

Design and Implementation of automated beverage vending machine with Iot-technology

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Abstract - This system aims to make ordering and obtaining beverages from an automated vending machine simple and efficient for consumers. Users may log in, browse the menu, and place orders via the system's web-based interface. The system checks the balance of the user's account to make sure they have sufficient funds to pay for the order. Before completing the order, the system asks the user to add money to their account if necessary. Once the payment has been made, the user's account balance is updated. At that point, they can place an order and have the money deducted from their updated account balance. The vending machine will immediately dispense the desired item. This system also incorporates IoT technologies to provide remote inventory and operation monitoring and control. The system provides a simple and trustworthy method for placing orders and purchasing drinks from vending machines thanks to integrated account management and payment processing features.

keywords - Keywords: vending machine, payment gateway, menu selection, efficiency, customer experience, profitability, automation, and retail.

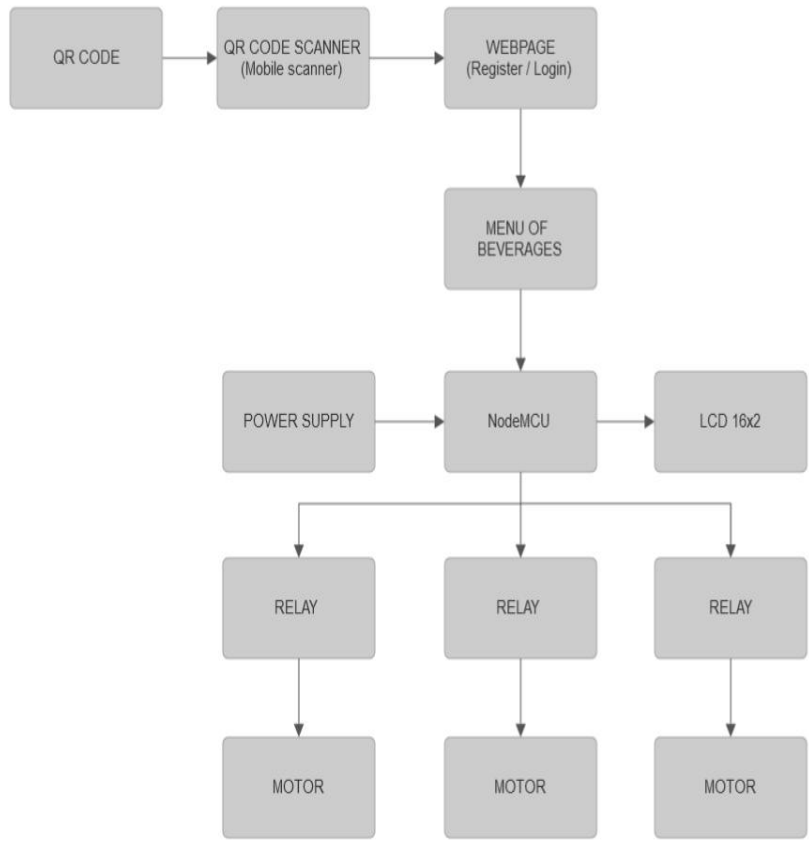
1. INTRODUCTION

Vending machines have spread throughout public spaces including airports, malls, and colleges and have become a frequent sight in addition to offering convenience and accessibility to a range of commodities. Traditional vending machines, on the other hand, have a number of disadvantages, such as the need to use actual money for all transactions, the absence of other payment methods, and shaky buying practices. The opportunity was created in order to improve the customer experience at the point of sale. This study offers a QR code-based beverage ordering mechanism to enhance the vending machine experience. Modern technology is included in the system, including payment gateways, delivery options, and QR codes, to improve the usability and efficiency of clients' online buying. The offered system eliminates the need for physicalization, eliminates floor transaction expenses, and gives customers secure and useful payment options. Customer satisfaction is also increased by the system's user-friendly interface, possibly increasing sales for vending machine makers. The research, which also advances the development of automated trading systems by analyzing the efficacy of the proposed system, offers a roadmap for future comparable systems.

