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Token Generation through Cashless Transaction with RFID

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Abstract: Digital transformation means the adaptation of the power of new technology to create a better experience for users. As part in the digital world our project aims to create a payment system for students inside the college. So, we have developed a payment system that enables students to pay with their ID cards inside the campus like stationary, canteens, food courts and hostellers can pay their mess bill. Our project utilizes RFID technology and Raspberry Pi to create a seamless payment experience for students using their NFC-enabled student ID cards. Students and cashier can also track their transaction in mobile application that are developed. Also, Students can easily recharge their ID cards using the mobile application. This system provides a user-friendly, efficient, and secure payment option that reduces the need for physical exchange of cash or sensitive payment information while using third party apps.
Keywords: NFC Reader, Digital transformation, Radio Frequency Identification.

I. INTRODUCTION

The world is rapidly moving towards digitization, and digital transformation is becoming the need of the hour. The outbreak of COVID-19 has further accelerated this shift towards a digital world. Digital payments have played a significant role in these tough times, and it has become essential to have a seamless payment system that can provide a better experience to users. In order to keep up with this fast-paced digital world, educational institutions are also adopting new technologies to improve their operations and provide better services to their students and employees. In this context, our project aims to create a payment system for students inside the college. We can see that students inside the campus use different payment methods to complete their transactions. Some students opt for cash, while others use various UPI apps. Even for tiny transactions like buying a pencil, students need to give their UPI credentials to pay, which is not a safe and secure option. To address these issues, we have developed a payment system that enables students to pay using their ID cards inside the campus at various locations such as stationary shops, canteens, and food courts. Students can also use this system to pay their mess bill, and easily recharge their ID cards using the mobile application that we have developed. This system provides a user-friendly, efficient, and secure payment option that eliminates the need for physical exchange of cash or sensitive payment information while using third-party apps. The traditional payment system of cash has its limitations, including the risk of theft, loss, and mismanagement. Moreover, the traditional payment system can be time-consuming, especially when students have to stand in long queues to make their payments. On the other hand, the UPI system, although convenient, can be risky as students have to share their sensitive payment information with third-party apps. Our project utilizes Radio-Frequency Identification (RFID) technology and Raspberry Pi to create a seamless payment experience for students using their NFC-enabled student ID cards. The RFID technology is used to read the information from the student ID card, RFID (Radio-Frequency Identification) is a wireless technology that uses radio waves to communicate data between a reader and a tag. It allows for contactless identification and tracking of objects, making it ideal for various applications such as access control, and payment systems. In our project, Raspberry Pi is being used to create a payment system that allows students to pay with their NFC-enabled student ID cards. Raspberry Pi as a mini computer updates data in real time firebase and communicates with RFID reader, printer, and display. This system provides a user-friendly, efficient, and secure payment option that reduces the need for physical exchange of cash or sensitive payment information while using third-party apps. Our project not only provides a better payment experience for students but also helps the college management to manage the transactions more efficiently. The system allows for easy tracking of transactions, and both students and cashiers can track their payments through the mobile application that we have developed. This project contributes towards the digital transformation of the college by utilizing the power of new technology to create a better experience for users, and we believe it has the potential to revolutionize the way students make payments inside the campus. By adopting this technology, colleges will look more innovative and forward-thinking, providing a better experience for our students and paving the way for future advancements in the field of education.

II. REFERENCE

Biljana Radulovic et al. [1] explains that contactless payment systems are cashless transactions that do not need direct contact between the consumer's payment device and the POS terminal being utilized by the retailer. RFID devices can be embedded in various objects such as cards, key fobs, watches, and cell phones. The same infrastructure that supports magstripe payment cards is used to implement contactless payment systems, so businesses and financial institutions need only upgrade their point-of-sale terminals. current sales. This article discusses the benefits of implementing a contactless payment system based on RF technology.

Nabil Munawar et al. [2] this paper describes how cashless payment methods have gained popularity owing to their many advantages and conveniences. One of the media often used for transactions is the RFID card which contains various data. If the data is centralized, we can do more than things with a single media RFID card. This study aims to combine IoT technology with a payment application commonly used at the checkout in a shopping mall.

