Automated Billing Trolley using Wireless Technology

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Abstract : *The automated billing trolley using wireless technology introduces the innovative idea to ease the shopping which is trending to be a regular activity among us. The proposed system is to minimize the big rush at the counter whereas standing in the queue for long time seems to be an hourly process. The customer can show the item to the barcode scanner placed in the trolley. With the help of concern webpage from the smart phone connected to the wifi network the user can view the list of the items purchased according to the budget of the customer they can alter the items list. The only thing the customer has to do is just to confirm the trolley number to the person incharge with the counter, so that the person incharge can provide the customer with the finalized invoice. The invoice will be stored in the database for any future references. The main aim of the proposed system is to provides the product details such as expiry date, cost, discount offers and avoid the unnecessary time wastage at the billing counter and to facilitate a smart shopping experience.*

Keywords *–Trolley, Barcode scanner, Arduino UNO R3, Node MCU, USB Host Shield, Webpage.*

I.   Introduction

With the advent interventions of the latest technologies,one regular task of human being is dealing with the time management. Inventions and discoveries of new technology have made man life easier and less time consuming in all sectors. As we are considering the shopping malls customers are facing the problem of long queue at the billing counter with the wastage of unnecessary time. Here we are introducing our innovative project on automatic billing trolley using wireless technology to improve the shopping experience of the customer. The automatic billing trolley is facilitated with barcode scanner to identify product details which can be viewed from the mobile phone using webpage whereas it will be interfaced with program in the arduino microcontroller. The customer can view the billed items from the mobile phone and can purchase according to the budget. Our proposed system enables the customer to initiate an easy and comfortable shopping experience.

II.   SYSTEM DESIGN

1. Hardware Used

1.1 PC

A computer is a device that can be instructed carry out sequences of arithmetic or logical operations automatically via computer programming. Computers have the ability to follow generalized set of operation called programs. These programs enable computers to perform an extremely wide range of task. A complete computer including the hardware, the operating system (software) and peripheral equipment required and used for full operation can be referred to as a computer system.

1.2 Modem

A modem is a hardware device that converts data between transmissions medium so that it can be transmitted from computer to computer or other devices. The main goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data. Modem can be used with any means of transmitting analog signals from light emitting diode to radio.

1.3 Node MCU

Fig.1:NodeMCU

Node MCU is an open source for IOT platform. It includes firmware which runs on the ESP8266 wifi-soc. The ESP8266 is a low cost wifi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer.This NodeMCU board is used to provide a wifi facility to transfer data over the system.

1.4 USB Host Shield& ArduinoUNO R3

Fig.2:USB Host Shield& Arduino UNO R3

The Arduino USB host shield allows you to connect a USB device to your arduino board. The Arduino USB host shield is based on MAX3421E which is a USB controller containing the digital logic and analog circuit which is necessary to implement a full speed USB peripheral or a full or low speed host compliant to USB. The shield is Tinker kit compatible which means you can quickly create projects by plugging Tinker kit modules to the board. The Arduino UNO R3 is used to program the USB host shield.
In this proposed system the USB host shield connected to the arduino board is used to connect the USB barcode scanner and it will send data serially to the Node MCU.

1.5 Smart Phones
Smart phones are a class of mobile phones and of multipurpose mobile computing device. They are distinguished from feature phones by their stronger hardware capabilities and extensive mobile operating system, which facilitate wider software, internet and multimedia functionality.
In this project, the customer can view and edit the list of the items in the concern webpage which is enabled by connecting the smart phone to the same wifi network.

1.6 Barcode Scanner
It is an electronic device that can read data of printed barcode. Like a flatbed scanner it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. All barcode readers contain decoder circuitry analyzing the barcode image data which provided by the sensor andit send the barcodecontent to the scanners output port.

2. Software Used

2.1 XAMPP

XAMPP is open source free software developed by Apache friends. XAMPP software package contains apache server, PHP, and Perl and it is basically a local server. This local server works on your own computer.

2.2 Brackets

Brackets is a source code editor with a primary focus on web development. It is written in java script, HTML and CSS. The main purpose of brackets is to create webpage.

