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Smart Canteen and Cafeteria ManagementSystem using RFID Technology

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Abstract: ***The Internet of Things (IoT) has revolutionized various industries by connecting everyday objects and devices to the internet. IoT is a system that incorporates IoT-enabled devices, software, and sensors to automate canteen services. One of the latest applications of IoT is in the canteen industry. IoT canteen is an innovative approach to streamline the food ordering and delivery process in educational institutions, hospitals, and workplaces. The traditional system to manage meals in the canteen can be updated by using Internet of Things (IoT) involving RFID technology provides applications togather information about a large number of the users by making it efficient to process the collected data and even encourages the use of e-cash. IoT provides transparency to admin by using the data effectively. This paper demonstrates how the system manages the canteen bills by introducing IoT in existing or traditional canteenmanagement systems.***
Keywords: RFID reader, RFID card, e-cash.

I. INTRODUCTION

A canteen installation is a auxiliary system which is providedby associations for their employees/students. Associations with large figures of employees cannot handle a canteen with manual processes. The being system is a cash and paper-based system. The payment and procedure take a lot of time as the client has to pay the exact amount and stay for the change. Functionalities delivered by our Canteen Management Systemare built on various factors Such as Canteen, Item and Sales. Manage the data of Canteen, & also Students/employees/Customers. Proper resource/stock management of Data will be done by editing, adding and modifying of records. Assimilation of all records of Sales. In colleges, schools, companies and various cafeterias this type of facilities can be provided. The users can be students, collegestaff or employees. Users will have to register themselves in order to be able to use this facility.

Section II will be displaying the research papers we referred for this project.

Section III consists of the basic idea of the project, block diagram with the description of components and the flowchart.Section IV will be describing about the methodology and the working of the project. Section V which is Workflow depictsthe idea about how the project would be working. Section VIwill be displaying the expected results of the project. In Section VII we will be conclude and discussion about the future improvement.

II. LITERATURE SURVEY

"Smart Canteen Management System Using RFID" (2020)

Rajath Bagre, Akshatha Y, J Hima Nanaiah, MohammedMehar Ali Sabri, Nihal S Karkera. The paper proposes a Smart Canteen Management System

(SCMS) that uses Radio-Frequency Identification (RFID) technology toimprove the efficiency of canteen operations. The system usesRFID tags attached to student ID cards to identify students andrecord their food purchases. It also includes a mobile application for students to pre-order their meals and track theirexpenses. The system allows canteen staff to manage inventory, track sales, and generate reports. The authors conducted a feasibility study and a user satisfaction survey toevaluate the system's effectiveness and found positive results. The SCMS is expected to reduce waiting times, eliminate errors, and increase customer satisfaction in the canteen.

"Canteen Management System" (2021)

Miss. Dhokane Vrushali Navnath , Miss.Devhare Vanita Adinath

The "Canteen Management System" is a project developed in2021 by Miss.Devhare Vanita Adinath and Miss. Dhokane Vrushali Navnath. The system is designed to manage canteen operations, including menu management, order placement, billing, and inventory management. The project aims to simplify canteen operations, reduce errors, and improve efficiency.

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"Canteen Management System" (2022)
Bidesh Chanda, Ganadhish Navelkar, Atish Gracias, Vaibhav Sharma, Valerie Menezes, Basil Jose
The "Canteen Management System" is a project developed in 2022 by a team consisting of Ganadhish Navelkar, Bidesh Chanda, Vaibhav Sharma, Atish Gracias, Basil Jose, and Valerie Menezes. The system is designed to manage canteen operations, such as menu management, order placement, billing, and inventory management. It includes features such as online ordering, payment processing, and user management.The project aims to improve the efficiency of canteen operations, reduce errors, and enhance the overall customer experience. It is likely a software-based solution.

"Cashless Canteen Management System" (2020)
M. Ambika, Sandhya S Nair, Ranjith Kumar,S Saravana Kumar R
The "Cashless Canteen Management System" is a project developed in 2020 by M. Ambika, Saravana Kumar R, Sandhya S Nair, and Ranjith Kumar S. The system is designed to manage canteen operations without the use of cash transactions. It includes features such as user registration, order placement, and payment processing through a mobile application or smart card. The project aims to reduce the handling of cash, prevent errors, and improve the efficiency of canteen operations. It is likely a software-based solution integrated with hardware devices for payment processing.

"Integrated Cafeteria Management System Using Rfid" Manali Chaudhari, Amol Shelke, Aayushi Vyawahare,
The "Integrated Cafeteria Management System Using RFID" is a project developed by Amol Shelke, Aayushi Vyawahare, and Manali Chaudhari. The system is designed to manage cafeteria operations using RFID technology, including user registration, order placement, and payment processing. The RFID technology enables the system to identify customers, track their purchases, and deduct the cost of items from their accounts automatically. The project goal is to decrease the use of cash, prevent errors, and improve the efficiency of cafeteria operations. It is likely a software-based solution integrated with RFID hardware devices.

