IoT Based Smart Shopping Trolley using Node MCU

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Abstract— **In recent years, the utilization of IoT devices is everywhere 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 the best solution. In this paper, smart shopping trolley using Node MCU is implemented to nullify the customer's long queues in front of billing counter. This helps the customers to save their precious time and helps the shopping malls or supermarkets to reduce the usage of manpower.**

Keywords — **NodeMcu, RFID, LCD Display, Auduino IDE, Web server.**

I. INTRODUCTION

In the present day technical scenario, the Internet of Things (IoT) are playing a prominent role across many fields. They are becoming very popular due to many advantages associated by their application.

This work is primarily focused on reducing the human efforts during shopping in the malls or supermarkets. The shopping malls generally witness huge crowd especially during weekends and peak hours. There will be long waiting queues near the billing counter. This work is primarily focused to minimize the waiting time at those counters. This work helps customers by saving their precious time and similarly helps the managements to decrease the manpower usage.

II. LITERATURE SURVEY

This work is carried out by consideration of different types of methods adopted by many authors to simplify the process of billing activity in shopping malls. [1]The authors discussed an innovative concept of Intelligent Smart Shopping and Billing. The key idea here is to assist a person in everyday shopping in terms of reduced time spent while purchasing a product. [3]The authors presented Smart shopping cart with automatic billing system through RFID and ZigBee.[5]This paper discussed about IoT applications on Secure Smart Shopping System. [6] The authors discussed Robust low-cost passive UHF RFID based smart shopping trolley. [7]This paper presented a Sensor-based Intelligent Shopping Cart.[8]This paper discussed on IoT Based Smart Shopping Mall

III. PROPOSED METHODOLOGY

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 scale 8/16 processor and operating systems are used. In sophisticated systems,

hardware software co-designs are preferred. This work belongs to the medium scale embedded systems. The overall block diagram of the proposed design is illustrated in Fig.1. This prototype model consists of Node MCU, RFID tag, RFID reader, LCD Display and hardware components.

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 required item, RFID reader with in the trolley scan the item and display the respective details on LCD screen. Suppose the customer finishes shopping, accumulated bill is displayed on LCD screen. Then the customer moves to billing section for only for payment 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 two categories: hardware Prototype and software program development

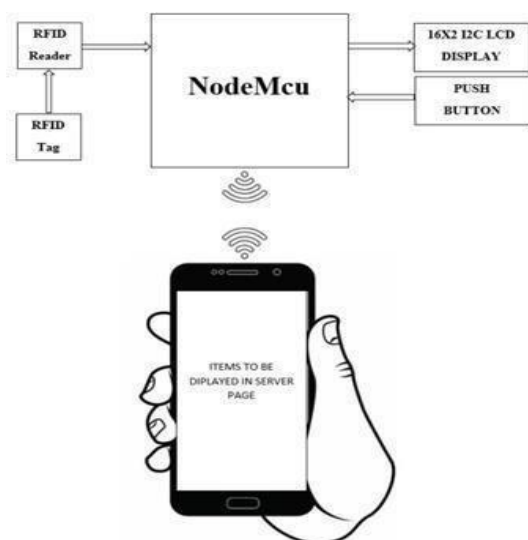Fig.2. Simulation Model of the Proposed Design

Fig.1. Block Diagram of the Proposed System

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A. Software Implementation:

The Operations of the Node Microcontroller has been programmed by Arduino IDE software .The model is initially designed and tested 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.
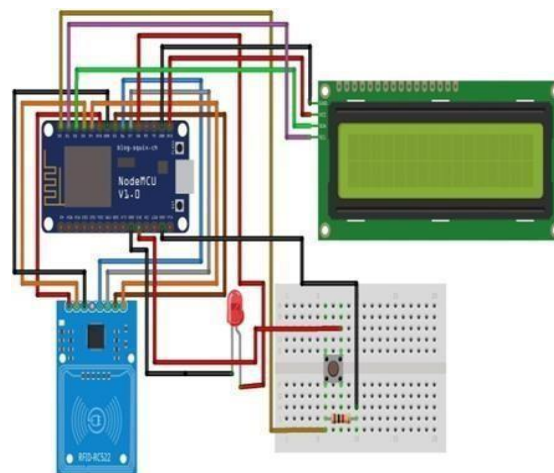

Fig.3. Arduino IDE

The RFID Reader 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. A push button is given to delete the items if a customer doesn't want to buy the item and a LED is provided to give indication for a valid scan of the item.

B. . Hardware Implementation:

The model is first implemented as software simulated model and later on implemented by using hardware.

The hardware modules/components used in this model are: Node MCU, RFID Reader, RFID tags, 16x2 LCD Display, PUSH Button, and Web Server. The hardware design prototype model is shown in Fig.4
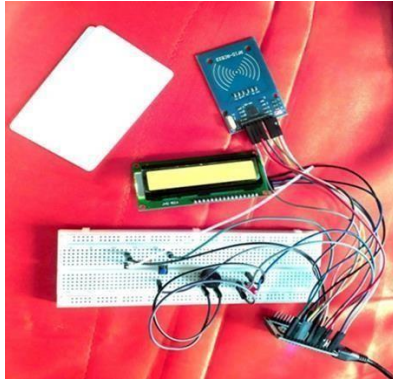

Fig.4. Hardware model of the Proposed Method

IV. RESULTS

Whenever 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, it is displayed in LCD as shown in Fig. 5b. Table.1 represents the selected product and the data stored . The Fig.5c and Fig.5d represents displaying screens whenever items are added into cart. The Table 2 and Table 3 show respective products. Whenever, the customer desires to remove the items, the button available in the hardware must be pressed. After completion of shopping, the customer moves on & pays the bill.

(b)

(c)

(d)

(e)

Fig. 5. Outputs on LCD

(a)

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

Pay Bill

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

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

Pay Bill

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

ITEMS	QUANTITY	COST
Boost(500g)	1	210
Milk	1	26
Rice(1Kg)	1	50
Total	3	286

Pay Bill

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

The implementation of this model helps the customer to view the list of selected items along with total price near the cart itself before going to the bill counter and thereby reduces the long waiting times in the queues at the shopping malls and also helps the managements to reduce the usage of manpower.

IV. CONCLUSION

In this paper, IoT based smart shopping trolley is implemented using Node MCU. Initially, this prototype model is verified using Fritzing CAD tool. The hardware model is designed based on this. When the customer selects any item and places in 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 is possible to remove or add another items also before payment of the bill through any of mode like credit/debit 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. This Project is used for speeding up of the process and also to improve the security performance.

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