DESIGN OF IOT BASED SMART SHOPPING TROLLEY


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ABSTRACT

The world is becoming more automated in various ways as technology advances, one of which is IOT, which is an enhanced network infrastructure for connection, transportation, and technology. Customers benefit from the smart Trolley system while shopping. The trolley features an automated invoicing system and responds to the user's movement directions while shopping. The use of wireless technology in conjunction with other forms of communication has aided in the widespread adoption of electronic commerce.

Keywords: Smart Trolley, Internet Of Thing (IOT), Arduino Uno, Shopping Trolley, LCD Display, Wi-Fi Module.

I. INTRODUCTION

A shopping mall is a location where the majority of people purchase their daily essentials. Customers who need to purchase various items at shopping malls or supermarkets require a great deal of time and patience in coordinating among themselves in order to complete their purchases successfully. We must address this problem by effectively utilising our technology. We show a realistic and cost-effective smart shopping cart using IOT technologies in this article. Such a framework is ideal for usage in places like shopping malls and supermarkets, where it may assist reduce effort and provide customers with a better shopping experience. Our present system relies on a barcode scanner, which takes a long time to scan, thus the answer is to use RFID for scanning.

II. LITERATURE REVIEW

Prof. Kirti Mhamunkar, 2Himanshu Saroj, 3Prajakta Katkar, 4Akanksha Tiwari, 5Rahul Jena have developed a "RFID based Smart trolley." Volume 03, Issue 04 [April 2019] of the International Journal for Research Trends and Innovation (IJRTI).

In today’s world, shopping at the mall has become a daily ritual in major cities. On the billing counter for payment, this takes a long time and can be quite annoying. As a result, the primary goal in creating this prototype was to decrease human labour, eliminate queues, and shorten billing time. As a result, Smart Cart with NodeMCU and RFID is the solution. It is a useful method for scanning items and generating bills. The RFID reader that is used for product scanning reads the RFID tags that are present on the item and then sends the information to NodeMCU, where a bill is created.
R.Sindhu, M.Shalini, P. Seema, and P.T.Sivagurunandhan released a research paper titled “Smart Shopping Trolley using RFID.” The present arrangement, in which customers must line at the billing counter, was described in this article. As a result, the answer to this problem is to create a smart trolley for customers in order to minimise line duration and length. According to that study report, the answer to this difficulty is to send the bill to the server computer using RFID technology (Radio Frequency Identification) and a ZigBee module.

“Smart Trolley utilising RFID” was implemented by Vaishali Rane, Rutika Shah, and Sahil Shah in the International Research Journal of Engineering and Technology (IRJET) volume 06, Issue 01[Jan 2019]. On holidays and weekends, malls receive a lot of foot traffic. The goal of this study was to reduce the time spent in line at a billing counter in a shopping centre. Smart Trolley performs the same thing by presenting the entire cost of the item in the cart. The consumer can then pay the bill immediately at the billing counter.

III. METHODOLOGY

Arduino UNO r3 board, RFID reader, one LCD, and ESP8266 WiFi Module make up the smart shopping cart. When a consumer begins shopping, he or she first selects a trolley, and then, when products are purchased, they are scanned by an RFID reader and subsequently placed in the shopping cart. If the user wishes to delete that item, just remove it from the cart, remove it from the cart, and scan it again; the item will be instantly deleted from the database. RFID readers perform the scanning process. The RFID reader scans the tag that is attached to the object. A coil is included with both the RFID reader and the tags. The electromagnetic induction method is used to read the data from the tag. Electromagnetic Induction occurs in the chip that is present in both the RFID reader and the RFID Tag, as seen when the RFID Tag is close to the RFID Reader. The produced electromagnetic induction aids in reading the data stored within the chip, which is then sent electromagnetically to an RFID reader.

A. Designed system

The suggested system is based on a shopping cart, which is primarily used to move goods throughout a supermarket. Inside the system, we’ll utilise RFID, which is a technology that reads data and turns it into a signal that can be sent to tags. RFID tags receive data and transfer it along with it to their memory, which is then recorded in a database. When a consumer scans a product, the RFID reader reads the information and transfers it to the tag, which then stores it in its memory. The procedure is then repeated in reverse order when the client takes the goods from the trolley, and ultimately the bill is displayed on the screen.

![Figure 2. Designed system](image)

The Smart Trolley system, as depicted in fig.2, is made up of the aforementioned components. When a product is placed in the cart, it is read and the data is saved. Following the conclusion of the addition of products, the client's bill will be generated on a screen located on the trolley, allowing the consumer to pay his or her bill immediately by scanning a QRcode.

B. Component Used

a) Arduino uno

- The Arduino Uno is an 8-bit microcontroller based on the ATmega328p.
There are 14 digital input and output pins, 6 analogue input pins, a USB connection, a power barrel jack, an ICSP header, and a reset button on the Arduino Uno.

- Flash memory is 32 KB, with the boot loader using 0.5 KB.
- The Arduino's length and width are 68.6 mm and 53.4 mm, respectively.

**Figure 3. Arduino Uno module**

**b) RFID Reader EM-18 and Tags**

RFID tags are divided into two categories: active and passive. The active tag is powered by a battery. The passive tags do not have a battery. Passive tags are used in this project. There is no need for a power supply with passive tags. Antennas with a range of one metre (125 KHZ) are incorporated inside the tags used in shopping malls. Any tag that falls within the range will be detected by the RFID reader.

**Figure 4. RFID Module**

c) **LCD Display**

The LCD is a liquid crystal display that is used to display information; in this case, we are using a 16X2 LCD Display to show the current scanned product, its price, and the total amount for the goods purchased.

**Figure 5. LCD 16*2 Display Unit**

d) **ESP8266 Wi-Fi Module**

The ESP8266 WiFi module is a self-contained SOC (Security Operation Center) with an integrated TCP/IP protocol stack that can provide connection to your WiFi network to any microcontroller.
IV. RESULTS AND DISCUSSION

The realization of the "Smart trolley" has been completed successfully. The communication is appropriately implemented without any interference between distinct modules in the design. It's also built to satisfy all of the criteria and regulations.

The Arduino IDE and the Arduino Uno board are used to build the circuit. Both the software simulator and the hardware design have been used to verify the device's performance. The whole circuit has been functionally
tested and is operating in accordance with the application software. Conclusions show that the design used in this study provides mobility, flexibility, and data transfer with extremely little power usage. The results may be seen in the photos below.

1. When the kit is first turned on by connecting the power source, the following graphics appear on the device's LCD screen, which reads "WELCOME."

![Figure 8: Initialization of system](image)

When an RFID tag is scanned by an RFID reader, the pictures below appear, together with information such as the product's name, weight, cost, and total billing amount.

![Figure 9: Adding products to trolley](image)

V. CONCLUSION

An RFID tag will be attached to every product at the store or mall. Each cart will be equipped with an RFID reader and a Wifi Module Trans receiver. Billing will be done using an online payment system. If a product is withdrawn, it must also be removed from the bill. For anti-theft purposes, an RFID reader must be installed at the exit door. Purchasing Patterns of Customers Offers/discounts should be displayed on the screen. Product information, expiration date, and a better alternative are all displayed. As a result, by utilising this, the supermarket shopping system will become more convenient. It will also equip a supermarket with an anti-theft technology. It will allow for online invoicing transactions and will also provide recommendations to the user for purchasing items, displaying special deals, and so on. Constraints: The RFID tags and the Wifi Module should both function properly.

VI. REFERENCES


