applied for billing Purchasing and IoT in shopping malls are used for bill management through the ESP module. Payment amount information is sent to the server, through which the central billing unit deals with the customer's payments. The ESP module acts as a short-range Wi-Fi chip for wireless communication. But there is a drawback that involves restrictions such as distance Interference. If there are too many customers the server will be slow and the internet connection should be stable so that it will run smoothly without any problems [8].

PT Sivagurunath, P. Seema, M Shalini, R Sindhu, they have already done "smart shopping trolley using RFID value". Existing shopping systems are using bar code scanners in malls. Each product in this project contains bar

codes. Using the bar code scanner, the bill is generated by manually scanning all the products. This process takes a long time and increases the queue. Consumers spend more time shopping there [5].

S.K. Shankar (2021) – In the present days, people are more attracted to buy special product from supermarket. In those cases, we are finding solutions for the customer need to wait in the billing queue to finish billing process of the in selected product. Currently, due to covid-19 pandemic government was order to maintain the social distance in the public places but it is no going practically. To overcome this challenge, a smart trolley based on the IOT with an advanced billing system that makes shopping easier and fast and also maintain the social distance as possible as and also avoids standing in the long queue [4].

III. METHODOLOGY

A. SOFTWARE REQUIREMENT SPECIFICATION:

1. ARDUINO IDE:

Arduino IDE (Interested Development Environment) is the software for Arduino. The Arduino IDE is for testing with unique characteristics. This is used for coding and debugging the errors from the program. This is for many types of software available for operating the system like windows, Linux. Supporting languages are C/C++. This software is open source. Users can write their personal functions to add software. Many types of Arduino software like Arduino Ethernet, Arduino mega, Arduino Leonardo. The structure of Arduino is saved as.ino [2]

2. ARDUINO UNO:

Figure 1: Arduino UNO

Arduino is extended version of microcontroller and as internal power supply shown in the Figure 1. The Arduino is used easily for both hardware and software and is an open-source software. Arduino having programmed with circuit board and this is a ready to use the program, so this is called as Arduino IDE and using write the program to the PC with physical board.

The key points are -

- These are used for study of input with analog or digital alerts from the specific sensors by activating the motors, switching of LED and for different actions.
- Arduino IDE is a type of microcontroller which can manipulate a set of instructions and thereby can send it Arduino board functions.
- Arduino board makes use of inbuilt power supply for its operation.

3. RFID READER:

EM-18 RFID reader receiver has nine pin devices, around nine pins 2 pins can not to be used or connected. EM-18 RFID reader is used to read the RFID tag, this RFID tag is 125KHZ. It has less form rector less power consumption and we can use easy. Its working voltage 4.5 volts to 5.5 volts and consuming current 50mA. EM-18 RFID reader frequency range 125KHZ and reading distance about 8cm to 10cm i.e., depends on the tag.

4. RFID TAG:

RFID i.e., “Radio frequency identification" it utilizes the radio frequency technology. The radio frequency waves transmitted from RFID tag to words the RFID reader. It is also called an RFID chip. In RFID tag there are two types:

a) Battery operated RFID tag
b) Passive RFID tag

B. BLOCK DIAGRAM

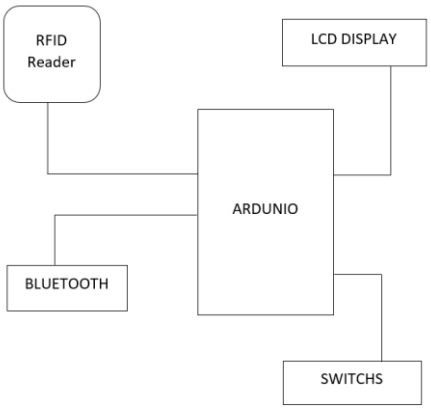

Figure 2: Block diagram

A Radio frequency identification of 125KHZ tag is along with every product in the super-market and mall etc., and the em-18 reader is along with the carrying or moving equipment like trolley. When the customer picks up the product in a mall, the RFID tag along with item scanned by wireless transmission model (EM-18 Reader). Every RFID tag have an individual 12- Digit code [2]. Reference on that 12 – Digit code received by Arduino; the product is showing the result on the LCD display with updated amount as shown in the above figure 2 [7].

The data shown in the mobile phone also with the help of the HC-05 Bluetooth model on the trolley. When the customer wants to remove the item by buying item They will scan once again the same item it will subtracted from the bill. The switch button is feeded at the trolley to shows the end of the shopping [9].