2.3 Arduino IDE

The Arduino IDE (integrated development environment) is a cross platform application which is written using programming language java, it is used to write and upload programs to the arduino board. The Arduino IDE is released under the GNU. The Arduino IDE supports the language of C and C++ using the special rule of code structure

3.Language Used

3.1 C/C++

C/C++ is a general purpose programming language. Itis widely used now a days for competitive programming. It has imperative object oriented and generic programming features. C/C++ runs a lot of platform like windows, Linux, UNIX, Mac etc.

In this proposed system,C/C++ language is used for programming the arduino board ESP8266 and USB host shield

3.2 PHP

PHP code is embedded into HTML code, or it can be used in combination with various web template system, web content management systems, and web frame work.PHP interrupter can be implemented as a module in the web server or as a common gateway interface executable.

3.3 HTML & CSS

Web browser receives HTML documents from a web server or from local storage and renders the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.HTML can be able to embedded programs which is written in a scripting language such as JavaScript, and affects the behavior and content of WebPages. Inclusion of CSS defines the look and layout of the content. The World Wide Web maintain of both HTML and CSS standards.

III. BLOCK DIAGRAM

The figure below depicts the block diagram of the proposed system. The diagram consist of PC, modem, Arduino, USB Host Shield and a barcode scanner.

Fig. 3: Overall block diagram
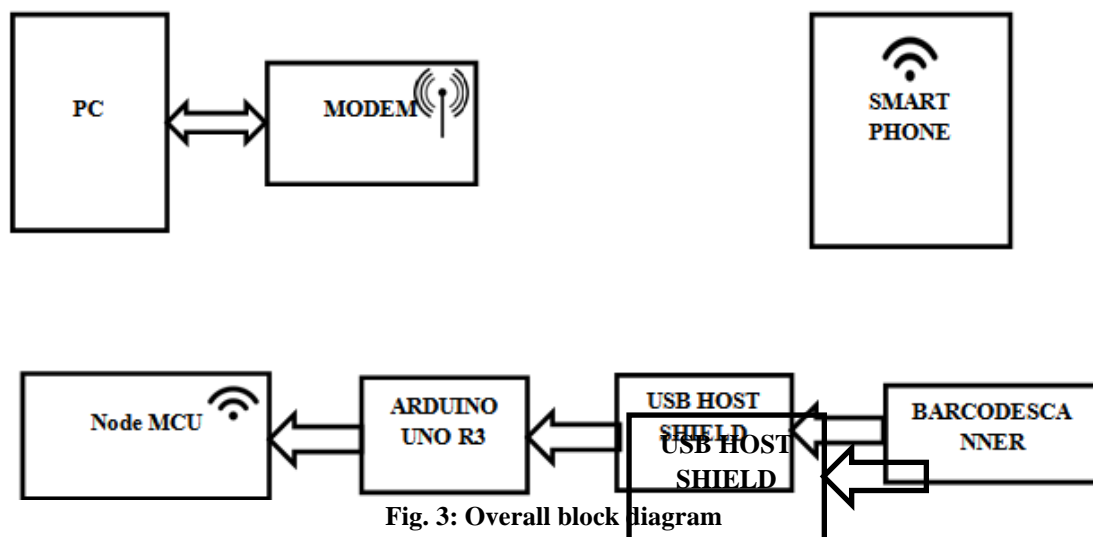
The PC and the smart phone will be connected to a common wifi network. The arduino ESP8266 and the barcode scanner will be connected to the USB host shield. The Arduino UNO R3 attached to the USB host shield enables the connection of all datas inorder to implement the program in the arduino IDE.

IV. Modes Of Working

The proposed system is mainly divided into three section. Trolley side, Admin side, User side respectively.
Trolley Side:

Whenever the customer chooses a product, and shows to the barcode scanner, it will automatically scans the product details and decrypts the data and sends the data accordingly to the arduino ESP8266. The USB host shield enables the connection of the barcode scanner and the arduino board. USB host shield provides the connection of all digital logic and analog circuits in order to implement USB peripherals or any other host controller withArduino. The transmitted data is correspondingly programmed in the arduino IDE platform using C++ language in the Arduino board.

