IoT ENABLED SMART CAFETERIA MANAGEMENT SYSTEM

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Abstract:- **These days, workplace workers are worried about issues related to the cafeteria that they encounter on a daily basis. The project's primary goal is to make workstations, cabins, and other locations where employees may be easily and comfortably situated even when they are not in the cafeteria. This would make it easier for staff members to reserve seats in the cafeteria and place orders using a web application and PERN Stack right from their work station. Together with features like order tracking and online payment integration, the web application will display the number of seats occupied and available in the cafeteria. Additionally, a menu enabling online meal ordering for employees and students at a university canteen will be displayed by the web application. Long wait times and limited menu visibility are only two of the inconveniencies and inefficiencies that come with using standard order putting techniques. This solution seeks to remedy these issues.**

Keywords — PERN Stack, Web Application, Order Tracking, Payment Integration

I. INTRODUCTION

Employees are frequently stressed for time in the fast-paced workplace of today, especially during meal breaks. With its lengthy lines and little seats, the traditional cafeteria experience may be ineffective and annoying. Seeing the need for change, this project offers a cutting-edge remedy: a web-based system for online meal ordering and reservation made especially for cafeterias in businesses, institutions, and universities, as well as food cafés. This cutting-edge solution seeks to transform the way workers engage with their cafeterias by substituting an easy-to-use digital interface for the outdated manual procedure. Now, from the convenience of their mobile devices, employees can easily place orders, explore comprehensive menus, make online payments, and reserve their seats in advance.

The suggested method drastically cuts down on wait times for staff members by doing away with the requirement for them to stand in large lines. This results in higher output and better general worker satisfaction. In addition to improving cafeteria operations efficiency, the shortened ordering process frees up staff members to concentrate on food preparation and customer care.Because the program uses secure payment channels, transactions are guaranteed to be dependable and safe.Users with varying technological backgrounds may easily navigate and understand the user interface due to its intuitive design.

An Effective Approach for Demanding Companies Numerous sectors have a high workforce population that shares lunch breaks, which puts pressure on the cafeteria's limited capacity.Employees experience lengthy lines and lost time as a result, which lowers their level of happiness and productivity. In today's atmosphere, crowded cafeterias can give rise to worries over safety and hygiene. We provide a unique solution to these problems: a web-based program that lets staff members reserve seats and place food orders right from their desks. Through the ability to reserve a seat and order meals in advance, this cutting-edge system simplifies the cafeteria experience. By cutting down on wait times, employees can make better use of their lunch breaks and return to work feeling rejuvenated and productive.

In order to ensure food availability and reduce waste, cafeteria personnel may effectively manage resources and make orders based on confirmed bookings. Workers may order meals and reserve seats from the comfort of their desks, saving them time and effort.The application increases transparency and fosters confidence by offering a user-friendly interface and real-time order progress information.The system improves safety and hygienic conditions in the cafeteria by controlling seat occupancy and avoiding congestion.Because the system runs over the web, it is less expensive to set up and operate than hardware-intensive alternatives.This flexible system is easily

deployable in a range of businesses and sizes of cafeterias, such as colleges, movie theaters, and airlines.Similar applications have shown how well web-based solutions work to solve problems in the real world, such as the online renting site Airbnb.

This flexible system is easy to use in a range of settings, including colleges, movie theaters, and airplanes, as well as cafeterias of different sizes.Similar applications have shown how well web-based solutions work to solve problems in the real world. One example of this is the online rental site Airbnb. Our suggested approach is to duplicate this achievement and completely transform the way workers see their cafeterias by emphasizing convenience, security, and ease of use.Putting this creative application into practice would not only solve the immediate problems of long lines and small cafeteria capacity, but it will also open the door for workers across a range of industries to have more productive, efficient, and pleasurable workplaces.

The primary purpose of this system is to allow users to order food and reserve seats through an online application. In the workplace, cafeterias are frequently completely booked, causing employees to wait a very long time in line and spending time. In order to solve these issues, we must come up with a different plan. We'll build a system that will allow staff members to reserve a seat and place food orders right from their desks by using a web application. As a result, people can save time and the cafeteria won't be crowded.

