



A Review on Automated Billing System for Smart Trolley (ABST)

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ABSTRACT: The Modern Technology has increased the standard of living of people and there is increase in demand for shopping in Supermarkets and Malls. The current Billing system in mall is quite Tedious as after complete shopping the customers have to wait in the long Queue to complete the Billing process and the cashier needs to constantly handle the billing counter to deal with customers. Thus, to avoid the Time consumption in Billing Process the proposed system Automated Billing System for Smart Trolley is introduced. The system consists of Camera which is trained as Barcode scanner attached to Trolley, which customer uses to scan the detail of every product including product Name, Price and Offer which is Displayed on LCD screen. The system also provide the facility to customer to set their shopping budget and a notification is given by Buzzer whenever the shopping Budget exceeds. The count of the products in trolley is also maintained to verify the number of items shopped and after completing the shopping, the Bill description is sent by mail to Administrator as well as customer. Then the Customer can complete the payment through any cashless mode. The Proposed Billing system is thus a system which can be independently handled by a customer itself and make the billing process simpler and Time efficient.

KEYWORDS: Barcode Scanner, Counter, Raspberry Pi, Camera.

I. INTRODUCTION

The modern technology has increased the standard of living for humans. There has been an emerging demand for quick and easy payment of bills in supermarkets. Every one of us craves for quality in everything we use in our daily lives. Commonly as in vogue of now shopping has become an integral part of today's society. We can see a huge rush at the Mall and Supermarkets during weekends, holidays and sales. Major concern for the customer at Mall and Supermarket occur when there is a long waiting queue at the billing counter. Customer tends to leave the queue rather than standing for hours at the billing counter this turns out to be a trouble for the mall and supermarket owner. So, the Automated shopping trolley which come together with a camera trained as a bar code scanner and a LCD is designed which would help the customer to pay for their goods in the mall and supermarket without being served by a sales associate. Every product in the supermarket will have a bar code the customer will pick the product scan the barcode with the help of camera attached to the shopping trolley. After scanning the barcode, the details and the price of the product will be displayed on the LCD along with the total bill of the items purchased. This system would also be beneficial for the customer with certain budget limit and saves long waiting time at the billing counter.

II. RELATED WORK

Survey

This survey deals with Preliminary Survey which authors have carried out using various observations and interviews and also based on some literatures.

2.1 Survey on various Traditional Systems used for Billing:

2.1.1 Traditional Method of Paper Work used in Billing System

The Traditional Method which was used in Malls and Supermarkets for Billing Purpose was that a Sales Associate used to engage the Long Queue at the Billing Counter and to generate the Bill there were various methods used like either the Sales Person used to do the Paper work of all the Products purchased by customer which may cause Errors during the Bill Generation and would ultimately dissatisfy the Customer and would lead to lot of wastage of Papers.



2.1.2 Current Billing System used in Malls and supermarkets

Current Billing System used in Malls and supermarkets. The Current Billing System used in Malls also involves the Sales Associate engaging the Customer but the Manual work is reduced as a Heavy Barcode is used to scan the products and Bill is generated automatically in the system of Malls. However, the system is very costly and also the owner have to provide the salary to every Sales Associate engaging Billing Counter. And on special offer days customer needs to stand and wait in long queues which leads to Dissatisfaction.

2.2 Summary of Preliminary survey:

Table 1 shows summary of various preliminary surveys carried out by authors.

Table1: Summary of Survey work

TYPE	NAME	DETAILS
Visit to D MART, Aurangabad	Mr.Damni	By communicating with the manager of D Mart got the idea about the current problems which customers face while Shopping.
Visit to Big Bazar, Nashik	Mr.Aziz	Study about the various techniques which are already introduced and currently used for billing in malls.
Visit to Pinnacle Mall, Nashik	Mr.Goswami	Came to know the various issues which customers face when they are unsure about the budget limit in which they need to shop which creates chaos.
Visit to Hira Nagina Super Market, Chandwad	Mr.Abbad	Survey on various techniques which can be applied commonly to both Malls and Supermarkets.

2.3 Research Papers Studied:

In this section literature review is summarized in the Table 2.