Dr. Jinsa Kuruvilla. et al. [3] The vending machine is a cash machine that issues tickets to consumers after paying by tapping a specially designed card, the NFC card, on the machine. This concept can be implemented using cashless payments. Even after reaching the location, the process requires additional time for tracking, and billing process. Another shortcoming of the current system involves several issues with currency. User's always must carry cash with them, which is not a good option these days because every payment is made as a digital transaction. There is also the possibility of money theft. We hereby provide a solution to bypass the payment part of online resources.

Viktor P Semenov. et al. [4]. This article discusses the idea of a vending machine and the primary functions of a contemporary vending business, one of whose key objectives is to accept as many different forms of payment as possible.Large enterprises, offices, organizations, and firms frequently have vending machines on their premises. Customer service is the main goal of the vending business. We present a cashless payment method that we created in this paper. Employees can pay for the purchase of electronic passes using the gadget. With this approach, the vending company avoids dealing with issues with currency (notes and coins), collection, and exchange, and it guarantees that clients are supplied within an hour, boosting the organization's income. Additionally, this payment option is quicker for the customer.

Mohammad Farid Saaid. et al. [5] This article explains that most supermarkets and retailers today use legacy or traditional payment and data management systems. Newer technology degrades performance and you will suffer the consequences of this bad technology. Therefore, it is particularly important to provide new intelligent systems that provide real-time suggestions to overcome the limitations of traditional control systems, as vulnerabilities such as data loss, long delays, etc. can be associated with this problem. Barcode technology is also being used as a means of tracking items because barcode systems are the least expensive and are still widely used in retail management systems. Research shows that instead of using RFID tags with e-money, fewer RFID-based currencies are being invented to allow customers to make cashless payments, but can increase the smoothness of payment transactions. Increase.
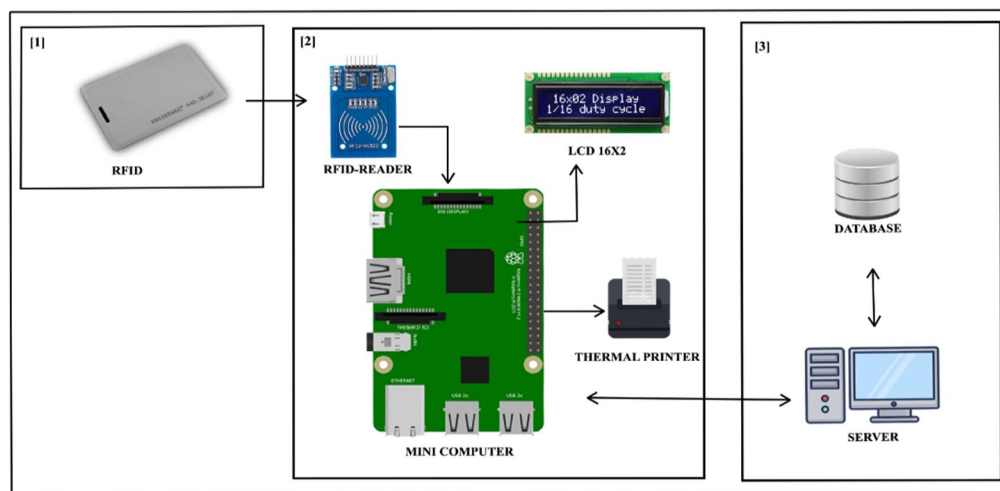
III. ARCHITECTURE

Fig 1: General Architecture.

1) RFID card serving as the input. The User uses an RFID card is near the field of the RFID reader machine. fter that, the payment card detection procedure is successfully started.

2) Process for generating Token. The tool that will be made has three function to generate and print token. Users may top up, which is helpful for making payments and eliminates the need for cash. Card details is sent from rfid-reader to compute. Display shows the instructions and what process is being executed presently what will be the output. If the balance is available in account token will be printed using Thermal printer.

