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NFC Based Bill Collection System for Mall's Using IOT

[1]Sudha Chavan, [2]Namrata Malik, [3]Chanda Sumber, [4]Poonam More

Electronics And Telecommunication, SNDT Women's University, Santacruz West, Mumbai 400040

[1]987Sudha@gmail.com, [2]namratamalik2112@gmail.com, [3]chandasumber80.cs@gmail.com, [4]poonam.more@umit.sndt.ac.in

Abstract - Now a days, shopping is not as problematic as standing in long queue and waiting to scan all items and paying bills also when we reach the counter many a times we realize that the shopping we did has exceeded the limit for which we have actually planned so in this project we have overcome all this chaos. In this proposed project we will be using an Active Tag NFC MI-fare card reader system which will be attached to the trolley or the carriage. This NFC Tag will scan all the items as we insert the items in carriage and will keep record of the items until you reach your destination of the counter to pay the bills. Along with the scanning the calculation of the bills will be done in the carriage itself so that the time of scanning the data at the counter will be saved. In addition to it we will be providing a limit of maximum amount which will be entered by the customer so that the customer will be aware that he has reached his limit for today's shopping.

Keywords— ***GPIO, IOT, MI fare, NFC Tags, RFID Module.***

I. INTRODUCTION

A shopping mall is a place where everything is available under one roof. Visiting a mall is advantageous because the shops like Groceries, clothes, shoes, food courts and entertainment etc. are available in one place. Families arrive for their weekly shopping, and keep the kids entertained at the mall. But along with it keeping a monthly budget is becoming increasingly difficult to go to the mall.

With all sales designed to tempt buyers, say no becomes very difficult. Hence it is necessary to develop a system which will take care of the monthly budgets as well as put a limitation on our tempts to do more and shopping. One of the main drawbacks of the malls include overcrowding, especially on weekends and holidays. Sometimes it seems that everyone has the same idea and go to the mall. The corridors and crowded stores make shopping very difficult, people often end up forgetting the items they need to buy. Whilst nearly all shoppers rationally expect some form of waiting around, it doesn't mean they enjoy it. Regardless of the queue method, the queuing time is the main factor, which shapes and influences the customers opinion of a service. Essentially, the key to customer satisfaction is no waiting time, whilst long queues lead to customer dissatisfaction. It's easy to say that nobody likes to wait in line, but some will argue it's just a fact of life. However, many customers cite poor queue management as the death knell for a prospective purchase. In fact, 75 percent of retailers will lose a sale because of wait related issues. What's worse is that a customer who walked out empty handed.

II. LITERATURE SURVEY

Nowadays, if a consumer would like to buy something at a shopping mall, consumers need to take the items from the display shelf and then queue up and wait for their turn to make payment. Problem will surely arise when the size of a shopping mall is relatively huge and sometimes consumers don't even know where certain items are placed. Besides, consumers also need to queue for a long time at the cashier to wait for turn to make payment. The time taken for consumers to wait for the customers in front of the queue to scan every single item and then followed by making payment will definitely take plenty of time. It will be a great convenience if the information of items that are available in the shopping mall can be obtained. It will be a great improvement on the existing system if the technology of NFC is implemented. Consumers will be able to get information of all the items at

shopping mall, total up the prices of items as they shop, and save unnecessary time at the cashier.

III. BLOCK DIAGRAM

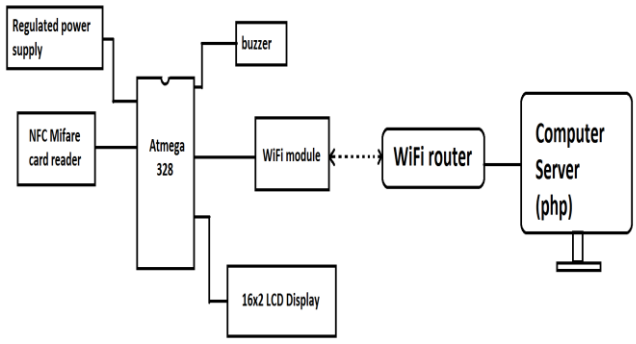

Fig. 1 Block diagram of NFC Based Bill Collection System for Malls

IV. WORKING

The IOT based Trolley has two sections transmitter section and receiver sections. First initialize the power of kit then it is ready to use for customer. If customer wants to purchase any product, then he/she has to put the product in the trolley. As soon as the product falls in the trolley the RFID reader read the RFID Tag place on the product. This RFID reader is connected to the microprocessor. Microprocessor crosschecks the information get from RFID reader and information in the memory of microprocessor. If the information get match then the cost of product, name of product and the total bill display on the LCD. Trolley is provided with ESP8266. ESP transfer the information to the main server which is in the range. This main server has its own cloud from that owner can access the information from anywhere and anytime with the help of internet. This is the concept of Internet of thing (IOT).

