Smart Shopping Mall

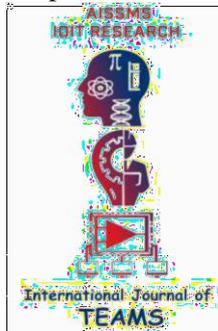## Sujit Meshram[1], Omkar Lanjewar[1], Mahesh Parshuramkar[1] and Prof. Vineeta[2] Philip

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Article Information	ABSTRACT

In the modern world, shopping has become an essential day to day activity for most of the people. And due to the COVID -19 pandemic people are afraid of going to a crowded place like shopping malls which made it difficult for people to buy their daily needs and medicines. This has made them to look for quicker, easier and safe ways to do their shopping. Some of the difficulties that people have to go through when they do shopping include standing in long queues for billing, having physical contact with other people and product they want to purchase in this pandemic era is very risky and shopping at malls is also a time consuming process .To avoid such situations, an IoT-based smart shopping mall is proposed. Contains RFID tag, Node MCU, Smart billing portal built using NodeJs, Wi-Fi and driver. All products available in the mall will be marked with RFID.

KEYWORDS: Node MCU, RFID Tag Scanner, L293 Motor Driver, and Dc Motor etc.

1. INTRODUCTION

The year 2020 witnessed people being afraid of touching things they don't have knowledge of and being in public places like shopping malls, airports and even hospitals. A lot of people still had to step out into these public places and expose them to dangers of a pandemic to buy essential commodities like daily supplies and medicines.

Even vending machines, which is the closest thing to this project has some places like buttons and cash where have to touch. These buttons are touched by hundreds of hands that may or may not be infected, who would want to take the risk?

A solution to this issue is a system that allows customers to purchase daily supplies or medicines without having to interact with other humans or even without having to touch the products they purchase.

The aim is to upgrade the Smart Billing Portal which can be used in supermarkets to resolve the payment counter hassle using RFID.

The use of this Smart Shopping Mall will reduce the time required for shopping drastically. Customers will have the freedom to pay their bills at any given time for their purchased products thus reducing manpower required for billing process. Safety and social distancing will be possible because of this Smart Shopping Mall.

2. LITERATURE SURVEY

Paper 1:

This paper demonstrates the integration of billing, location and inventory management technology in the shopping cart itself. It aims at creating a low cost and robust system to reduce the time for shopping required in malls. A smart shopping cart will see a product in the aisle of a mall and display relevant information about the product on the cart screen. User Interface will also contain a payment system embedded in the shopping cart. This cart has 4 functions, detecting its location in the shopping mall, communicating with the central server, displaying information about the closest products to the user and managing the inventory. Combining all these technologies into one place will help customers do their shopping in comfort. This will end the hassle of long queues in the malls.

Paper 2:

This paper investigates how RFID technology will revolutionize the future of retail industry. RFID can be possible replacement to the bar codes on the products.
A system that adopts a cart level scanning through RFID can be very helpful in enhancing our shopping

experience. This will end the system of manual work of scanning bar codes in the shopping complex.

Paper 3:

The importance of embedded systems is discussed in this paper. An integration of embedded systems with RFID technology will not only improve the shopping experience, but also make inventory management more efficient with reduced manpower requirement. Each shopping cart is equipped with a mechanism for product identification and information display. RFID scans the product code and product information is displayed on a LCD Display for price, discounts and offers. Billing information and payment options are also displayed on the cart display itself. A ZigBee device is used to establish a connection between the cart and billing database. This paper aimed at an improved, queue-free system for billing and payments

Paper 4:

This paper was aimed at reducing Line payment in the shopping area. The system does the same by displaying the price of the product stored inside the cart. In this way the customer can pay directly into the billing account and carry the items purchased. It eliminates the usual scans of products on the counter and speeds up the entire purchase process, and with this system the customer will know that the amount to be paid so he can properly plan his purchase buying only the essentials that lead to improvement. saving. As the whole process of automatic billing reduces the chances of human error significantly.

Paper 5:

In the current climate, shopping malls are increasing rapidly. At the mall, people find their essential daily products such as consumer goods, clothing, and food. During festivals and offers, there is a lot of running in the mall. At a mall or supermarket, they use a barcode to charge products. It takes a lot of time and the customer has to wait until all the products are scanned to generate credit. To avoid this, we have proposed an IoT-based smart shopping mall. Contains RFID tag, LCD display, android system, Wi-Fi and clouds. All products available in the mall will be marked with RFID. The required customer products will be placed in the trolley, where their code will be obtained using RFID and the product name and cost will be displayed on the LCD.

