

SMART CANTEEN MANAGEMENT SYSTEM

Ms Poornima A¹, Indhumathi K², Harini R³,

¹Assistant Professor, Department of Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.

²Final Year Student, Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.

³Final Year Student, Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.

Abstract - The introduction of the Internet enables financial transactions through digital payments, supporting the vision of a cashless society. The appearance of the corona virus (COVID-19) had a significant impact on how we handled currency in the past and marked a turning point in the shift from cash to contactless digital payments. By enabling devices to provide goods and services without requiring human involvement, Internet of Things (IoT) technology also advances digital payments. This study presented an Internet of Things (IoT)-enabled cashless vending machine that combines cloud computing and payment gateway for placing orders and making purchases via mobile applications. The system enables a pre-installed mobile application to scan a Quick Response (QR) code attached to a vending machine's body, opens a web-based virtual machine through the code, enables users to select and order items from the virtual vending, initiates and authorizes a digital payment through an IoT gateway installed inside the physical vending machine by connecting users' and vendors' financial entities, and then disburses the purchased goods. It uses an ATmega 2560 Microcontroller, a Esp8266 Wi-Fi module, mobile application software, and payment gateway API to run on the Arduino platform. After 150 consecutive API test calls, the system selected a product with an average response time of 14500 milliseconds. This outcome demonstrates a successful time for enhancing customer purchasing experiences with digital payment systems and an adaptable and reasonably priced intelligent vending machine based on the Internet of Things to be introduced for mass production.

Key Words: smart canteen, ordering system, blynk, android phone, vending machine,

I. INTRODUCTION

In order to provide advanced and intelligent services, the Internet of Things (IoT) integrates a variety of devices into networks. The idea of intelligent devices, smart homes, smart cities, and other related concepts have emerged, and the Internet of Things (IoT) has emerged as a field of unfathomable impact, potential, and development. Cisco Inc. predicts that by 2020, there will be roughly 50 billion intelligent devices on the market. The current firms aim to increase customer involvement by considering various business models and marketing techniques as innovation continues to grow at a rapid pace. Current company tactics have changed as a result of the fourth industrial revolution and the growing popularity of the IoT. Actualizing sensors updates them to an object in existent goods. Big data analytics techniques have also been noted for the important goals of the

current organizations, but a few obstacles and limitations have prevented their fusion in practice. To handle the ever-expanding usage of speed and validity of acquired data, current big data analytics techniques should be upgraded. In essence, the vending machine is an automated device with IoT capabilities that dispenses goods like drinks, snacks, food, and so on. By paying a cheaper rental fee and providing 24 hours of service each day, the vending machine can help store owners lower their costs while increasing their profit margin. With the aid of digital payment methods, a client can effortlessly purchase goods from a vending machine. There are numerous small and medium-sized enterprises operating in each country, but only two or three multinational corporations, making the vending machine market extremely competitive and fragmented. There is no getting around the fact that the vending margins are so low that any interest in advanced technology bringing operational costs and investment funds expecting high legitimacy the Return on Investment is a waste of money (ROI). In this way, we use tiny vending machine owners are typically hesitant to invest in new developments. Due to the enormous relevance of vending machines, this paper proposed a smart locker-based vending machine that is connected to the Internet and implemented with IoT technology. Customers would be able to purchase any product 24/7 at a reasonable price. It has capabilities that enable administrators, revilers, and sellers to operate and manage their businesses online. Customers can buy products from the developed smart vending machine by making payments using their digital payment wallet with the help of a mobile application. Customers can buy products from the developed smart vending machine by making payments using their digital payment wallet with the help of a mobile application. This is because digital payment systems are widely used today and have opened up new potentialities for payment methods. the first. The goal of our methodology is to lower total business costs, making this model ideal to attract a larger number of vending machine operators who may implement this innovation, and concurrently enhance the purchasing experience for customers.

II. LITERATURE SURVEY

1. D. Hongyu, L. Lizong, Q. Dixin and O. Baibing, [1] "Design of College Canteen Ordering System Based on Cortex-A9 and Android," 2020 International Workshop on Electronic Communication and Artificial Intelligence (IWECAI), 2020, pp. This paper describes a system that can accept orders at the counter and via an internet application and show them on kitchen monitors. The internet programme

would employ JSP for the backend and HTML5, two Java script, two, and Boot Strap for the frontend. To secure the 2048 bit El-Gamal encryption method from attacks, the proper protection measures must be put in place. We'll develop a web application that allows customers to place orders in advance. An ORDER ID will be assigned to each order placed in Enhance, and this ID will be utilised to have the order immediately brought to the serving counter. At the counter, payments can be done using cash or an e-wallet. Elgamal is a public key cryptography algorithm and an asymmetric encryption system. Calculating discrete logarithms is the key to this algorithm's security. The database values need to be decrypted before actions like recharge, payment, and refund are carried out on the decrypted values. The values are once more encrypted and stored in the database after the operation is complete. The encryption key is a 2048-bit one. In order to encrypt the transmission of sensitive data between the consumer and server, an Ajax call is performed from the consumer side to a servlet to obtain cipher-text. To further assure safe data transmission when using the online application, an SSL certificate was added on the website.