User Side:

The user can login into a webpage from the smart phone using wifi modem and a login panel will be available where we can enter the trolley number automatically the concerned trolley will be connected to the smart phone via common wifi. Hence the details of the scanned items will be displayed on the webpage where the user has logged in from the smart phone. As per the customer budget or interest, the user can alter the purchased items from the smart phone and whenever the user wants to add any items which are unable to scan by the scanner and also they can include it with the help of product code. Fraud customers will be caught while cross checking is done from the billing side of the admin panel, if the customers have not taken the cancelled items from the trolley.

Admin Side:

The admin side mainly consists of a personal computer system, wifi modem and a person incharge in the counter. After the purchase the user can confirms the trolley number to the incharge. While entering the trolley number in the admin panel, he/she can generate the final "invoice" after crosschecking the purchased items from the list and the customer will be provided with the final bill. For future references the the final invoice will be stored in the database of the apache server of the supermarket. If another customer have logged in with the same trolley number, the preceding item list will be cleared automatically and it will be temporary until the bill is finalized.
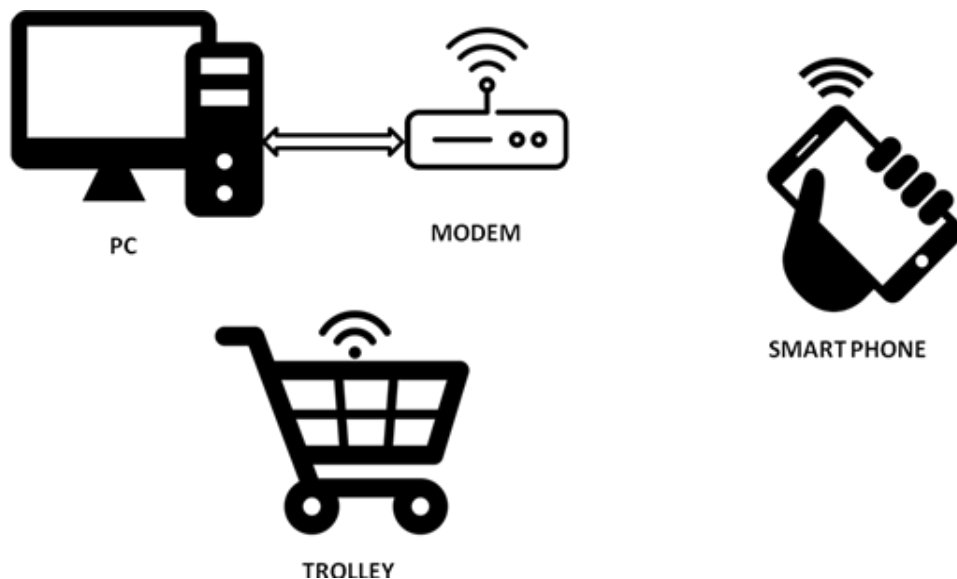

Fig.4:Pictorial Representation

V. Simulation Result

For a web user, the home page is the first page that is displayed after entering into the webpage. The home page contains an user login panel for customers and an admin login panel for the admin. For accessing this webpage the customer should enter the web address by the help of a browser.
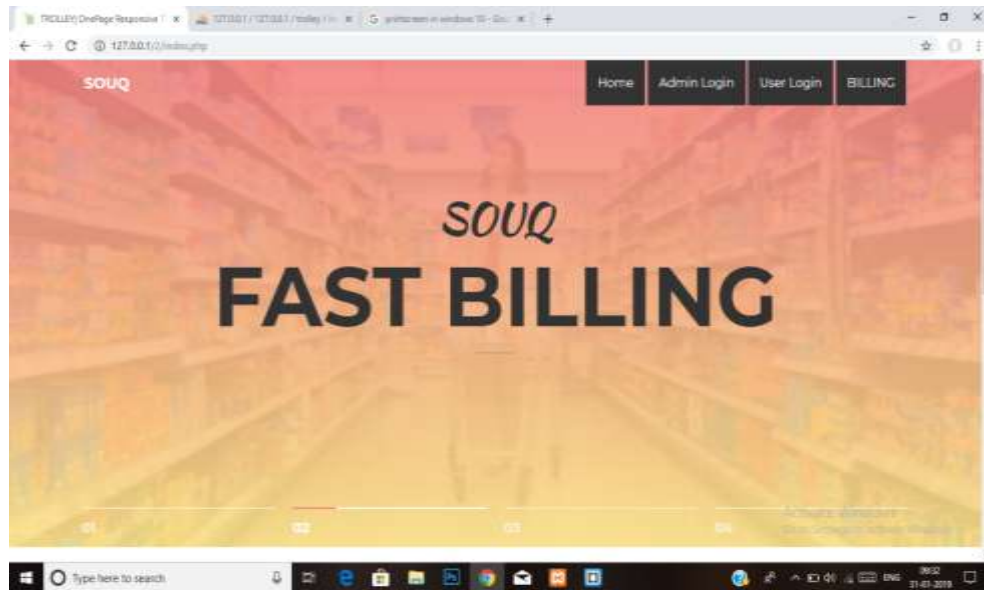
Fig.5: Home Page