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II. Methodology

A thorough process was followed in the creation of the Appetizer online application, which is intended to facilitate meal ordering on college campuses. The system design uses a monolithic structure with a carefully selected technologica lFig1.Architecture Overview) stack that includes NodeJS,PostgreSQL, React, and GraphQL.The hardware component uses RFID technology to provide an effective table reservation system and incorporates Proteus PCB design software for circuit design at the same time. The ordering procedure includes a user-friendly interface with options for delivery by faculty, takeout, and dining in. Users receive email confirmations when their orders are placed successfully, which opens the admin panel and starts the kitchen's preparation and verification process. The Appetizer platform will continue to develop with the addition of user evaluations, online payment integration, and increased university support in the future.

III. Software

"Appetizer" was created using PostgreSQL and Node. The frontend and backend are the two sections of the project.Because it is a monolithic application, the frontend (fig2. HomePage) and backend are contained within the same project. "Appetizer" allows front-end and back-end communication over both REST and GraphQL APIs,
Scalability, dependability, and performance are ensured by the carefully chosen technological stack that underpins Appetizer's architecture, which combines NodeJS, PostgreSQL, React, and GraphQL. The frontend and backend reside in the same project and have a monolithic structure. The backend facilitates smooth communication between the frontend and backend components by offering REST and GraphQL APIs.

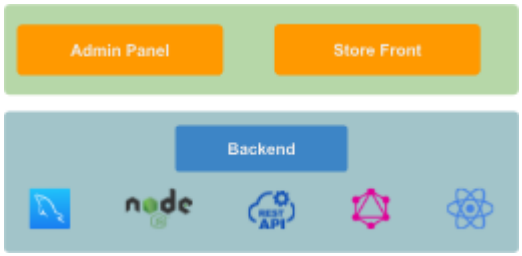

Fig1.Architecture Overview

The "Appetizer" project includes media, extensions, cache files, configuration files, and node_modules. Now let's examine the directory structure.
The Appetizer app is the perfect example of a smart, user-focused platform that makes it easy to explore a wide range of product options. Users of this user-friendly program may browse a wide selection of items, place orders quickly, and navigate the interface with ease. After placing a successful order, customers are directed through a simplified checkout procedure, giving them the option to book tables, choose takeout, or finish their purchase,

.Appetizer makes meal ordering hassle-free for faculty members by enabling direct meal ordering through the site. This service guarantees delivery to chosen places on campus, such as workstations, in a timely and convenient manner. The flexible payment choices offered by the program cater to a range of preferences, encompassing both online and offline payment methods like credit and debit card transactions.

Furthermore, by offering a reliable and well-known online payment option, PayPal integration enhances the app's payment capabilities. With PayPal, users may safely conduct secure online purchases, increasing the range of payment alternatives offered by the Appetizer app.

As a sign of its commitment to customer satisfaction, Appetizer provides consumers with comprehensive confirmation information via email as soon as their orders are placed successfully. Concurrently, the administration panel receives the order data seamlessly, allowing the administrator to efficiently verify and authenticate each order. The order proceeds without a hitch to the kitchen for preparation following verification. The Appetizer application ensures a well-organized and effective order-to-fulfillment process by providing customers with timely alerts upon completion.