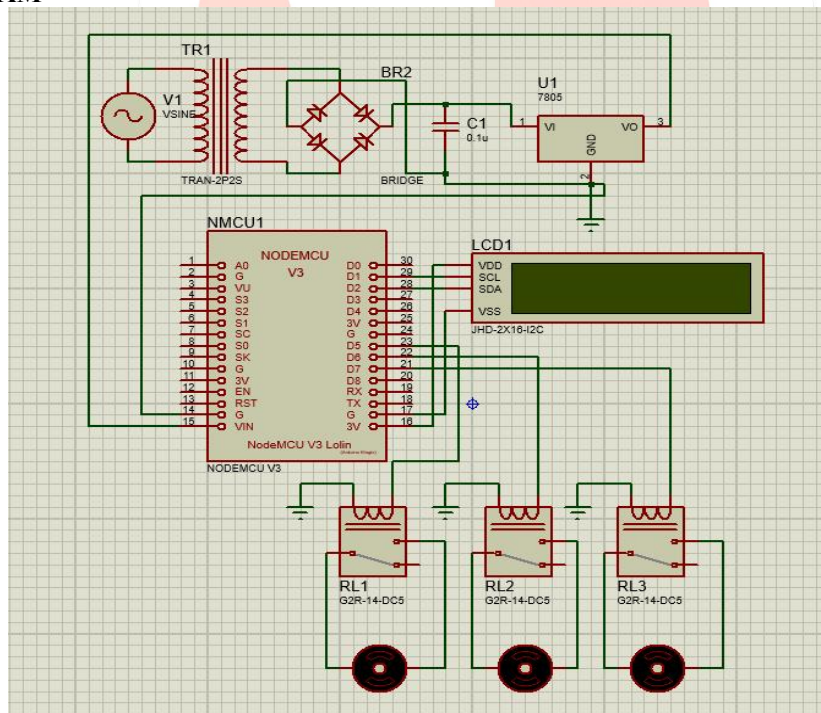
2. PROPOSED SYSTEM

The selection of portable snacks available from traditional vending machines is limited. Due to the fact that they usually offer limited alternatives and depend on cash transactions, customers who prefer digital payment options may find them cumbersome. Additionally, it's possible that existing vending machines' security and user experience haven't been evaluated, which could increase the risk of fraud or annoyance. These restrictions might have a negative impact on consumer satisfaction and revenue. To overcome these difficulties, a cutting-edge and useful vending machine that gives clients a portable snack choice is needed. These vending machines should provide a variety of drinks and simple, safe payment options. The use of payment gateways should be generally accepted and allow for secure, rapid transactions. Additionally, when designing vending machines to be user-friendly, user experience should be taken into account. To achieve this, include user-friendly features, provide a clear drink selection choice, and utilize an automated delivery system to reduce wait times. In conclusion, the problem statement emphasizes the shortcomings of traditional vending machines and the need for innovative, useful substitutes. The recommended solution includes a vending machine with a user-friendly layout that improves consumer satisfaction, a safe payment system, and a variety of beverage options.

3. BLOCK DIAGRAM



4. CIRCUIT DIAGRAM



5. WORKING

a. Customer's QR-Code

This block is a representation of the user's QR code. When a user uses the camera on their smartphone to scan this code, they are sent to the system's registration/login page.

b. Sign-up or Login

This block represents the user authentication procedure. Users must either login or register with the system before making an order. The user typically has to provide personal data, like their name, email address, and payment information, to finish this procedure.

c. The Order/Menu page

This block represents the user interface for selecting and making an order. Users may browse the available beverages and choose the ones they wish to purchase. The amount of sugar or milk that they desire in their tea, for example, may be customized by the user. After the user places their order, the cost is deducted from their account balance.

d. Payment procedure

The user's account gets charged for the price of the chosen beverage. The price is deducted and the chosen beverage is distributed if the user has enough money in their account. Before the user may place an order through admin, they are prompted to deposit funds to their account if they don't have enough balance.

e. Power source

e.1 Step-down transformer

The potential transformer will lower the power supply voltage from 0 to 230 volts to 0 to 15 volts and 0 to 9 volts. The voltage will decrease if the secondary coil has less turns than the main coil, and depending on the wire gauge, the current or amps will either increase or decrease. A STEP-DOWN transformer is what it is. The secondary of the potential transformer will then be connected to the rectifier.

e.2 Bridge rectifier

The AC output of the transformer is converted into a pulsating DC voltage via this electrical circuit. The rectifier, which consists of four diodes arranged in a bridge configuration, has a positively polarizable DC voltage output. The motor needs this component to convert AC electricity into DC voltage so that it can run.

f. NodeMCU

The behaviour of the circuit may be controlled by programming this microcontroller device. It uses the rectified DC voltage output from the bridge rectifier to drive the relay and display the data on a 16x2 LCD. The NodeMCU is a popular choice for IoT applications since it can connect to Wi-Fi networks and interact with other devices via the internet.