Paper 6:

A shopping mall is a place where people get their daily needs such as food, clothing, fashion accessories, electronics and more. Today we can find shopping malls every few meters in any developed or developing city around the world. Sometimes customers face the problem of not having enough information about the products and have to lose their valuable time in the payrolls waiting for their turn. Continuous upgrades are required in the standard payment system to improve the quality of the customer shopping experience. In order to overcome these difficulties and advance the current

system, we are setting our approach to RFID based on Smart Shopping Automation System (SSAS) which includes automatic billing calculations, this method is done by attaching RFID tags to products or objects and RFID. a student with a touch panel showing the exit gate and other essentials.

Paper 7:

A smart shopping cart is a program designed to entice a person to everyday shopping by adding some automation to a custom process. This will help the individual in their daily shopping by reducing the amount of time required, while purchasing the product at a reasonable price with the best discounts. The ultimate goal is to provide robust technology with low cost, high efficiency and a flexible system to simplify the purchase process.

Paper 8:

In this paper, we discuss the new concept of Intelligent Smart Shopping and Billing. The main idea here is to help the person in their daily shopping about the reduced time spent while buying the product. The ultimate goal is to provide a technology-focused, economical, easy-to-use, and efficient way to help with personal purchases.
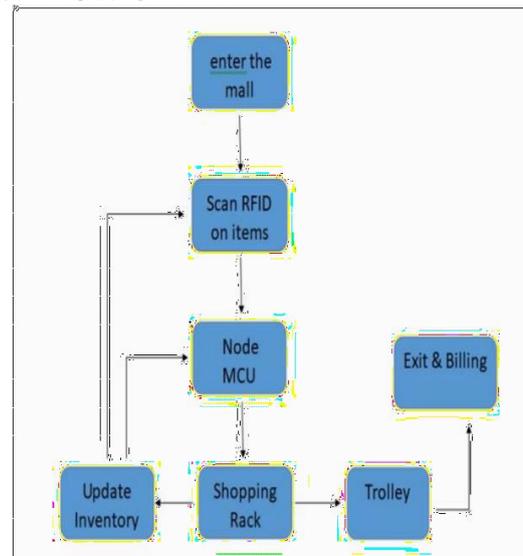
3. FLOW CHART

Fig. 1. Smart shopping mall flowchart

1. Every product has an RFID tag that contains a unique ID. These IDs are provided on a website provided with compatible products.
2. If a purchase is required, the product can be placed on a cart while the RFID reader reads the tag. Product information is extracted and displayed on the user's device. At the same time payment information is updated.
3. If a customer wants to remove any product from the trolley, that product needs to be cancelled by software and placed at the end of the mall in the basket where it will be cleaned and put in the storage area again.
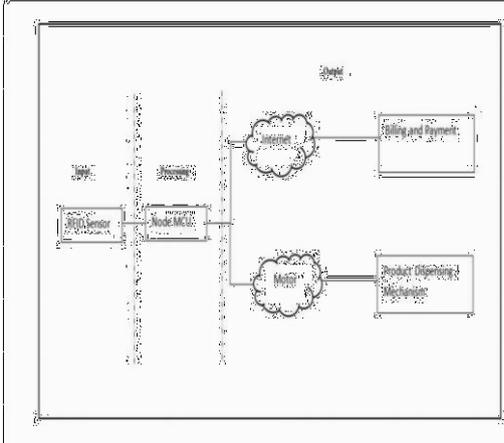
4. SYSTEM DESIGN AND IMPLEMENTATION

Fig. 2. Smart shopping mall block diagram

This project is divided into 3 parts according to functionality, 1) Input block, 2) Processing block and 3) Output block.