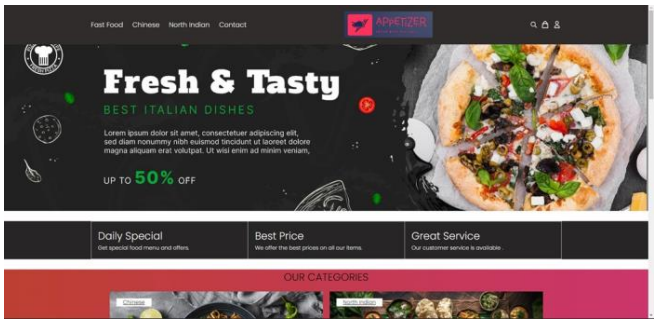

fig2. HomePage

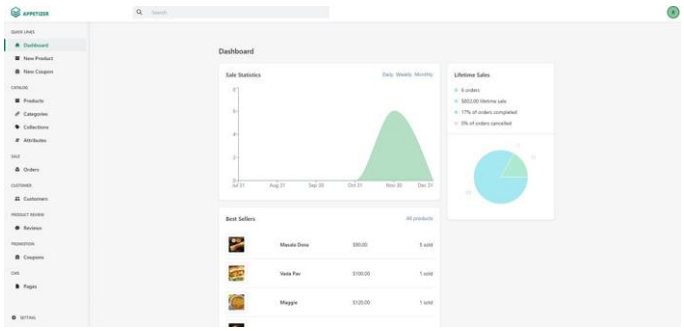

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fig3. Frontstore

IV. Hardware

Circuit design and PCB layout were crafted using (fig 6. Circuit Diagram) Proteus PCB design software. This involved creating a detailed schematic diagram representing the electrical connections and components.To guarantee that electrical components (fig 5. 3D View of Complete Mounted PCB) are securely attached to the printed circuit board (Fig 4. PCB Design), soldering is the last step in the PCB fabrication process, which comes after screen printing, drilling, and component placement.
Radio Frequency Identification (RFID) technology was used in the development and deployment of a table reservation system.

The Atmega 8951 microcontroller receives the unique identifier that an RFID tag scans from the RFID module. The validity of the RFID tag is subsequently confirmed by the microcontroller. The microcontroller uses the UART communication protocol to send the tag's identification to the Bluetooth module of the receiver if the tag is legitimate. The transmitter's LED turns on simultaneously, indicating that the booking was successful.

Booking data from the transmitter is quickly forwarded to the Atmega 8951 microcontroller by the receiver's Bluetooth module. Once the table has been identified as being specifically linked to the data received, the microcontroller sets the matching flag to 'ON,' indicating that the table has been reserved. The microcontroller simultaneously turns on the reserved table's LED, making it unavailable for the next fifteen minutes.