7. Relay

A relay is an electrical switch that is controlled by an electrical signal. When the NodeMCU instructs the relay to do so, the internal switch shuts, allowing electricity to pass to the motor. Relays are widely used in circuits that need high current or high voltage control signals.

8. DC Motor

After selecting a beverage, the selected relay allows electricity to flow to the motor for a certain amount of time. After the motor starts, the selected beverage is dispensed from the vending machine.

6. RESULT

a. HARDWARE



Fig. of outer view

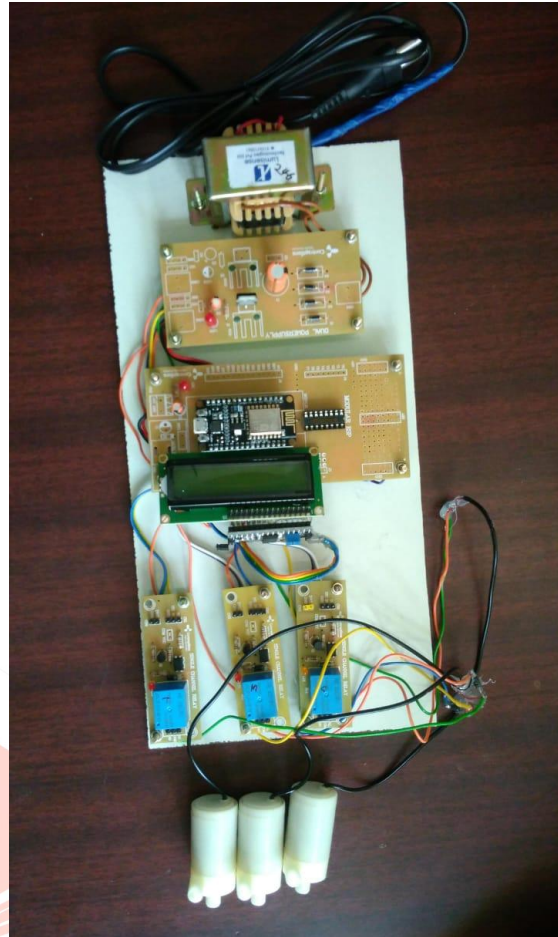


Fig. of inner view

b. SOFTWARE



Fig. of Admin webpage

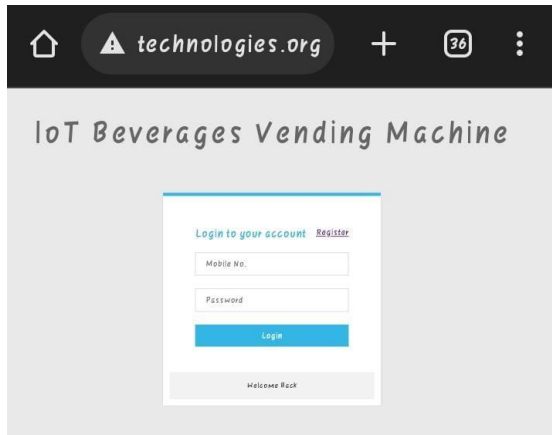


Fig. of User’s webpage (Register/Login)



Fig. of User’s webpage (Beverage choice)

7. CONCLUSION

Finally, the suggested QR code-based vending machine technology provides a major improvement over the experience provided by traditional vending machines. Incorporating cutting-edge technology, such as QR codes, payment gateways, and dispensing mechanisms, results in a streamlined and efficient purchasing process that also increases transaction security and convenience. Customer satisfaction is increased by the system's user-friendly interface, which might lead to increased sales for vending machine operators. The suggested system enhances automated retail systems in general and provides a foundation for the development of similar systems in the future. The study's findings suggest that the system is effective in achieving its objectives and has significant implications for the vending machine industry.

8. REFERENCE

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