IoT Enabled Smart Cafeteria Management System

This project report is submitted to

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution Affiliated to Rashtrasant Tukdoji Maharaj Nagpur University)

In partial fulfillment of the requirement

for the award of the degree

Of

Bachelor of Technology in Electronics & Telecommunication Engineering

by

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YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING,

(An autonomous institution affiliated to Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur)

NAGPUR – 441 110

2023-2024

CERTIFICATE OF APPROVAL

This is to Certify that the project report entitled "**IoT ENABLED SMART CAFETERIA MANAGEMNET SYSTEM**" has been successfully completed by **Rishikesh Jadhav, Vedangee Gadgil, Tanishka Patel, Pratyusha Balki** under the guidance of **Prof. Minal Patil** in recognition to the partial fulfillment for the award of the degree of Bachelor of Engineering in Electronics& Telecommunication Engineering, **Yeshwantrao Chavan College of Engineering***(An Autonomous Institution Affiliated to RashtrasantTukdoji Maharaj Nagpur University)*

Signature	*Signature*	*Signature*
Prof. Minal Patil	**Mr. Sanjay Panchdhane**	**Dr. M.S.Narlawar**
(Guide)	**(Co Guide/Industry Person)**	**(HoD, ET Dept.)**

DECLARATION

We hereby declare that

a. The work contained in this project has been done by us under the guidance of my supervisor(s).

b. The work has not been submitted to any other Institute for any degree or diploma.

c. We have followed the guidelines provided by the Institute in preparing the project report.

d. We have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.

e. Whenever we have used materials (data, theoretical analysis, figures, and text) from other sources, we have given due credit to them by citing them in the text of the report and giving their details in the references. Further, we have taken permission from the copyright owners of the sources, whenever necessary.

Signature & Name of the Students

1. Rishikesh Jadhav
2. Vedangee Gadgil
3. Tanishka Patel
4. Pratyusha Balki

ACKNOWLEDGEMENT

We feel profound pleasure in bringing out this project port for which we had to go from pillar to post to make it a reality. This project work reflects contributions ofmany people with whom we had long discussions, work out, experiment and without which it would not have been possible. We must first of all express our heartiest gratitude to respect **Prof. Minal Patil (Department of Electronics and Telecommunication)** and **Mr. Sanjay Panchdhane (Industry Person)** for providing us all guidance to complete the project.

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ABSTRACT

Nowadays employees in the organizations are concerned about their cafeteria related problems which they are facing regularly in their workaday. The main purpose of the project contributes towards the ease and comfort attained by the employees even when they are away from the cafeteria such as at their work desks, cabins etc. This would help employees to book their seats in the cafeteria and place their orders from their work desk itself via web application using PERN Stack. The web application will show the occupancy and vacancy of the seats in the cafeteria and provides features like order tracking and online payment integration. The web application will also showa menu that facilitates online food ordering for students and staff within a university campus canteen. This system aims to address the inconvenience and inefficiencyassociated with traditional order placement methods, such as long queues and limited menu visibility

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

CHAPTER-1

INTRODUCTION

1.INTRODUCTION

1.1 OVERVIEW

In today's fast-paced environment, employees often find themselves pressed for time, even during meal breaks. The traditional cafeteria experience, with its long queues and limited seating, can be inefficient and frustrating. Recognizing this need for improvement, this project proposes a modern solution: a web-based system for online food ordering and seat reservation specifically designed for cafeterias within industries, colleges, universities, and food cafes. This innovative system aims to revolutionize the way employees interact with their cafeterias, replacing the antiquatedmanual process with a user-friendly digital interface. Employees can now browse detailed menus, conveniently place orders, make online payments and reserve their seats in advance, all from the comfort of their mobile devices. The proposed system eliminates the need for employees to wait in long queues, significantly reducing their wait times. This translates to increased productivity and improved overall employee satisfaction. The streamlined ordering process also enhances the efficiency of cafeteriaoperations, allowing staff to focus on food preparation and customer service. The application employs secure payment gateways, ensuring safe and reliable transactions. The user interface is designed to be intuitive and easy to navigate, making it accessible to users of all technological backgrounds.