V. HARDWARE AND SOFTWARE REQUIRED

A. *ATMEGA 328 Microcontroller*

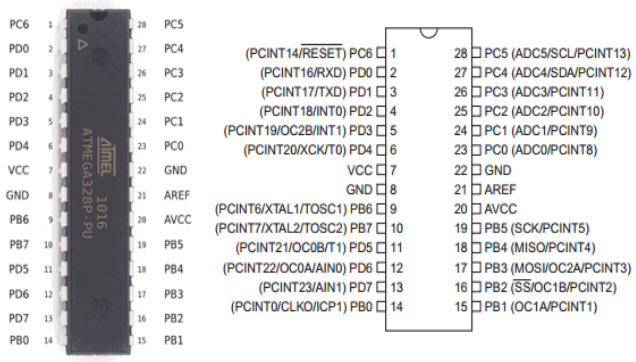

Fig. 3 ATmega328P Pin Mapping.

The high-performance Atmel Pico-Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities. This is the main brain of the entire system which will do all the calculation of the cost when the product is inserted inside the basket and will display it on the LCD screen. The controller will also store the maximum amount stored inside it for which the user wishes to buy so that when he amount or his budget is crossed he will be notified by the buzzer.

VI. FLOW CHART

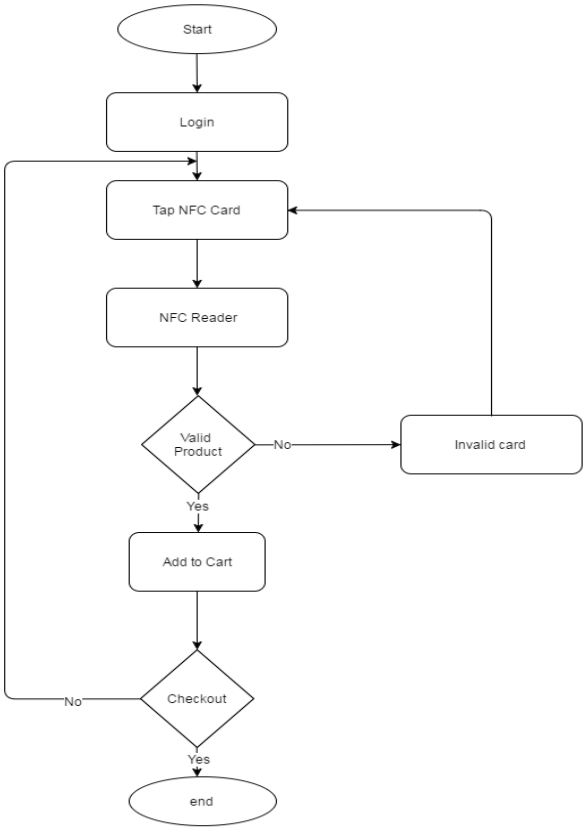

Fig. 2 Flowchart of NFC Based Bill Collection System for Mall's Using IOT

A. ESP8266 Wi-Fi Module

ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. When ESP8266 hosts the application, and when it is the only application processor in the device, it can boot up directly from an external flash. This ESP module will link the data inside the trolley with the main server when the customer's reaches the counter and it's all details will be displayed on the server or the monitor of the billing counter.

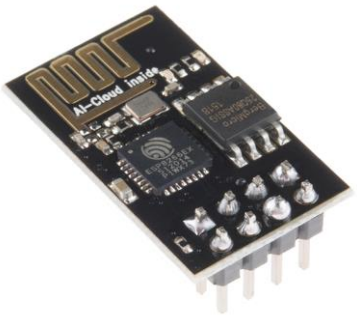

Fig. 4 ESP8266 Wi-Fi Module.