Table2: Glance of related work

NAME OF RESEARCH PAPER	AUTHOR NAME	DATE OF PUBLI SH	WORK
Smart Trolley System for Automated Billing using RFID and ZIG-BEE	Janhvi Iiyer,Haarshad Dhabu,Sudeep Mohanty	2015	RFID avoids the limitations of barcode scanning, which requires line-of-sight access to each barcode and can only be used to scan one item at a time.
Automated Billing Trolley using RFID and ZIGBEE with android application rewarding system	Bhagyashree Bhumkar,Tejaswini Changal,Bhagyashri Dahifalet	2016	It gives real time tracking with speed and accuracy
Wireless Smart Trolley for Shopping Malls using ZigBee	Anupriya S.L,B.Jyothi, P.G,ShilpaShree.L	2017	ZigBee supports large number of nodes and has less power Consumption
Smart Trolley using Smart Phone and Arduino	Harpreet Singh Bedi, Nikhil Goyal, Sunil JKumar,Avinash Gupta	2017	It's very easy to interface analog sensors, motors and other electronic components with Arduino, with just few lines of code.



III. PROPOSED WORK

Modules in the proposed Automated Shopping System

This section describes the various modules used in ABST.

3.1 Training the Camera as Barcode Scanner:

- This Module is the core module of ABST as the main purpose to introduce the system is that the System should be cost efficient and by providing the ability to simple camera to act as Barcode Scanner Completely fulfil the purpose.
- This module takes Barcode of the product as an input which is captured by Raspberry Pi camera used in the system.
- The output generated by the Module is to successfully decode the product details once the product is scanned using camera trained as Barcode Scanner.
- The condition for successfully scanning the Barcode and get the correct Product Details is that the parameters which are set while generating the Barcode should match the sequence used in running Firmware Code.
- Installing Zbar library and interfacing it with Raspbian Noobs is must before activating the Barcode Environment and Pyzbar.
- A Rectangular Bounding Box is drawn to surround the image and capture it with the gesture of Mouse Clicks.

3.2 Counting of the Product:

- Input to this module is ultrasonic sensor with Raspberry pi to count the product and upload firmware code
- Output of the Module is the count of product which displayed on LCD 20*4
- **Steps for Module**
- **Step1:** Turn on Rpi
- **Step2:** Interface ultrasonic sensor with raspberry pi.
- **Step3:** Interface LCD 20*4 with raspberry pi.
- **Step4:** Write a firmware code to count the product and display count on LCD.
- **Step5:** Run the code.
- **Step6:** Get the count printed on LCD.

3.3 Sending the Complete Bill Description to Customers Mail Address

- **Input:** The Mail Address of Customer to whom Bill Description is to be Sent
- **Output :** The Complete Bill Description at Customers Mail Address

Steps for Module:

Step 1: Setting Up the SMTP sever with respect to Python Firmware Code

Step 2: Create the MIMEMultipart message object and load it with appropriate headers for From i.e the Mail Address of Admin which will send the Bill Description , To i.e the Customer to whom complete bill description will be sent , and Subject field i.e the Bill Description.

Step 3: The Bill Description includes the top Head fields which includes Product Name, Product Price and the corresponding offer on the Product when applicabe and the Bottom Field is Total which denotes the total Amount of All Products Purchased

Step 4: The Firmware Code is written in message Body in a loop to keep on Adding the list of Details of each product purchased in the message Body and at the end Total is printed after adding the amount of all Products.

Step 5: The code for message Body is generated and then interfaced with the firmware code which is used to run the entire Embedded System.

Step 6: The Bill Description is sent to Customers Mail Address using the SMTP server Object.

3.4 Buzzer Notification when Budget Exceeds

- **Input:** Amount of the Budget which customer wants to set during Shopping
- **Output:** Notification Given by Buzzer when the Shopping Budget exceeds.

Steps for Module

Step 1: Set the Shopping Budget of the Customer Manually in the Firmware Code

Step 2: Start scanning the product with the help of camera trained as Barcode Scanner.

Step 3: As the Products are scanned their amount is added in the Total Amount Variable

Step 4: As soon as the condition (Total Amount Budget) proves to be True



Step 5:-The flow of control comes out of the For Loop in Firmware Code

Step 6: The Notification is given by Buzzer as the Budget exceeds.