3) Checking data in database. After the [1] & before step [2] to execute data needs to be checked before generating the token. When user taps the rfid card to rfid reader, system checks in the database for user data. If data available inside the database, token generation will be taken place, else it will display as no data found.
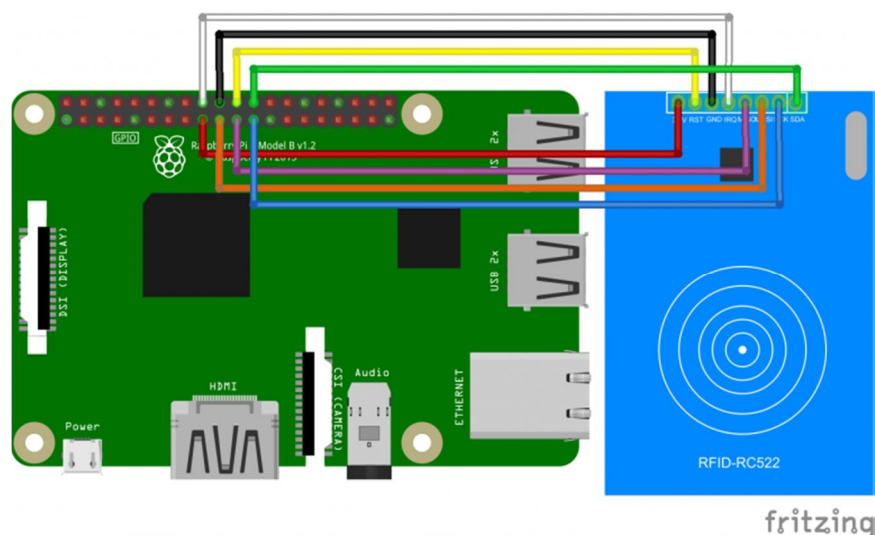
IV. CONNECTIONS

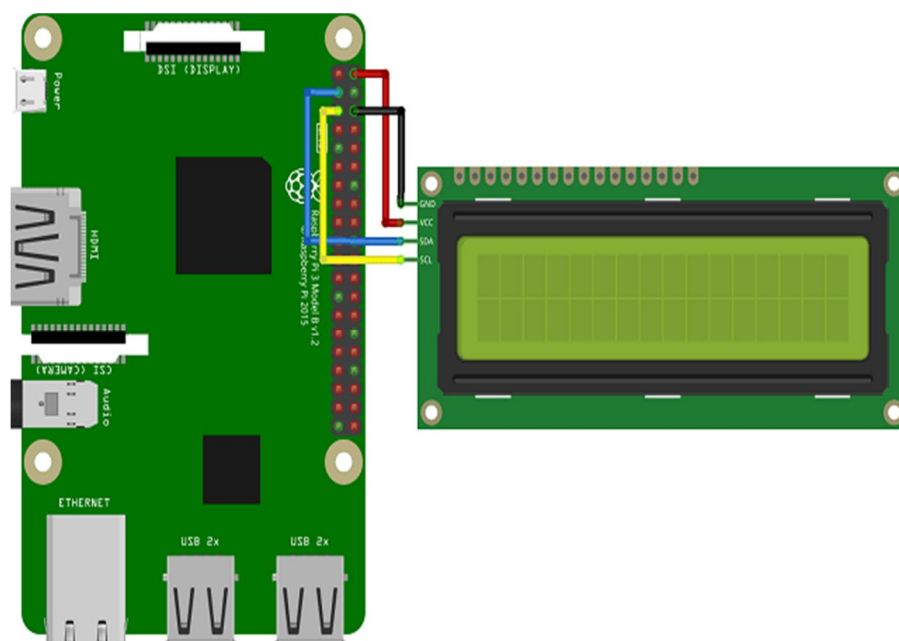Fig 2: Displays the connection for the RFID-RC522 reader.

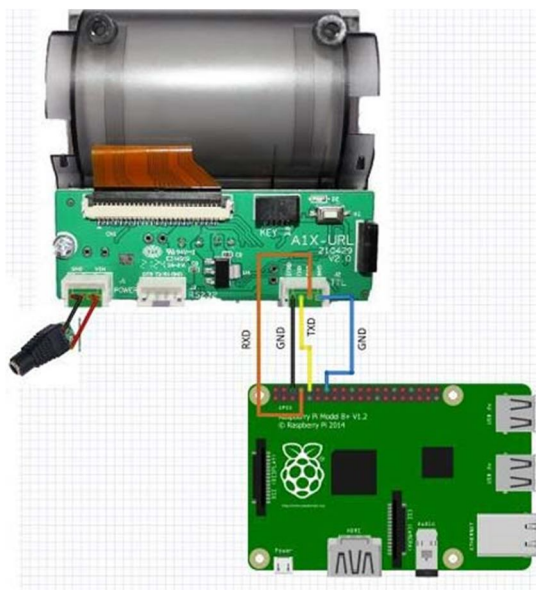Fig 3: Displays the connections for the LCD display.

