

IOT BASED SMART SHOPPING CART

Ravindra Asundi

BMS Institute of Technology and Management

Spurthi Adibatti

Govt SKSJ Institute of Technology Bengaluru

Abstract: *Technology is enriching our lives by making things easier and faster. But there are still some areas that follow the old-school methodology and there hasn't been a drastic upgrade in a long time, for example, shopping malls, supermarkets, etc. Usually, we spend a lot of time in the checkout queues, and most of the time we don't have a fair idea about the total cost of the items in our shopping cart. Especially during covid times, where we have to maintain social distancing and prevent crowding, it becomes quite difficult to follow Covid-appropriate behavior in such a setting. So we have proposed a System in which the cart keeps track of the total cost of all the items in the cart which facilitates express checkout and prevents the user from shopping exceeding their budget. In this system, we use RFID tags instead of barcodes. The tags are placed on all the items that are present in the supermarket. The customer has to scan the product in the scanner placed on the top of the cart before adding it into the cart. The display shows the real-time cart total to the user. The bill is transferred to the pc using the Wifi module of the Node MCU at the checkout*

INTRODUCTION

Nowadays, shopping in supermarkets is almost an everyday chore. Considering this is something we have to go through daily, it is still very time-consuming and not to mention, a tiring process. It is also very labour-intensive and requires a lot of personnel to manage and run a supermarket.

All customers follow the same set of procedures within a supermarket. It involves picking up a cart and moving around the entire supermarket in order to fill the cart with what they need and to wait in a queue in order to check out, where the cashier would have to scan each and every one of the items from within the cart to determine the price and then to load it all back into the cart so that the customer can check out.

It is a very drawn-out process and, especially in these covid times, where maintaining distance and avoiding direct and indirect touch is an absolute necessity, it is tough to abide by these necessities with the current existing system. This paper aims to provide a solution to this problem, by making the entire shopping process faster, easier, and most importantly safer.

This makes use of IoT and improves the most fundamental part of any supermarket experience, the shopping cart. The shopping cart is fundamentally only used as means of transport for items within the supermarket, but the shopping cart can be much more. We plan to use the shopping cart not also to carry items but also to bill them and help the customers check out themselves.

We make use of RFID scanners to automatically detect any item which is added into the cart or removed from the cart, and with the help of the Node MCU module, all the items recorded are shown on an LCD which helps the customer keep track of what they have and also the total price of all the items in cart thus far. With the press of a button, the quotes the price of the items in the cart are displayed. Once the payment, the customer is free to take the bought items. A buzzer is also installed to inform the management of any malicious activity or any shop-lifting attempts. It also reduces the risk of violating social distancing as it has no need for any direct or indirect contact with any employee or cashier.

LITERATURE SURVEY

Existing System

The majority of supermarkets and shopping malls have a traditional billing system. This experience involving customers picking the products they want to purchase in a cart and hand the cart near the billing counter. The counter attendant picks up all the products and scans the barcode on them manually. The major drawbacks of this system are customers have to wait in a queue for a long extended period. This system also involves the requirement of manual labor. With rising concern over safety during the Covid pandemic, this does not ensure a safe experience.

Proposed System

The system proposed uses radio frequency identification (RFID) technology. This technology provides an immersive system that is useful in tracking and identification of products. RFID tag is an object that will be attached to every product that emits radio waves for determination. The shopping cart is equipped with an RFID reader. The cart has the capabilities to calculate the bill automatically and show the total cost of products on the liquid crystal display. This way the customer will have faster service at

the counter skipping the manual scanning of products one by one. This system also involves minimal touch that ensure a safe shopping experience to the customers. This is also advantageous to the owners as they don't require additional cashiers at the counters.

RFID over Barcode

For this implementation, the entire system should be shifted to the use of RFID tags instead of barcodes. When compared the RFID technology is far superior to barcode technology. RFID tags can be read from a variety of distances. The scanning of RFID tags is a lot quicker than barcodes. Barcode reading is comparatively slower as it requires an immediate line of sight. Data collection and handling are automated which avoids both human error and effort. RFID tags are more reliable as they are less prone to wear and tear. Barcodes can not be reused as there is no facility to rewrite.

HARDWARE IMPLEMENTATION

The methodology proposed here is under the assumption that all products available in the market have a RFID tag attached to them in form of a sticker and all the shopping carts have a provision to mount the system that consists of the following components. They are,

Node MCU - NodeMCU board consists of ESP8266 wifi chip. The **ESP8266** is a low-cost Wi-Fi chip. It has 128 KB RAM and 4MB of Flash memory. It's the heart of the project that coordinates the other components and it also updates the bill in the server real-time.



Fig1:Node MCU

RFID Tags: Each RFID tag contains a microchip that is used for storing important data and it also contains a small coil that acts as an antenna to transmit the data through radio-frequency waves. We use this as a medium to store the product details like the name, price, quantity. The tags used are usually passive rather than active since they are more economical in the longer run. So when we place the RFID tag in the proximity of a RFID reader, there would be a radio-frequency wave emitted by the reader which would reflect back after it acknowledges the RFID tag's antenna and hence making the process of identifying the shop item feasible.