- In the Input block, the RFID scanner will act as an input sensor to the shopping aisle. When the users will scan the RFID Tags provided to them on the RFID scanner, it will read the information regarding customer data, billing and the product and will sent this information to the Processing block. RFID is connected to NodeMCU using SPI interface.
- All the processing of information is done in the NodeMCU. This processing block is connected to internet via the Wi-Fi technology in NodeMCU. It identifies the RFID Tag information sent by the RFID scanner, verifies the information and updates the billing information for the customer corresponding to the RFID Tag. At the same time it sends information to the motor driver circuit to dispense the product. It uploads the bill to the database which will be shown to the user oh his/her device on the web portal of shopping mall.
- The output is given out by a DC motor as an Actuator that will run a spring mechanism to dispense our product. This spring mechanism is based on the Archimedes screw principle which is widely used in modern vending machines. As the motor spins, the spring will spin which will push products outward. This motor spins for a fixed amount of time so that a single product is successfully dispensed out of the aisle. Motor is run by a motor driver circuit because it has larger current and voltage requirements.
- Billing information is shown at the web portal

5. SYSTEM DESCRIPTION

5.1 Node Mcu
NodeMCU is an open source platform based on ESP8266 that can connect objects and allow data transfer using a Wi-Fi protocol. Additionally, by providing some of the most important features of microcontrollers such as GPIO, PWM, ADC, etc., it can solve many project needs alone.

- Operating Voltage : 3.3Volts
- Input Voltage: 4.5 to 10Volts
- Digital I/O Pins: 11
- UART: 1
- I2C: 1
- SPI: 1
- Analog Input Pins: 1
- Flash Memory: 4 MB

Fig. 3. Node Mcu

5.2 RFID Tag Scanner
This RC522 RFID Card Reader Module 13.56MHz is an MFRC522 based RFID Reader module that is cheap and easy to use and can be used in many different applications.

- Operating Voltage: 2.5 to 3.3Volts
- Communication: UART, SPI & I2C protocol.
- Maximum Data Rate: 10 Mbps
- Read Range: 5 cm
- Current Consumption: 13 to 26 mA
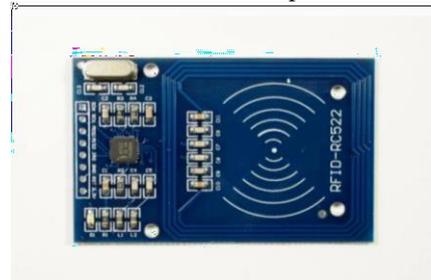- Power down mode consumption: 10 uA(min)

Fig. 4. Rfid tag scanner

5.3 L293D Motor driver
The L293D is a famous 16-Pin Motor Driver IC. As the name suggests it is widely used to drive engines. One L293D IC is capable of using two DC motors at the same time; and the direction of these two engines can be controlled independently.

- Supply Voltage to vcc2 (vs): 4.5 to 36 Volts
- Maximum Peak Motor current: 1.2 A
- Supply Voltage to vcc1 (vss): 4.5 to 7 Volts
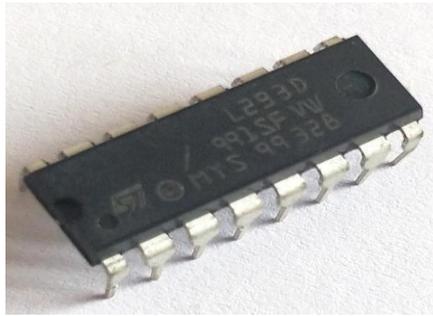- Transition Time: 300 ns

Fig. 5. L293D motor driver IC

5.4 Dc Motor

A DC motor is any class of rotating electric motors that converts existing electrical energy into mechanical power. The most common types depend on the energy produced by the magnetic field. Almost all types of DC motors have some internal mechanics, either electromechanical or electronic, periodically changing the current direction in the vehicle component.

- Operating Voltage: 4.5 to 9 Volts.
- No-Load speed: 9000rpm.
- Loaded Current: 250 mA (approx.)
- Recommended or Rated Voltage: 6 Volts

Fig. 6. DC motor

6. TEST RESULTS

After the RFID Tag was scanned, NodeMCU identified the name on the customer corresponding to the Tag. The motors turned ON and the desired product was dispensed. A delay is observed between two consecutive processes of dispensing. A light on NodeMCU shows if the RFID Scanner is ready to scan RFID Tags again. Billing information is updated in the web portal. Payment is done through the device of user on the web portal.

7. CONCLUSION

The paper gives an overview about smart shopping mall which was managed with the help of iot technology. It specifies various technologies used for executing the project. This project will help every citizen to deal with such pandemic situations which are occurred due to Covid-19.

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