Step 7: And the notification (Budget exceeds!!!!)Is also displayed on LCD Screen.

ABST System Architecture:

The Proposed System consists of Raspberry Pi connected to Pi Camera. The Camera is Trained as a Barcode Scanner, whenever a customer scans the Product, the details of product like product Name,Product Price, Product offer are displayed on LCD Screen20*4 which is connected to Raspberry Pi.Whenever a customer inserts the product in Trolley it is Detected by Ultrasonic sensor which maintains the count of product. The system is embedded with three push Buttons Insert Product Button, Delete Product Button and Exit Shopping Button. Also there is facility for customer to set the Budget and system is provided with the Buzzer which notifies the Customer when the Shopping Budget exceeds. At the End of Shopping Complete Bill Description is sent to Customer on its Mail address using SMTP Protocol and the Database at Admin side is maintained at Thing Speak Server to monitor and visualize Data received.

There are many systems which are developed to overcome the problems which customers face while shopping in Malls and Supermarkets. But the Proposed System proves to be very Beneficial as instead of using the Heavy Machines which are used to scan the barcode of Product, the Proposed system uses a normal pi camera which is trained as a Barcode Scanner and the system is very easy to be Handled by Customer by its own.Thus, the proposed system outstands different from other systems as it is cost and time efficient and easy to handle.

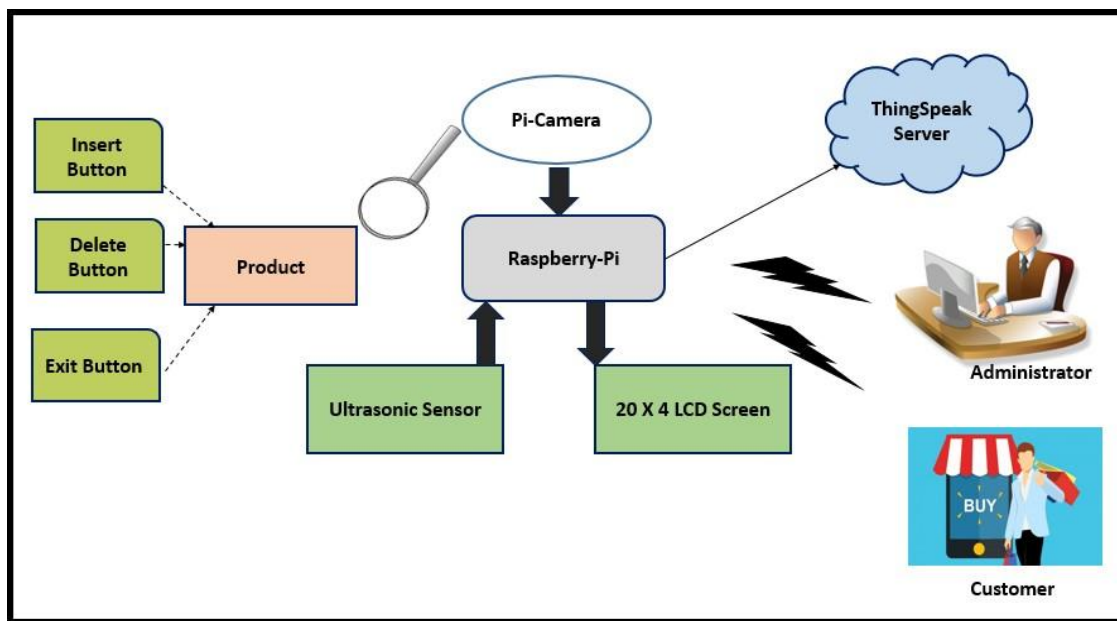


Fig. 1 ABST System Architecture

IV. CONCLUSION

The advancement in science and technology is a persistent process. Latest gadgets and latest technology are being designed and developed. This application is used in shopping malls for assisting customers by saving a lot of time in buying commodities. In this project Camera Trained as Barcode Scanner is used as safety access for the item which thereby enhances the surveillance performance. This implementation initiates for an automated central billing system in shopping malls and supermarkets. With this, shoppers no longer have to wait near counters for payment of bills because of their purchased item information getting transferred to central billing unit. By this billing process speed increases and becomes much simpler. This will enhance the shopping experience to a new level.

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