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DIGITAL VENDING MACHINE

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Abstract: The design of Automatic vending machine. The Primary goal is to dispatch new Innovation applications in the public eye. Vending machines that dispense different types of products. Here we use a servo motor to dispense the item along with Raspberry Pi. To overcome the physical cash we are building a digital payment based on QR code (paytm UPI).The customer can select the product before scanning the QR code. After the successful payment process the particular servo motor will rotate and dispense the item.

Keyword: Raspberry Pi, Servo motor,IR Sensor, Payment through QR code.

I. INTRODUCTION

Vending machines are digitally operated machines that can dispense snacks, drinks, sandwiches, coffee, tea, and other products.These are extremely convenient outlets for the industry known as automatic retailing.The vending machines are located in public buildings, transportation hubs, and subways, at gas stations courthouses, hospitals, and the local automotive repair shop. With vending machines, it's essential to find a location with significant foot traffic. This means finding a place where plenty of people are coming and don't have an easy alternative to get snacks or refreshments elsewhere. Big corporate buildings or college campuses are classic examples of these places that charge rent.The main purpose of designing our project was to create a vending machine that could provide a number of soft drinks, juices, water, and snacks to people using extremely simple steps. These steps would not be time-consuming at all. The user would gets all the details on the screen which he/she should follow. We have made an attempt to vend products of different prices in the same machine. The machine will also provide the balance of money to the user depending on the selected.

II. RELATED WORK

2.1 Smart Coffee Vending Machine Using RFID.: Rahul Jadhv , Mrunali Jejurkar ,Pranita Kave & Prof . H.P. Chaudhari . (November 2017)

Working: In this article they have used RFID for the payment method and it's only for the employees of the company and Arduino as their processing unit. Reader of the payments is cut in their employees salary while according to their usage and bills.

Conclusion: From this publication they showed Arduino can be used for making vending machine, taking it as a reference we have used Raspberry pi zero as a processor since it's more futuristic and budget friendly and uses python language for its commands

2.2 Smart Vending Machine Komal Brar , Ambika Mishra , Neha bhagat , Raghav Gupta.(FEBRAUARY 2019)

Working: In this paper , they have made digital vending machine by introducing a QR code scanner as a cashless digital payment method , it indicates that in future there will be a cashless society in the world.

Conclusion: From this article they already used QR code scanner as a payment method . Taking it features we are used real time QR code scanner as a payment method and it is code by the python and only after the payment confirm message is recieved the product is dispatched

2.3 MEDICINE VENGING MACHINE USING RASPBERRY PI : Khan Mohammed Asim (September 2021)

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Working: In this article they have used Raspberry pi as a processor for the medicine vending machine and a DC motor with spring for the dispatch of the product.

Conclusion: From this article they are already used a Raspberry pi as a processor and in the other article we observed that Arduino is used as a processor , but here's no one used in between those two so we are using raspberry pi zero since it is more futuristic than the Arduino and less then Raspberry pi and it's budget friendly.

2.4 Smart Vending Machine Based on SMS Gateway For General Transactions : Moch S. Arifin S, Mat Syai , J. Endrasmono, Sryang T. Sarena, L. Subiyanto, A.S.Setyoko , Boedi Herijono, R.T.Soelistijono, Aang Wahidin , Adi Soeprijanto . (2017)

Working: In this article we have seen that sms gateway is used for the confirmation of the payments in any kind of machines.

Conclusion: From this article we can take it as a reference to secure the payment by introducing the sms gateway so that the payment is confirmed and secured for the user as well as the operator so that no one is cheated .

2.5 IoT Based Smart Vending Machine For Bangladesh :Wahidul Alam , Fahima Sultana , Jubaida Bahar Saba , Ayikutu Courage Kofi. (November 2019)

Working:In this article they used IOT platform for running the programs in online using internet and the rest of the process is done through the hardware components guided by the IOT.

Conclusion:From this article we can see there is live connection between the IOT platform and the processor , it's necessary to have good condition of internet for this operation . Taking it as an example we replaced IOT by Tk interface so that we can operate machine without internet connection and it is precoded the programs required . its easy to mention and work properly without internet

2.6 "Architecture of Beverage Vending Machine – IJACEN, vol-2, Issue-8, Aug-2014" This Proposed System ATM Card is the primary required for ordering the Beverage. This Machine Accompanies the request for ATM card number along with the request for PIN, once the PIN has been validated by the financial institution, after this Beverage ordered is debited from the Customer account. Finally Beverage being served to the Customer.

2.7 "Automatic Paper Vending Machine – IJSETR, vol-4, Issue-4. April-2015" This proposed system design and fabricate an automatic paper vending machine, the payment setup is arranged in such a way that one sheet of paper would be delivered when a one Rupee(Indian Rupees-INR) is inserted, And two sheets of paper would be delivered when a two Rupees is inserted. After coin is inserted to machine delivers the paper when a customer asks for the number of papers, by using IOT devices and microcontrollers based on the mechatronics principles.