III. IMPLEMENTATION

The canteen management system (CMS) is a exclusive and latest solution connected to automation practices around the college canteen/company's canteen.This benefis to verify and track employees reports within the canteen about food, daily and monthly consumption of food, employees order, etc.
As we know, various organizations provide eatery amenities to their employees to assist their food services. So, the CANTEEN MANAGEMENT SYSTEM USING RFID helps to construct transparency among the firm, retailer, and employees as well as keeps a track of the amount of meals taken by the employees.

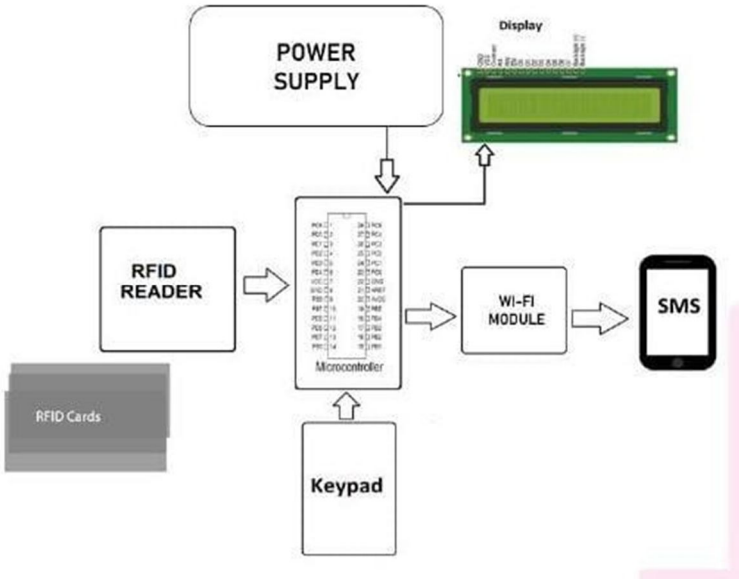


Fig.1. Block diagram

A. ESP32



The SoC microcontroller is the ESP32. Popular low-power system-on-chip microcontrollers, such as the ESP32, include Wi-Fi and dual-mode Bluetooth.As a result, they are ideal fordesigning and developing Internet of Things (IoT) applications. It has a WiFi chip that operates at 2.4 to 2.5GHzand is compliant with 802.11 B, G, and N standards.

B. RFID Reader



RFID stands for radio frequency identification devices (RFIDs) and is used for automatic identification and tracking. RFIDs are wireless, non-contact systems that transmit data from tags attached to objects using radio frequency electro magnetic fields. This technology enables contactless and line-of-sight data transmission from a data medium. A tag, an antenna, and a transceiver with a decoder form the components.

C. Matrix Keypad



The matrix keypad is used to provide input to the system such as menu selection, billing, and so on. The Keypad 4x4 in matrix configuration has a total of 16 buttons. Matrix keypadswith 4 rows and 4 columns imparts button states to the host device, that is normally a microcontroller. It has an overlay with a telephone-style keypad and four additional useful buttons. It can be connected to your mirocontroller circuits viathe included female 8-pin berg connection.

D. LCD Display



LCD stands for Liquid Crystal Display and is a 16*2 resolution type of flat panel display that operates primarily with liquid crystals. They have a wide range of applications for consumers and businesses, as they are commonly found in smartphones, televisions, computer monitors, and instrument panels. Backlight colours for the display LCD 16x4 series include blue, green, white, yellow-green, amber,red, and white LEDs.

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E. RFID Card



An RFID credit card is enabled with radio frequency identification technology. This enables your card to communicate with a payment terminal by using a radio frequency by replacing a magnetic strip. RFID cards allows you to simply tap or wave your RFID card near a card reader which provides much more security than any other creditcards.



Fig.2. Final Setup

IV. WORKFLOW

Admins need to register first by signing up using Id and password for identification and authentication through the credentials presented.

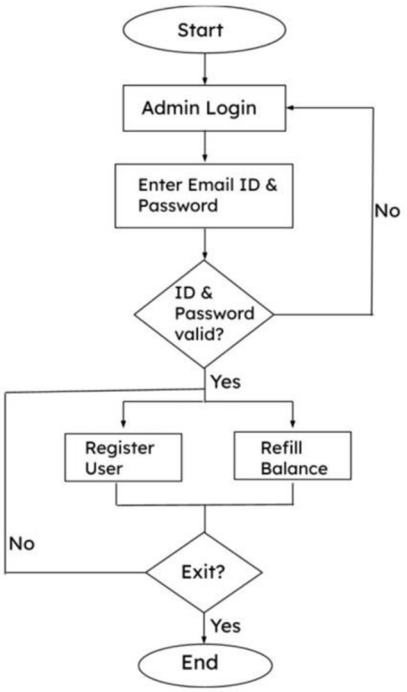


Fig.3. Flowchart for Admin Interface

If the password or any credentials appears to be incorrect thenthe admin will be redirected to the login page and if the adminforgets the password they can also create a new password andlogin again. When credentials are valid then admin will be ableto look into the dashboard where he/she can view balance andrefill the balance of the users.