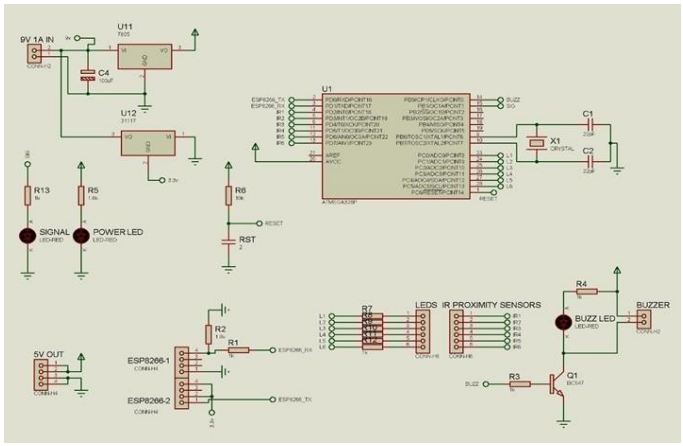

fig 6. Circuit Diagram

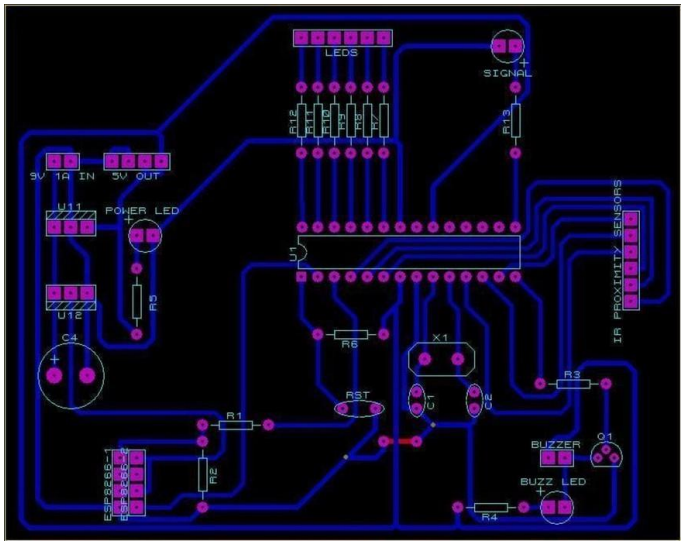

Fig 4. PCB Design

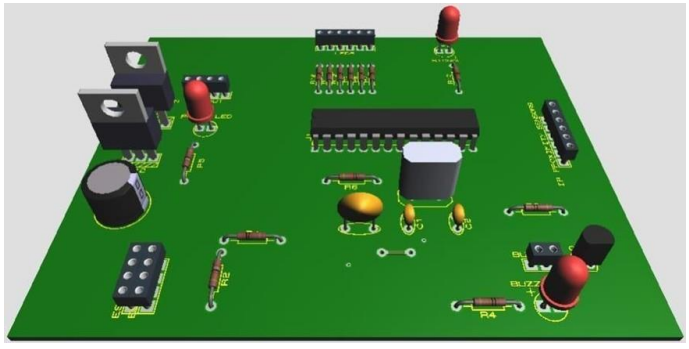

fig 5. 3D View of Complete Mounted PCB

V. Flowchart

1. RFID tag scanned by the transmitter sends a unique identifier to the Atmega 8951 microcontroller.
2. Microcontroller validates RFID tag authenticity and transmits the identification to the receiver's Bluetooth module using UART communication.
3. Receiver's Bluetooth module swiftly relays booking data to the Atmega 8951 microcontroller.
4. Microcontroller identifies the table linked to the data, sets the reserved flag to 'ON,' and activates the corresponding LED, rendering the table unavailable for the next fifteen minute as shown in fig 7 Receiver and fig 8 Transmitter

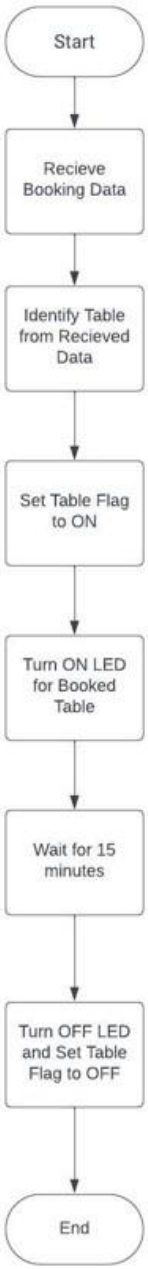

fig 7 Receiver

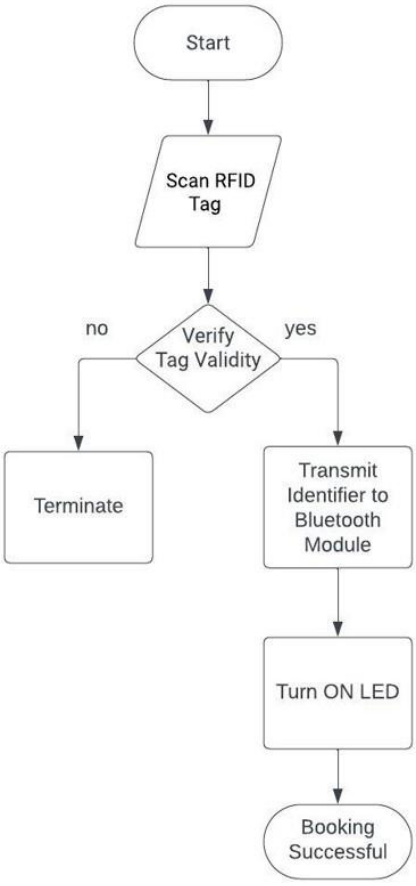

fig 8 Transmitter

VI. RESULTS AND DISCUSSION

The majority of the goals were effectively achieved, allowing us to create a web application for ordering food and booking seats. A web application is created that allows users to order food and reserve a seat in the cafeteria directly from their desk. As a result, the system's design aids in both lowering human labor and saving time for the organization's employees. It will take the place of the current laborious procedure because it is quicker and simpler. Employee time management is highly important to us, and this project was created to help them both with their demands and time management. The current procedure took longer and needed more resources, including labor. The online application is dependable, portable, and user-friendly.