ESP8266 on-board processing and storage capabilities allow it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime Sophisticated system-level features include fast sleep/wake context switching for energy efficient VoIP, adaptive radio biasing for low-power operation, advance signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation.

B. RC522 MIFARE Card Reader

MF RC522 is used in highly integrated 13.56MHz contactless communication card chip to read and write, of NXP for "three" and the application launched a low voltage, low cost, small size, non-contact card chip to read and write, intelligent instruments and portable handheld devices developed better.

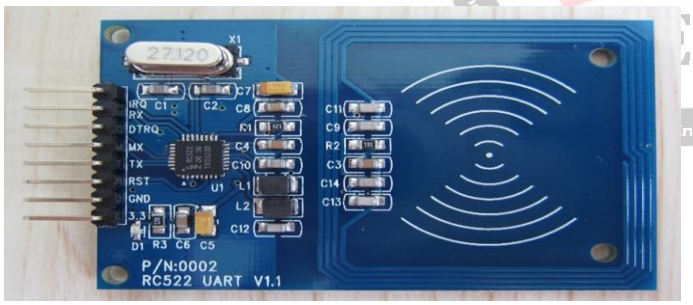

Fig. 5 RC522 MIFARE Card Reader.

The MF RC522 will be mounted on to the trolley to scan all the items which will be having the NFC tags on it also it will send the information scanned to the LCD and the to the controller which will do the calculation of the items in itself.

This module can be directly loaded into the variety of reader models. Module uses voltage of 3.3V, simple few lines through the SPI interface directly with any user CPU board is connected to the communication module can guarantee stable and reliable work, reader distance.

C. 16 X 2 LCD Display.

Fig. 6 16 x 2 LCD Display.

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. This acts as the display unit which will inform the user about product scanned and the limit reached.

These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

D. NFC tags

NFC tags are passive devices, which means that they operate without a power supply of their own and are reliant on an active device to come into range before they are activated. These devices can't really do any processing of their own, instead they are simply used to transfer information to an active device, such as a smartphone. This tags will be attached on to the items or the product in that malls when the customer pickups the product and inserts it inside the trolley the product ID and its price will be entered in the controller which will do its addition of the product and it will also display the details on the screen of the LCD screen.

Fig. 7 NFC tags.

In order to power these NFC tags, electromagnetic induction is used to create a current in the passive device. The basic

principle is that coils of wire can be used to produce electromagnetic waves, which Can then be picked up and turned back into current by a coil of wire. This is very similar to the techniques used for wireless charging technologies, albeit much less powerful.

E. Software used

XAMPP is a free and open source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages. XAMPP stands for Cross Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). It is a simple, lightweight Apache distribution that makes it extremely easy for developers to create a local web server for testing and deployment purposes. Everything needed to set up a web server server application (Apache), database (MariaDB), and scripting language (PHP) is included in an ex-tractable _le. XAMPP is also cross-platform, which means it works equally well on Linux, Mac and Windows. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server extremely easy as well.

F. Advantages

- Reduces manpower required in billing section. This can reduce the expenses incurred by the management.
- Users can be aware of the total bill amount during the time of purchase.
- Reduces time spent at billing counter and Increases customer satisfaction.
- Does not need any special training.
- Customer can get throughout information at the time of shopping. Can guess exact amount at the time of shopping.
- Save time. More efficient because use of RFID.
- Reduce rush at billing counter.
- Freeing staffs from repetitive checkout scanning.

VII. APPLICATIONS

1) Shopping mall it is use in shopping mall for automatic billing.
2) Use as common observatory system for owner as he/she can observe billing of all mall from anywhere.

VIII. CONCLUSION

Taking into account the changing trend in retail shopping, we come to a conclusion that the Intelligent Shopping Basket is most certainly a definite necessity for the Retail marketing industry to step up their portfolios, cope up with the advancement in technology and save time and manpower.

The use of LCD in this trolley make it user friendly. LCD display the name of product, cost of product and total bill. Automatic billing is done in trolley so it save the time of customer and reduce the rush at billing counter. It also reduce the man power. Because of the use of IOT it will also helpful to owner.

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We are grateful to God for the courage and strength. He gave us to complete the goals of this project. We are thankful for the support and encouragement given by our parents and their prayers for our success. We also obliged our Project Advisor Ms. Poonam More whose knowledge and guidance was paramount in the realization of our objectives and keeping us motivated.

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