Fig 4: Displays the connection for the Thermal Printer.

V. METHODOLOGY

FIG 5: RASPBERRY PI 2 MODEL B

1) *Raspberry pi 2:* A line of single-board computers known as Raspberry Pi was developed by the Raspberry Pi Foundation, a UK-based non-profit organization whose mission is to provide accessibility to computer education and computer literacy. The Raspberry Pi is a relatively affordable computer that runs Linux and has a set of general-purpose input/output (GPIO) ports that let users explore the Internet of Things and control devices for physical computing. (IoT).
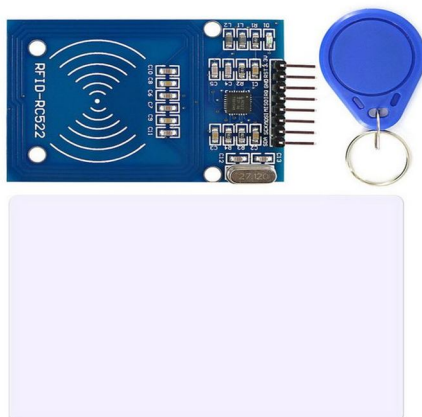

Fig 6: RFID-RC522 reader and RFID tags.

2) RFID-RC522 with NFC tag and NFC card. An RFID system comprises two main components: a tag affixed to an object and a reader that scans the tag. The reader includes the radio frequency module and an antenna that generates radio frequency signals. RFID tags are usually passive, meaning they do not have a battery. Instead, they contain a microcircuit that stores and processes data, and an antenna that transmits and receives signals. When the reader comes near the tag, it produces an electromagnetic field that powers the chip inside the tag. After the tag's chip is powered by the electromagnetic field generated by the reader, it transmits the stored data back to the reader using a radio signal. This type of radio signal is known as backscatter. The reader detects and decodes the backscatter, and transmits the data to a computer or microcontroller.
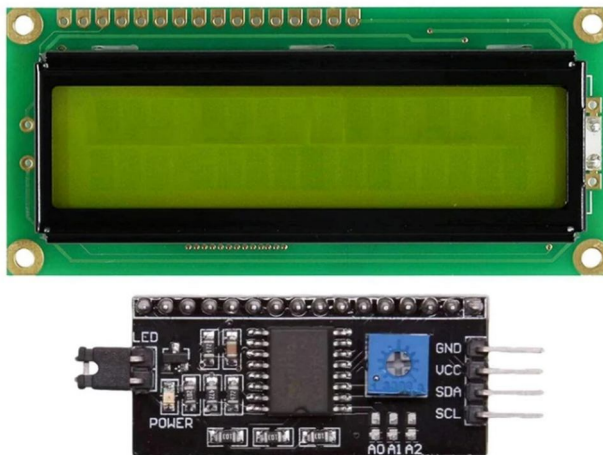

Fig 7: LCD 16x2 1602 Alphanumeric Display And IIC/I2C Serial Interface Adapter Module.

3) LCD 16X2 display. Two of these lines make up a 16x2 LCD, which can display 16 characters per line. This LCD displays each character using a 5x7 pixel grid. The 16 x 2 intelligent alphanumeric dot-matrix display can show 224 distinct letters and symbols. There are command and data registers on this LCD.

Fig 8: RP203 2 Inch Thermal Printer.