The below web page is the user login panel. This page consists of two textboxes for Trolley ID and Password. Whenever the user enter the trolley id and password, they will be automatically logged into the billing page.
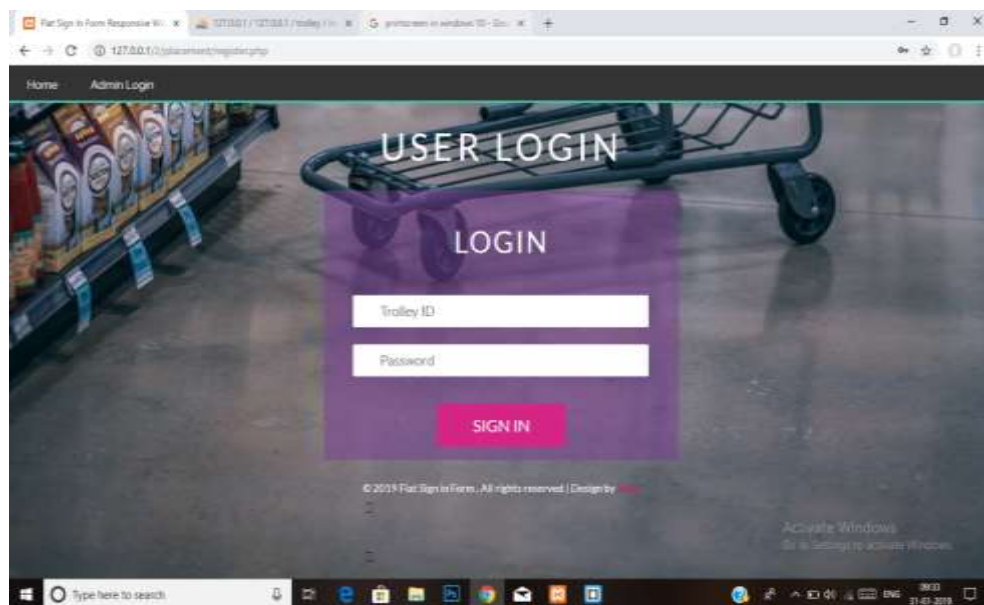

