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IoT Based Smart Shopping Trolley using Node MCU

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***Abstract* - In recent years, the utilization IoT devices in ever where like, Health, Military, Industry, Agriculture, Feet Management etc., whenever there is need for atomization, reduce power consumption and minimize human resources with effective utilization, the IoT modules are best solution. In this paper, implement smart shopping trolley using Node MCU to nullify the for customer's long queues in front of billing counter. This helps the customer to save the time as well as from malls or supermarket management side pay down the number of employees.**

***Index Terms* - NodeMcu, RFID, LCD Display, Auduino IDE, Web server.**

I. INTRODUCTION

Nowadays, the Internet of Things (IoT) are very popular because of their own advantages like reduce human resource, proper management operations, cost effective and enhanced safety precautions, etc,.In these days, time is very important factor for any humanbeing. According one survey, 1 to 1.50 hours for shopping and most of the customers will always tend to walk out of a queue if it is long[1].in this paper, thecustomer waiting time is almost nullified by using smart trolley using Node MCU.

the node MCU have 4Mbyte of flash memory, Micro USB port,USART,SPI,I2C,16 digital IO pins and one analog pin with operating voltage 3.3V. the RFID readers and tags are used to scan the items.In any IoT module processor play vital role to get desired response. Here, Node MCU is preferred than Arduino because of their own advantages like small size, low cost and open source IoT platform[2]-[8].

The remaining of work is organized as follows. Section II, Discussed basic block diagram as well as software and hardware prototype models. In section III, hardware prototype result can be elaborate in different items are scan by using RFID tags and readers. Finally, conclude this work in Section IV.

II. METHODOLOG

One of the classifications of embedded system is small, medium and sophisticated embedded systems. In small scale use only 8 bit processors and does not use any operating systems. Where as in medium scale8/16 processor and operating systems are used. In sophisticate, co-designs are preferred [9]. In this workis belongs the medium scale embedded systems. The overall block diagram of the design is illustrated in Fig.1. In this prototype model consists Node MCU, RFID tag, RFID reader, LCD Display hardware components.

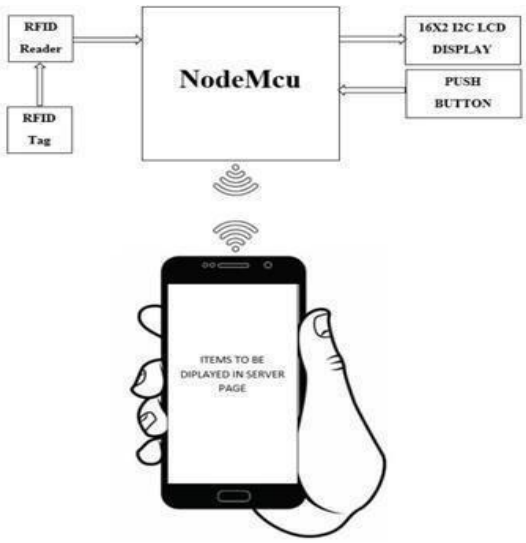

Fig-1 Overview block diagram of smart shopping

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trolley

RFID Libraries are placed in Node MCU. The RFID tags should be attached on all the items. Whenever the customer use smart trolley and choose any of his

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required item, RFID reader with in the trolley scan the item and display the respective details on LCD screen. Suppose the customer finishes shopping, accumulatedbill displayed on LCD screen. Then the customer moves to billing section for only for payments process. If total bill generated on LCD screen then customer should not wait in the queue at the billing counters for their bill payment. The system uses Wi-Fi module as a replacement for direct interface with Node MCU. In this way, they are possible to reduce queue.The entire work basically divided into categories: hardware Prototype and software program development

A. Software Program Development: -

The Operations of the Node Microcontroller has been programmed by Arduino IDE software and basic block diagram of the project has been discussed in the above terminal.

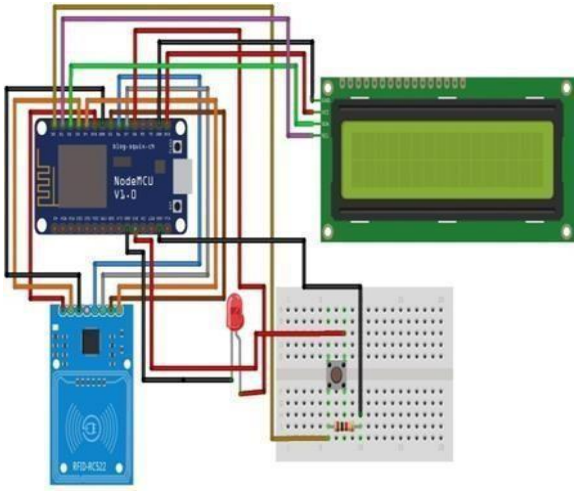

Fig-2 Prototype model for Software developed circuit

Fig.3 Interface of the Arduino IDE Software

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Now, the software simulated model of the project before going into the hardware implementation of the circuit. Fig. 2 represents the software developed circuit by using Fritzing tool. The Fritzing is an open-source CAD tool, which helps the designer to support experimenting with a prototype to building a more permanent circuit.