2. L. Koivunen et al., [2] "Increasing Customer Awareness on Food Waste at University Cafeteria with a Sensor-Based Intelligent Self-Serve Lunch Line," 2020 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), 2020, pp. 1-9. This paper's time billing technique for the canteen management device suggests that the canteen manager will issue an RFID to their clients, who may be staff or students, or employees in the case of an organization. This system works incredibly well. It is especially helpful for those who frequent the canteen frequently, perhaps even daily. They are no longer required to bring the money with them. Every single registered consumer will receive a card, which they can reload with any amount they like. According to this project, deliveries must stop creating during non-canteen hours and just an invoice must be issued during such hours. With this system, we can completely alter how the canteen operates. Is it possible to receive a refund for the balance on the card? Weekly or monthly reports for each individual user must be provided. Only consignment needs to be created in order for this work to deliver Page 2 of 3 a good solution and be completed on time. Only during the designated hours are clients permitted in order to accomplish that.

3. B. Vatcharakomphan et al., "vCanteen: A Smart Campus Solution to Elevate University Canteen Experience," 2019 IEEE International Smart Cities Conference (ISC2), 2019, pp. 605-610. This article provides a framework for cloud-based automation of the entire process to make it more convenient for the canteen and the customers. With the use of cloud computing technologies, installations and hardware components are not needed. Compared to owning separate components, cloud computing is incredibly cost-effective. The gap between the canteen and its use is filled by the suggested cloud-based programme. Each consumer will utilize a Radio Frequency Identification card issued by the system to make purchases at the counter. Additionally, there is a new method of purchasing and paying via a mobile device in which payments are taken immediately from the customer's account, which helps to shorten lines. Online transfers and electronic wallets can be used to recharge accounts. The cloud will serve as the hosting facility for both the web and mobile

applications. It is simple to complete the demanding administration of a canteen business. Long wait times in line are unnecessary, and orders can be placed more quickly as a result. Only one data migration to the cloud is necessary. Everything about the canteen is automated. The alternative payment technique entails using a smart card that is exclusively used for payments. Although the RFID card enables a cashless billing system, real money is still used to reload the card.

III. PROBLEM STATEMENT

- The hassle announcement for a clever management machine the use of vending machine and an android cell phone is to design and put in force a machine that may correctly manipulate the operations of a canteen, which include ordering, charge, and inventory control.
- The current manual gadget can be time-ingesting, inefficient, and vulnerable to mistakes, ensuing in unhappy customers and loss of revenue.
- The proposed gadget need to using vending machines for short and clean self-service options, and an android app to facilitate ordering, fee, and comments.
- The machine ought to additionally consist of actual-time inventory management to avoid stock-outs and wastage standard, the device must be user-pleasant, fee-effective, and scalable to fulfill the needs of a massive canteen.

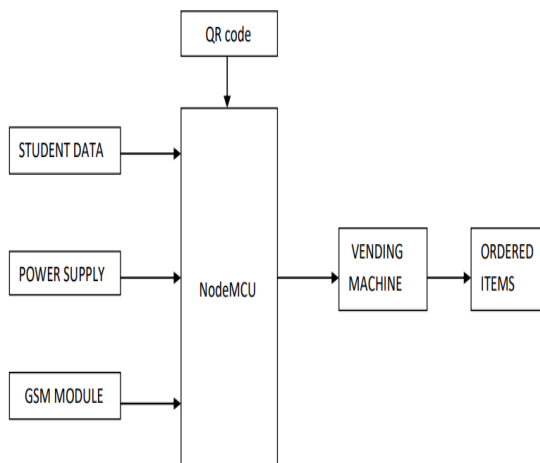
IV. METHODOLOGY

4.1 Overview

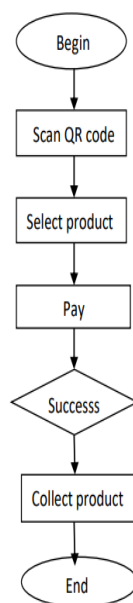
Our research's major objective is to use cutting-edge technology and IoT technologies to empower a financially viable platform for the vending machine industry. The underlying high-level scenario (SCN) between the various important components and users is shown in Fig 3.1. The Mobile Network will enable customers' smart phones to access the Internet. Each vending machine has a distinct QR code (Quick Response code) printed on its body. This code has a unique URL linked to a web-based system that provides the user with a virtual version of the vending machine called Virtual Vending Machine. The customer can then choose which items to buy from the vending machine after viewing the list of that machine's products. The customer smart phone must have the mobile application installed in order to communicate with the virtual vending machine. It has the benefit of offering increased security when using the user's wallet to make payments and gives the customer a good user experience when interacting a time with the machine to make a purchase. The physical vending machine has an IoT Gateway installed inside of it that is connected to the Internet. This integrated electronic board was created and put together using inexpensive Arduino compatible modules. The device receives a request to distribute the item in the locker following a successful payment. Customer payments made through the app are received by Digital Payment Service. Mobile proximity payment can be used on vending machines powered by the Internet of Things utilizing a smart phone app in a

totally contactless manner. After deducting a specific percentage as a commission that the vending machine operator agreed to receive from the merchant, the money is officially sent to the merchant account.