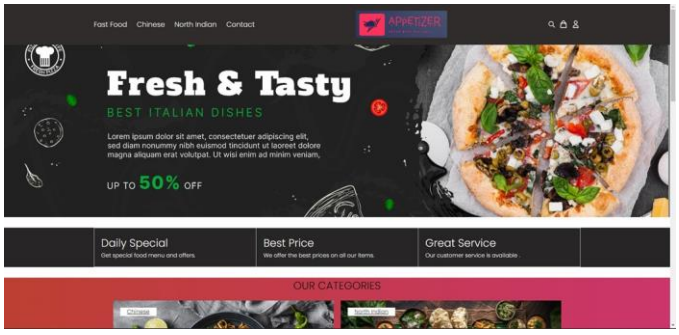

Fig.9: Appetizer Main Screen

The app is created using the publicly accessible Appetizer App Inventor, an online tool. The Appetizer App's operating screen is displayed in Fig.9: Appetizer Main Screen. We may now start creating our web application. We can enter information from the backend regarding products, their attributes, categories, collections, daily special items, and all other requirements that our application may require.

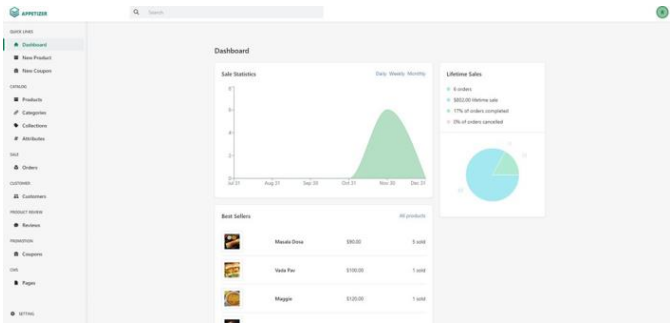

Fig.10: Admin Panel of the application

Once the application's design is complete, our web application and the suggested system are prepared for use. The main interface of our online application, which requires a few clicks to place an order, is depicted in Fig.10: Admin Panel of the application. This screen will take us to the application's login page. One can obtain the user name and password needed to access the program by simply enrolling or logging in to Google. To log onto the application, one must input their user name and user ID. The application's login screen is seen in

fig11. Login Page.

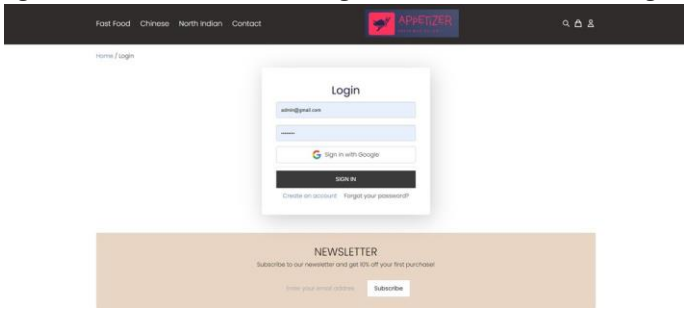

fig11. Login Page

For an employee, as you can see in fig11. Login Page this login method is unique to them. When a worker enters their credentials, the information is saved in the application's database. Because of this, an employee using

the same device to access the application a second time can book a seat without having to input their credentials again.

The employee can now order food and make an online payment after successfully logging into the program. The employee will receive an order confirmation email with their order ID as soon as they choose their order and fill out the one-time payment details. Figure 3.5 displays the screen for ordering food and booking a seat.

After a seat is reserved and the meal is ordered, the customer or employee will receive another email as soon as the order is complete, and its order number will appear on the screen for the student to accept, or the order will be delivered to the desired table or faculty member.

VII. CONCLUSION

This online application has distinguished and explained the benefit of digitalization, which is saving time, which is becoming more and more important to employees working in a company. This system can be further expanded and used widely with very minor alterations, given its versatility and applicability to several institutions and organizations. The employees' ability to manage their time and the rush in the cafeteria will both be significantly enhanced by the IoT-enabled smart cafeteria management system. The system works quickly and doesn't need human labor. This complete perspective of the IoT-Enabled Smart Cafeteria Management System replaces the conventional method of creating lines in the cafeteria with a digital method.

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