The RFID Reader here we used MFRC522 has been interfaced with the Node MCU and the LCD display has been interfaced with theI2C module to make simple interfacing with the LCD. After making those connections with LCD and RFID. A push button is initiated to delete the items if a customer doesn't wantto buy the item and a led is initiated to give an indication for a valid scan of the item. We first implemented the software simulated model in order toget an idea of the final prototype of the project. The program for the NodeMcu has been written in the Arduino IDE software. Fig. 3 shows the interface of the Arduino IDE Software.

A. Hardware Implementation:

Once obtain desired response and satisfy those simulation results, then move on hardware prototype model. In this scenario, there were six hardware components are in prototype model: Node MCU, RFID Reader, RFID tags, 16x2 LCD Display, PUSH Button, and Web Server. The hardware design prototype model is shown in Fig.4

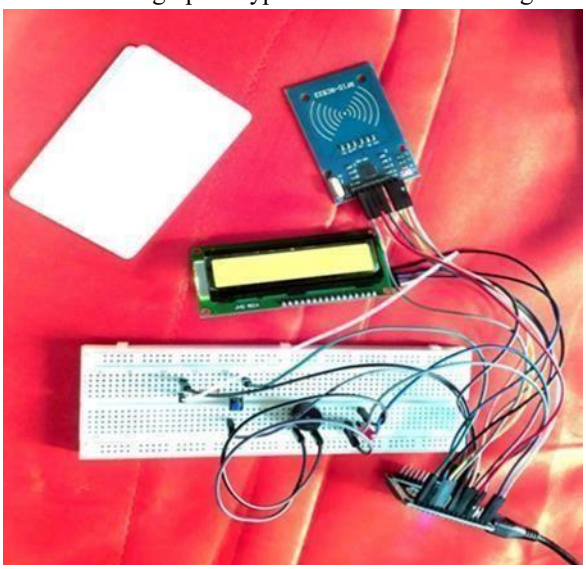

Fig.4.Prototype model for hardware D

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III. RESULTS

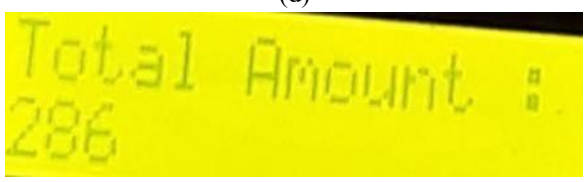
The customer enters into mall and chooses smart trolley, Fig. 5.a represents the starting interface of the circuit. Whenever a product is added into the cart, the Fig. 5b and Table.1 represents for suppose the customer selected milk packet corresponding product reads and stores the data. The Fig.5c-Fig.5d representsdisplaying screens whenever add item into cart. The table 2 and Table.3 shows respective products. The customer desires to remove items use press button in hardware. After completion of shopping customer moves on pay bill options.

(a)

(b)

(c)

(d)



(e)

Fig.5. LCD Display smart shopping cart

Table.1. Display chart of corresponding Fig.5.b

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By Implementing this hardware prototype could reduce the waiting time in the long line queue and to allow you to display the items, total price at the cart itself. The waiting time in the queue will reduce automatically with this smart cart.

ITEMS	QUANTITY	COST
Milk	1	26
Rice(1Kg)	0	0
Boost(500g)	0	0
Total	1	26

Pay Bill

Table.2. Display chart of corresponding Fig.5.c

Table.3. Display chart of corresponding Fig.5.d & Fig.5.e.

ITEMS	QUANTITY	COST
Milk	1	26
Rice(1Kg)	0	0
Boost(500g)	1	210
Total	2	236

Pay Bill

Total	3	286

Pay Bill

IV. CONCLUSION

In this paper, IoT based smart shopping trolley is implemented using Node MCU. First this prototype model verified Fritzing CAD tool. Once satisfies our requirements then move on hardware prototype model. When the customer selected any item and put smart trolley, customer can easily understand the particulars about the items like cost, weight and any offers. After completion of his/her shopping, the customer knows total bill and it has possible to remove or add another items also possible before pay the bill through any of mode like credit/debate card or any UPI payments.Weight sensors can be placed at the bottom of the cart for more security purpose. Ultrasonic sensors are placed to avoid imposture. Project is used to improve the security performance and also the speed.

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