4.2 Block Diagram



4.3 Flowchart



4.4 Working

- To interact with the vending machine using our suggested framework, a user must install a mobile application we have created. A user of this programme must sign in by providing a mobile number.
- A user must first confirm their account by entering a verification code that has been produced and sent to their cell phone by the system. If the user's phone has an internet connection, the list of products with the price of the specific machine will be presented in the app when

the consumer successfully logs in and scans the printed QR code in the machine.

- Customers can select products and pay for them using the mobile app's integrated Digital Payment Service account. The items will be released from the lockers for pickup following a successful transaction.

V. SCOPE OF THE PROJECT

- The system that has been suggested aims to digitalize all of the canteen's operations and management through canteen business process automation.
- Efficient use of resources through rising productivity by automation
- The application provides a report that could be used for different purposes, such as accounting management and reference for future.
- It satisfies the requirement of users.
- Understanding the working of system is not complicated in case of both the users and the admin.
- Easy to operate.

VI. RESULTS

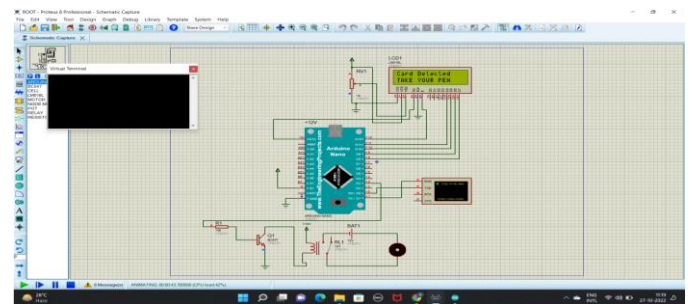


Fig-1: Output of the simulation for smart canteen management system

This (Fig 1) is the simulation results for our Smart Canteen Management System experiment. It shows which item we have ordered and how we receive the ordered item.

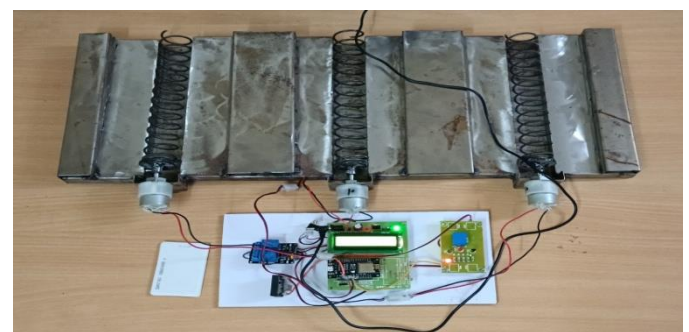


Fig-2: Hardware Module

This (Fig 2) is the hardware module of our project. Vending machines most commonly sell food (like chips and candy) and drinks (water bottle juice, and soda). Typically, insert coins, a

bill, or a credit card into the machine, punch some buttons, and grab snack from the compartment into which it's dropped. In vending machine ultra light sensors are use to detect the metal type of the coil and whether the coin original or not.

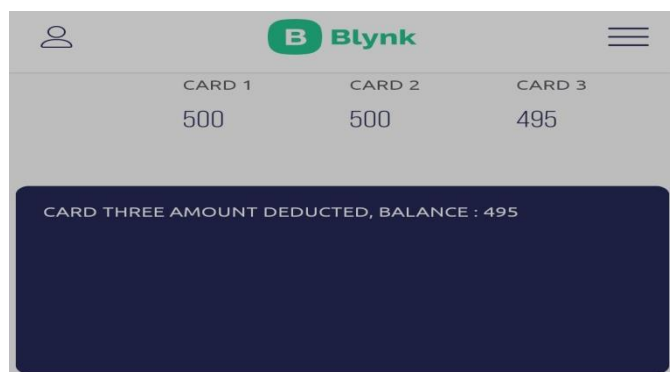


Fig-3: Amount deduction and balance results

Fig 3 shows card amount deduction and balance amount details in BLYNK app.

VII. CONCLUSION

In this article, a presentation of a cutting-edge IoT platform that supports a variety of industries, devices, and applications has been made. For our nation of Bangladesh, we created a smart vending machine application that will be beneficial in a variety of ways. The innovative and economical strategy used in this research connects mobile applications and payment gateway, allowing for the **safe** purchase of smartphones using electronic payment methods. With this IoT solution, clients will have a unique experience purchasing goods at their convenience. It is also affordable, user-friendly, and simple to use. Additionally, the same programme integrates a hassle-free digital payment method (bKash), in contrast to conventional methods. In order to promote technology in the IoT sectors, this invention can be considerably expanded in a variety of businesses.

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