On pressing switch button, the final bill will deduct from the prerecharged card are individual RFID tags given to each

customer of the super-market or malls. These cards are gathering the data of ID name and the available balance amount in the prerecharged card. By scanning recharged card, Payment will show at the trolley itself. Finally, the LCD display show the available balance in the recharged card [3].

C. PROPOSED SYSTEM

In this section requires hardware components to implement the project. The figure-2 shows block diagram of the proposed system. The black diagram containing the subsystem of trolley section, receiver section, RFID section and Bluetooth section and also it has LCD display section.

Then every subsystem interphase to each section to shape the entire module.

In a proposed system Arduino is the heart of the model merged with the RFID reader, Bluetooth HC-05 model LCD and RFID tags. This hardware unit is connected to the software systems that is mobile application HC-05 Bluetooth app is required. This shows the product ID, cost and other details. This entire unit is attached to the trolley and every product has a RFID tag then customer add the products to the trolley. Then total amount shows in the LCD display, the amount will be deducted by the free recharge card of the customer. When customers shopping done press the switch to end the shopping [6].

IV. RESULTS AND DISCUSSION

In previous or present days, each shopping malls have a different billing system. For example, bill is prepared by the manually or with the help of the billing computer. When bill was prepare then billing amount is paid by the customers through cash or cards. But this process takes more time and customers or irritating the queue. From the customer point of view in super market most of the time spent with the billing system.

So, in "RFID Based Smart Trolleys Automatic Billing System". The EM-18 reader, HC-12 transmitter & RFID tag, trolley & LCD display are used to achieve the objectives. Whenever the customer entering to shopping mall, the customer take trolley, before in trolley RFID Automatic Billing System model fitted inside the trolley & tag attached to on every product.

Whenever the customer pre recharged card swapped as shown in the Figure 3 Now the customer added the items to the trolley the tag scanned by the RFID reader then show the amount in the LCD display as shown in figure 4. If the customer adds the more products the total amount shows in the LCD display an also in the smart phone also as shown in the Figure 6. If the customer not interested to buy any one of the products among the product that item can be removed. Then amount will be deducted balance amount will be show in the LCD display then amount can be paid by the customer through card or cash figure 5. The main object of this project was achieved i.e., time saving the customer.

Figure 3: When the customer pre recharged card swapped

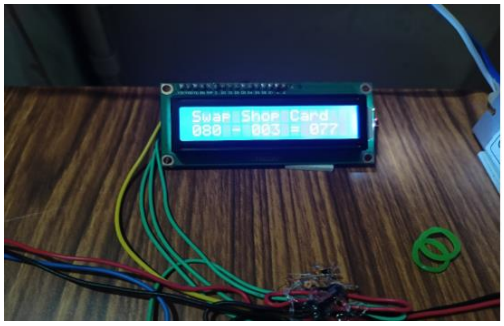

Figure 4: When the customer buys the product in the mall, the amount will deduct from the customer prerecharged card.

Figure 5: When the customer removes the item, once again he scans the same item it will subtracted from the bill.

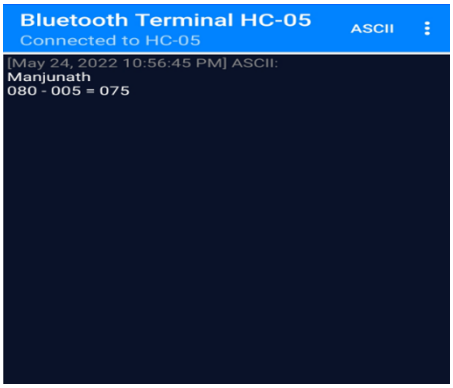

Figure 6: After the completion of the shopping the final data will be shows in the smart phone also.

V. CONCLUSION

This paper represents on RFID System it is good replacement of the barcode scanning system they have many disadvantage in the barcode system like the barcode scanning system can be read data certain distance. The RFID technology very easier to use for old customers and there is

no put extra effort this system also called as human friendly smart trolly with automated billing system. This technology provides many benefits. Nowadays all the people depend on digital money transaction like as UPI Payments and this method used in our system it is very easy and faster. If buy a any product, show the name of product, cost of the product, total bill in the LCD. Program dump in the cart it is save time of the client and reduce the labor work. In future ten years, develop the trolley with using dynamic motor that can be connected to the wheel. Already in Japan using robotic trolley. The expected goals of the project are safe to use, minimize the human efforts.

VI. REFERENCES

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