4) Thermal Printer. It is mostly utilized in the airline, banking, entertainment, retail, grocery, and healthcare industries and has grown in popularity as a result of its high print quality, quick turnaround, and technical advancements. In contrast to many other printing methods, thermal printing solely relies on thermal papers to produce the pictures. It does not need ink or toner. Because of how quickly they print, they are also highly popular for making labels. Because thermal printers do not require cartridges or ribbons, businesses may use them to save money.
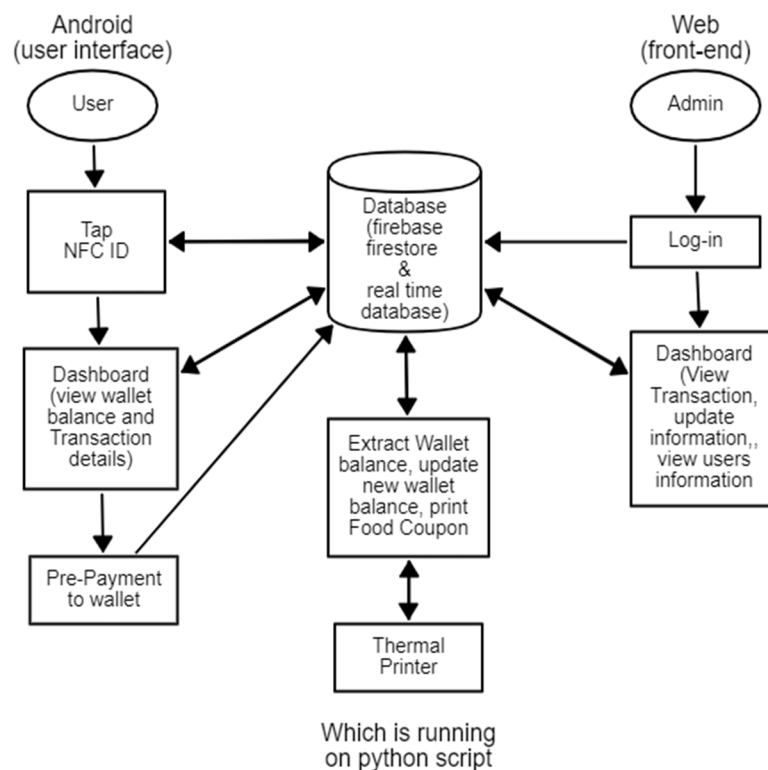
VI. METHODOLOGY

Fig 9: Methodology

This project uses a Python script to generate tokens. The proposed system includes features such as maintaining user information, importing transactions using user IDs, and managing the number of tokens generated per day. There are two portals for administrators and users. We have a mobile application for user registration, and when the user registers the application, we send data in a specific format. This method uses an RFID card that you scan with an NFC reader. The application receives the RFID ID and data from the card and verifies it against a cloud database. When the RIFD data matches the cloud data, the user data is retrieved from the cloud and printed in a specific format. Users can make prepayments using the mobile application. In the admin portal, administrators can view and manage user data. Administrators can also track the number of tokens created per day. A printing device that runs a Python script to retrieve user information, update new information, and print tokens.

VII. RESULTS

The token generation system uses technology to generate tokens quickly and efficiently without human intervention. one of the important advantages the token generation system is a feature that provides faster transaction times. This technology allows rapid generation of tokens, reducing the time it takes for customers to pay for goods and services. This reduces queues and waiting times and increases service quality and customer satisfaction. The token generation system also brings more convenience to users. A simple registration and prepay feature allow users to quickly fund their account and use their tokens to make purchases. This provides a safer and easier way to complete transactions as users do not have to carry cash or credit cards. another advantage the token generation system is a feature that tracks transaction history. This feature allows users to view their payment history, including the number of tokens used and items purchased. The token generation system also provides an efficient way to track token usage. By tracking the number of tokens created each day, the system can help businesses and organizations manage inventory and sales more efficiently. This will reduce waste and ensure sufficient inventory to meet demand. Therefore, the token generation system is a convenient, efficient, and secure means of non-cash transactions. It provides users with simple registration and prepayment capabilities, faster transaction times, and ability to track transaction history. The system also provides businesses and organizations with an efficient way to manage inventory and sales. Given these advantages, it is not surprising that the use of token generation systems is becoming widespread across a variety of industries.

Fig 10. Result

VIII. CONCLUSION

The development of a payment system for students using their ID cards and RFID technology is a significant step towards the digitalization of payments in college campuses. The system offers a secure, user-friendly, and efficient payment option, reducing the need for physical exchange of cash or sensitive payment information through third-party apps. By leveraging RFID and Raspberry Pi technology, this project aims to address the limitations of existing payment systems by providing a seamless payment experience for students. Furthermore, this project has the potential to enhance the overall student experience, making transactions faster and easier for students. It also reduces the burden on cashiers by automating the payment process and makes it easier for students to keep track of their transaction history. The system's integration with a mobile application allows students to easily recharge their ID cards and access transaction details. This project's success could pave the way for further innovation in the field of digital payments and encourage the adoption of similar systems in other educational institutions.

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