Fig. 6: User Login

The admin login is the login panel for the supermarket authorities. This webpage contains the username and password for the admin. They can log into the page using this username and password. The username and password which are stored in database is fetched and checked and it will allow you to approach the webpage.
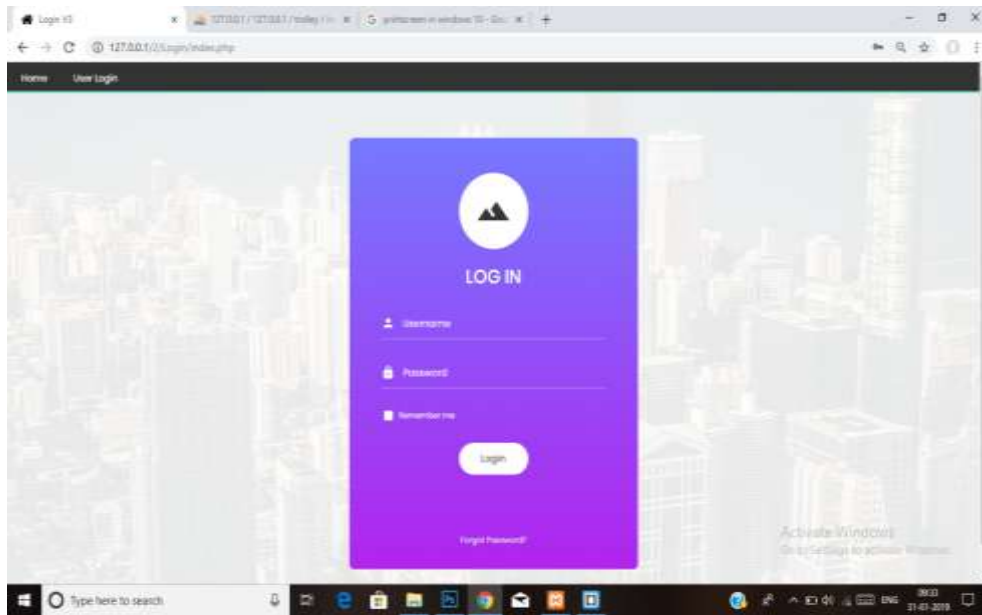
Fig.7: Admin Login

Trolley page will appear after the logging of the admin panel. This web page contains a form of trolley id / invoice number and the details of the invoice will be visible to the user. After entering the trolleynumber the admin can go through the final bill of the customers.
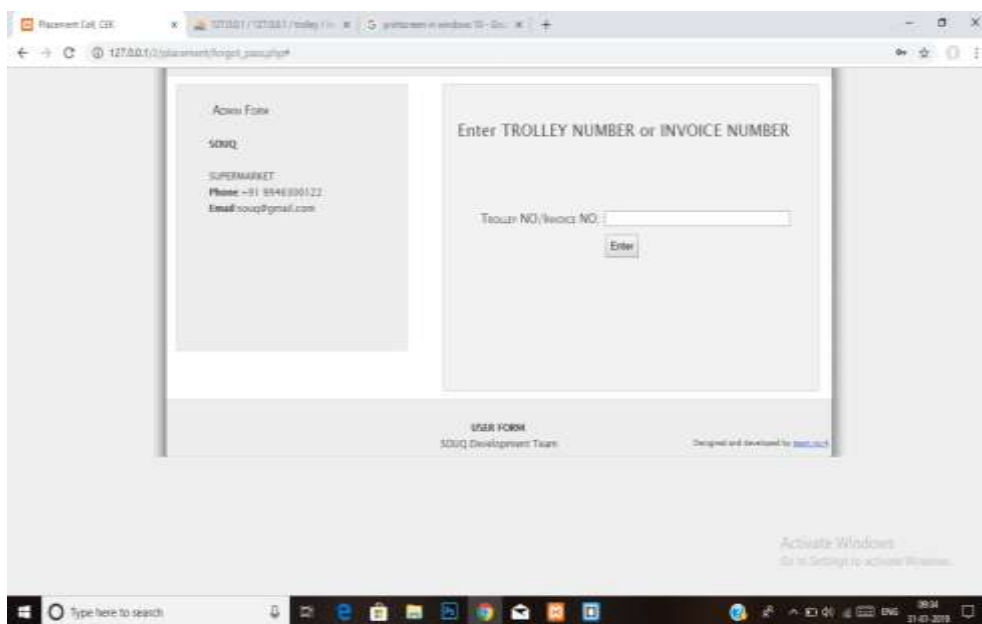