RFID Reader- EM18 Reader is a very popular RFID module that can read the ID information stored in the RFID tags. The RFID tags store a 12 digit unique number which can be identified by an RFID reader.

module (Em-18 in this case) when the tag comes in the vicinity of the Reader. This module has an inbuilt antenna that operates at a frequency of 125 kHz and a 5v DC power supply is required to power it up. It gives a serial data output and has a range of 8-12cm. The serial communication parameters are 8 data bits, 1 stop bit, and a 9600 Hz baud rate.



Fig 2: EM-18 RFID Reader Module

LCD Display: A 16X2 LCD screen is used for displaying the information. The LCD screen can display a multitude of alphanumeric characters which uplifts the user experience and keeps on reflecting the total bill amount till then so that the customers can prevent overspending. It is connected to the I/O port of the microcontroller and can display information like the name of the article, price in real-time when the respective tag is read.



Fig 3:16x2 LCD display

Push Button: It functions as a simple switch that performs a function of cancellation. In case a customer scanned an item by mistake or doesn't need the product anymore then they can press this button and scan the unwanted product within a stipulated time so that it can be removed from the current bill.

Buzzer: It's a simple audio signalling device that produces a beep sound everytime a customer scans a product(with the RFID tag) through the RFID reader so it notifies the customer that the product has been scanned successfully.

All the components are connected as shown in the diagram below and hence implementing the smart shopping cart system that can keep track of the total bill amount of the products scanned and can transfer the bill to the server, hence making the whole shopping experience contactless and can also prevent wastage of paper as the bill will be stored and viewed digitally.

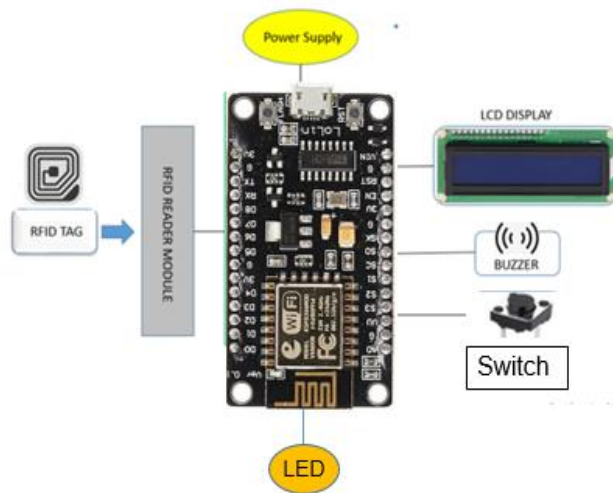


Fig 4:block diagram

CONCLUSION

The main objective of the project was to minimize contact during the shopping and the billing process. So that the customers need not stand in the long lines waiting for the billing process. This even reduces the crowding near the billing sections. The customers can get all the required essentials and checkout in a short period so that time is saved and more customers can shop simultaneously. Contactless smart cards are the largest RFID sector by far. Contactless chip technology enables strong security features along with convenience, durability, flexibility, and reliability. It provides the features and performance needed to meet the day to day requirements in a shopping setting. This not only ensures security to your money but also provides security to us against the deadly virus. This shopping system marks the change in the entire shopping experience. Around the world, RFID sensors clung to the exit gate will ensure that no product can be taken away without scanning. Thus, the electronic system provides hassle-free and user-friendly shopping system.

REFERENCES

- [1] Ms.Vrinda, Niharika, "Novel Model for Automating Purchases using Intelligent Cart," e-ISSN: 2278-0661, pISSN: 2278-8727 Volume 16, Issue 1, Ver. VII (Feb. 2014),
- [2] Ms.RupaliSawant, Kripa Krishnan, ShwetaBhokre, PriyankaBhosale "The RFID Based Smart Shopping Cart", International Journal of Engineering Research and General Science Volume 3, Issue 2 pp 275-280, March-April, 2015.
- [3] KalyaniDawkhari, ShraddhaDhomase, SamruddhiMahabaleshwarkar "Electronic Shopping Cart For Effective Shopping based on RFID", International Journal of Innovative Research In Electrical, Electronic, Instrumentation And Control Engineering Vol. 3, Issue 1 pp 84-86, January 2015.
- [4] Shahroz, M., Mushtaq, M. F., Ahmad, M., Ullah, S., Mehmood, A., & Choi, G. S. (2020). IoT based Smart Shopping Cart Using Radio Frequency Identification. IEEE Access, 1–1. doi:10.1109/access.2020.2986681.
- [5] Raju Kumar, K. Gopalakrishna, K. Ramesha, "Intelligent Shopping Cart," International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 4, July 2013.
- [6] EktaMaini and JyotiShettar" Wireless Intelligent Billing Trolley for Malls, International Journal of Scientific Engineering and Technology Volume No.3 Issue No.9, pp: 1175-1178.
- [7] SatishKamble, Sachin Meshram, Rahul Thokal, RoshanGakre "Developing a Multitasking Shopping Trolley Based On RFID Technology", International Journal of Soft Computing and Engineering (IJSCE), Volume-3, Issue-6, January 2018.
- [8] Rahmani.E, "Zigbee/IEEE 802.15.4", University of Tehran, 2005. 10. GalandeJayshree, RutujaGholap, PreetiYadav"RFID Based Automatic Billing Trolley, International Journal of Emerging Technology and Advanced Engineering Volume 4, Issue 3, March 2019.