V. RESULTS

As a result, the admin will be able to see the details ofcustomers such as balance, email id, unique identification number and order details. Admin will also get the option to update or edit incase of any errors in the details of customers. Users will get the message via SMS or mail to check the balance and order details and will be able to refill the balance. Table 1.1 is shown below.

Table 1.1 Customer Details

Student ID	Name	Email ID	RFID Card No.	Mobile No.	Balance	
1	Riya	riya002@gmail.com	rfid004	8420672598	2000	Edit
2	Tej	teju477@gmail.com	rfid009	7836423789	1500	Edit

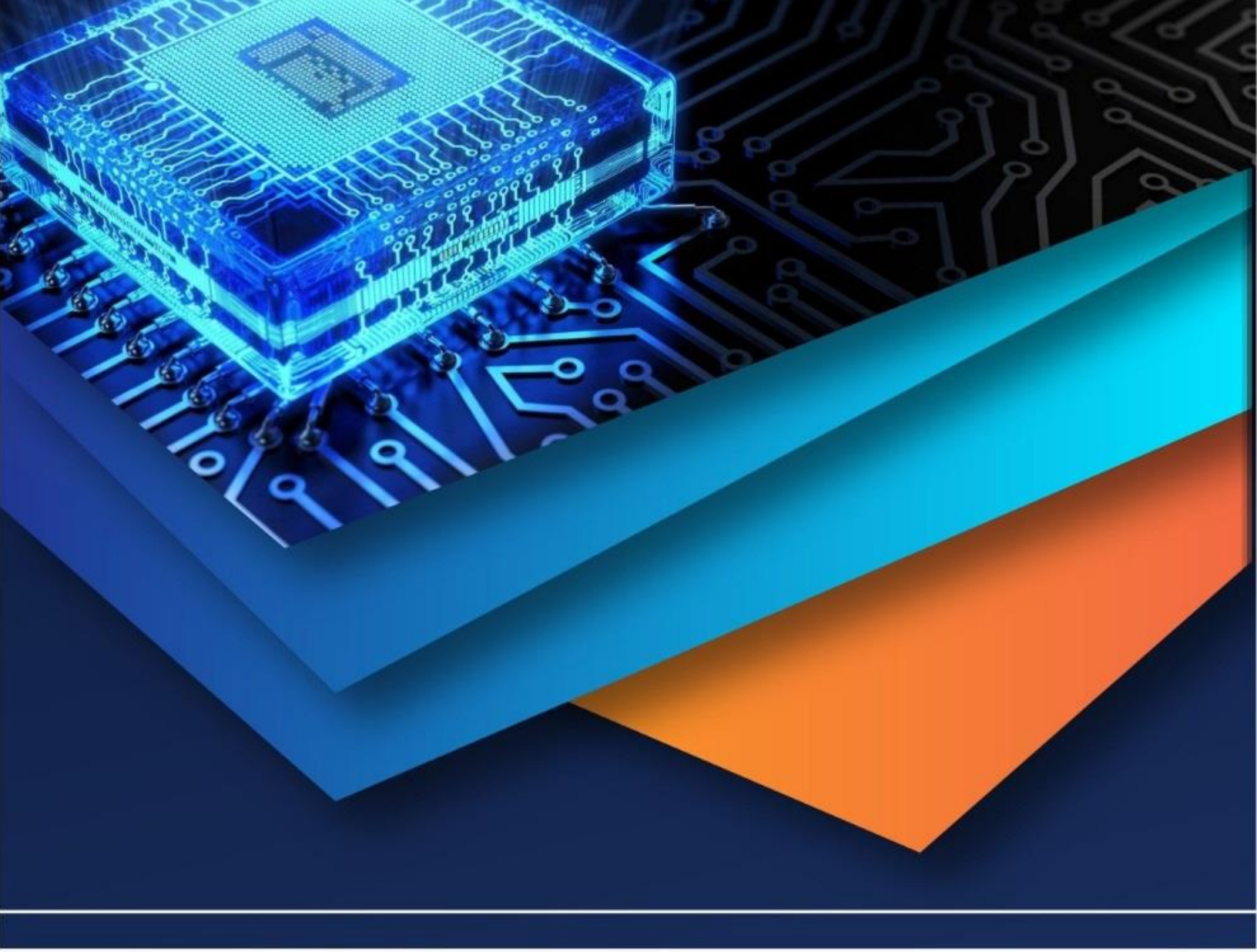
The canteen management has the benefit of avoiding paper usage, there is no need for extra manpower in the bill counterand they can manage the old data easily which will be useful for the future.

VI. CONCLUSION

IoT based Canteen Management System involving RFID Technology can be used in cafeterias, food courts and canteenso that the operation for administrators becomes easy since themanagement of customers becomes easy. The main objectiveof keeping record of customer details such as balance, ,order details, ID number and contact information and use of electronic cash thereby increases the efficiency of management single-handedly. Also this system reduces the efforts for customers as they can recharge their accounts as they will be receiving SMS or Mails. IoT can enhance the profit in this type of service industry. This script studies the existing canteen's difficulties and finally suggests an effectiveand implicit working solution for the same.

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