Fig.8: Trolley Panel

Invoice page is the page for viewing the list of the purchased items in the list. It is used to view and modify the list of the purchased items. This webpage contains the billing column that are connected to the database and also there is a delete and add function for the product from the database.
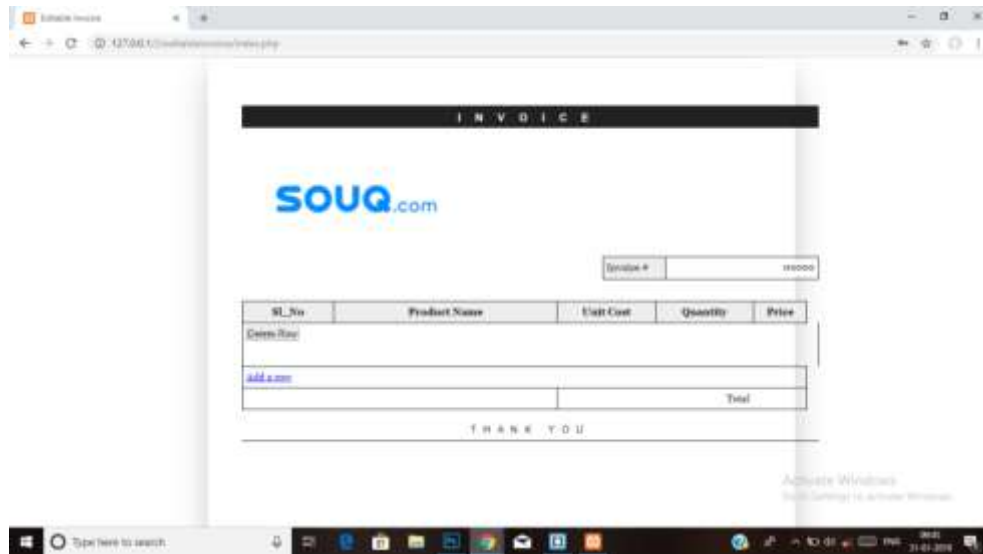
Fig.9: Invoice page

VI. Conclusion

The innovative idea of the automated billing trolley uses the wireless technology which replaces the traditional shopping system. Taking an account of increasing shopping trends, now a days the proposed system enables the easy shopping facility. This proposed system mandatory chases the method to minimize the long queue at the counter of the shopping concern which enhances the shopping experiences of the customer. The automated trolley is an extreme user friendly device whereas there is nochances of difficulty in implementing the system. The system doesn't requireany special technical knowledge to operate but only needs the basic ideas about smart phone. The web page technology which have connected to the common wifi network enables the user to view the item list they have chosen and to alter the item list using login page.The proposed system suggests the customer to shop according to their budget. The finalized invoice will be stored permanently in the system database, if any further investigation needed. In future, the system will approaches to electronic payment with the various payment application available and moreover the electronic payment system will also generate an e-receipt and we have to find next schedule of the system attached with electronic payment facility for the advanced system.

References

[1]. F. Xia, L. T. Yang, L. Wang, and A. Vinel, "Internet of things," International Journal of Communication Systems, vol. 25, no. 9, p. 1101, 2012.

[2]. P. Castillejo, J.-F. Martinez, J. Rodriguez-Molina, and A. Cuerva, "Integration of wearable devices in a wireless sensor network for an e-health application," IEEE Wireless Communications, vol. 20, no. 4, pp. 38–49, 2013.

[3]. N. Mitton, S. Papavassiliou, A. Puliafito, and K. S. Trivedi, "Combining cloud and sensors in a smart city environment," EURASIP journal on Wireless Communications and Networking, vol. 2012, no. 1, p. 1, 2012.

[4]. T. Song, R. Li, X. Xing, J. Yu, and X. Cheng, "A privacy preserving communication protocol for iot applications in smart homes," International Conference on Identification, Information and Knowledge in the Internet of Things (IIKI) 2016, 2016.

[5]. T. Shanmugapriyan, "Smart cart to recognize objects based on user intention," International Journal of Advanced Research in Computer and Communication Engineering, vol. 2, no. 5, 2013.

[6]. R. Kumar, K. Gopalakrishna, and K. Ramesha, "Intelligent shopping cart," International Journal of Engineering Science and Innovative Technology, vol. 2, no. 4, pp. 499–507, 2013.

[7]. S. Gupta, A. Kaur, A. Garg, A. Verma, A. Bansal, and A. Singh, "Arduino based smart cart," International Journal of Advanced Research in Computer Engineering & Technology, vol. 2, no. 12, 2013.

[8]. Smart Cart to Recognize Objects Based on User Intention. International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 5, May 2013.

[9]. Raju Kumar, K. Gopalakrishna, K. Ramesha on "Intelligent Shopping Cart" in International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 4, July 2013.