2.8 "Automatic Chocolate Vending machine – ICACCS, Issue-2019" This Proposed System sales different types of Chocolates. Here they used RFID card along with Arduino Uno, The external devises such as keypad, stepper motor, display can be connected through the various pins on the Arduino Uno. The Stepper motor is connected to the spiral ring, those chocolates are inserted in the ring, Finally the Product can be selected and then the motor rotates to deliver the product.

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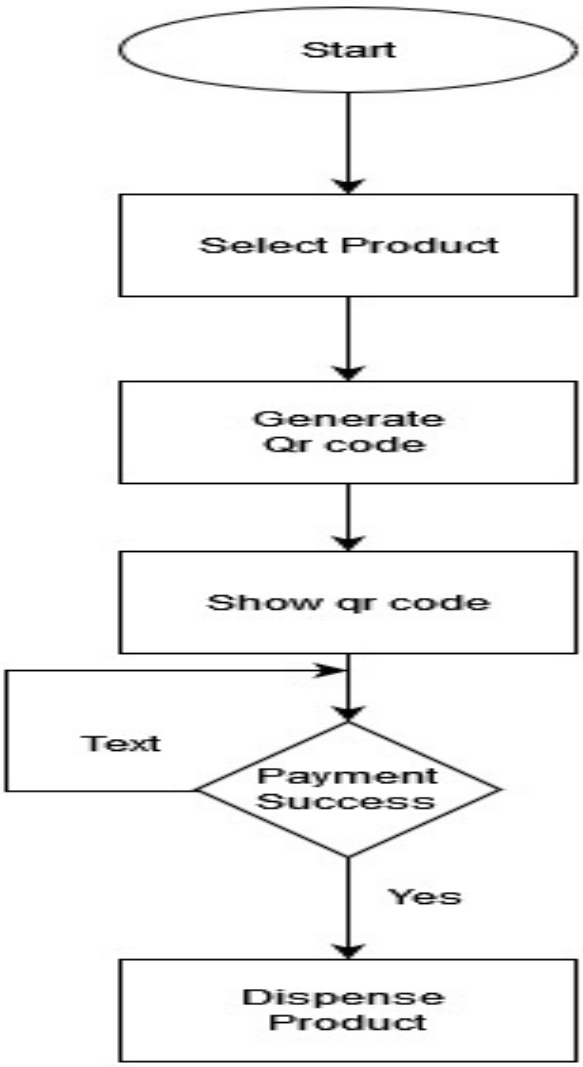
III. METHADOLOGY



IV. PROPOSED SYSTEM

The proposed digital vending machine which interact with each item dispenser.

User Interface and Product Selection: The system's user interface (UI) is designed to be intuitive, displaying all available products on a screen connected to the Raspberry Pi Zero W. Users can browse through the products and select the desired quantities. The interface updates in real-time, ensuring accurate and efficient product selection.
Payment Processing: Once the user has selected the products and quantities, the system calculates the total price. This total is displayed alongside a UPI QR code generated for the transaction. Users can scan the QR code using any UPI-enabled payment app. This method is both secure and widely accessible, making it a convenient choice for users.
Product Dispensing Mechanism: Upon successful payment, the system activates the motor driver connected to the Raspberry Pi Zero W. This driver controls a DC motor responsible for dispensing the selected products. The integration of the motor driver ensures precise control over the dispensing process, reducing the risk of errors.
Dispensing Confirmation: An Infrared (IR) sensor is employed to verify that the product has been successfully dispensed. The sensor detects the passage of the product and sends a confirmation signal back to the system. This feedback loop ensures that the vending machine accurately tracks dispensed items, maintaining inventory integrity.
Payment Verification and Notifications: A GSM module is incorporated to handle payment verification. Once the payment is successful, the module reads the payment confirmation message and relays this information to the Raspberry

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Pi Zero W. Additionally, the system is programmed to send an SMS notification to the vending machine owner when products are low in stock. This proactive approach helps maintain product availability and customer satisfaction.

Inventory Management: The Smart Vending Machine utilizes Google Firebase for real-time inventory management. The system fetches product quantities and other relevant data from Firebase, ensuring that the inventory is always up-to-date. A dedicated website allows the owner to manage the vending machine remotely, updating product quantities and prices as needed. This integration simplifies the process of maintaining and operating the vending machine.

V. HELPFUL HINTS

[1].Ensure proper wiring connections between components for seamless functionality.
[2].Test each component individually before integrating them into the system.
[3].Implement error handling mechanisms to address any technical issues promptly.
[4].Regularly update software and firmware to maintain security and efficiency.
[5].Document the assembly process and keep a record of troubleshooting steps for future reference.

VI. CONCLUSION

The smart vending machine project successfully integrates Raspberry Pi Zero, GSM module, and various hardware components to create an efficient and user-friendly vending solution. With a focus on real-time inventory management and interactive user experience, the machine offers convenience and reliability. Future enhancements could include touchless solutions to address global health concerns and further improve customer satisfaction.

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