1.2 LITERATURE REVIEW

An Efficient Solution for Busy Organizations In many industries, large numbers of employees share the same lunch break, placing a strain on limited cafeteria capacity. This results in long queues and wasted time for employees, impacting their productivity and overall satisfaction. Additionally, crowded cafeterias raise concerns about safety and hygiene in today's environment. To address these challenges, we propose a novel solution: a web-based application that enables employees to booktheir seats and order food directly from their desks. This innovative system streamlinesthe cafeteria experience by enabling seat reservation and advance food ordering, the system

significantly reduces wait times, allowing employees to utilize their lunch breaks more effectively and return to work refreshed and productive. Cafeteria staff can efficiently manage resources and prepare orders based on confirmed bookings,

ensuring food availability and minimizing waste. Employees can comfortably book their seats and order food from their desks, saving them time and effort. The application provides a user-friendly interface and real-time updates on order status, enhancing transparency and building trust. By managing seat capacity and preventing overcrowding, the system contributes to a safer and more hygienic cafeteria environment. The system utilizes web-based technology, making it relatively affordable to implement and maintain compared to hardware-intensive solutions. This adaptable system can be easily implemented in cafeterias of various sizes and across various industries, including colleges, cinemas, and airlines. Similar applications, like the online rental platform Airbnb, have demonstrated the effectiveness of web-based solutions in addressing real-world challenges. By focusing on user-friendliness, security, and convenience, our proposed system aims to replicate this success and revolutionize the way employees experience their cafeterias. Implementing this innovative application will not only address the immediate issues of time-consuming queues and limited cafeteria capacity, but also pave the way for a more efficient, productive, and enjoyable workplace for employees in various industries.

1.3 PROBLEM STATEMENT

To design a web application tackles the challenge of long cafeteria queues and limited seating capacity by offering convenient seat booking and food ordering features for both students and faculty members. Students can book seats and place orders online, saving time and maximizing their lunch breaks. Faculty members can order food from their desks, ensuring they have a hot meal ready when they are free. The application streamlines cafeteria operations, offers real-time order tracking, and facilitates secure online payments. This scalable and cost-effective solution has the potential to revolutionize the cafeteria experience across various organizations.

1.4 THESIS OBJECTIVE

This System is mainly developed for booking the seat and ordering the food via web application. In industry, many times Cafeterias are fully occupied and employees wait for a very long time in the queue which results in time expenditure.

To overcome such problems, we must form an alternate proposal, developing a system in which a web application is to be created through which employees will be able to book their seat and order the food from their work desk itself. So, they can savetheir time and there will be no rush in the cafeteria.

This Project Consist of both hardware and software. The hardware, in which microcontroller is interfaced with Bluetooth module using UART communication and physically book vacant seats with RFID module. This whole system will be managed by the owner or host of the cafeteria.

So, the scenario is like, there will not be a need to go to the cafeteria and wait for a seat to be vacant. The seat booking will be done through web application for employees from their work desk itself. A lot of problems will also be avoided by this Alternative Solution.

Thus, the objective of our Project entitled as "IoT Enabled Smart Cafeteria Management System" are as follows,

- Employee will book the seat through the web application and this status will be showed on the cafeteria's server. In addition, booking status will also be shown on the hardware. If seat is booked, LED will glow automatically.
- Student:
- Food Ordering: Browse the menu, order meals, and choose your pickup time. Order Tracking: Follow your order in real-time and plan accordingly.
- Secure Payment: Pay seamlessly through integrated online payment options.
- Faculty:
- Order from Desk: Order meals directly from your work desk.

1.5 THESIS ORGANIZATION

The thesis is divided into several chapters. The project's goal and objective are presented in the first chapter, along with an introduction to the suggested system. The second chapter describes the model's construction and operation and highlights important contributions that are relevant to our project idea. The third chapter providesa detailed account of the work completed to meet the project's goals and objectives. Information regarding the software and hardware tools used in system design is provided in the fourth chapter. The last chapter concludes with the suggested system's findings and recommendations, followed by a list of the referenced literature.

CHAPTER-2

REVIEW OF LITERATURE

2.1 CONSTRUCTION OF HARDWARE:

The design and implementation of a table booking system utilizing Radio Frequency Identification (RFID) technology and Bluetooth communication. The system comprises two units: a transmitter and a receiver.

Transmitter Design: Atmega 8951 Microprocessor: Responsible for controlling the overall operation of the transmitter.

RFID Module: Reads data from RFID tags and transmits it to the receiver.

Bluetooth Module: Communicates with the receiver's Bluetooth module to transmit booking data.
Voltage Regulator IC 7805: Regulates the voltage supply for the microcontroller.
Crystal 11.0592 MHz: Provides a clock signal for the microcontroller.Reset Button: Resets the microcontroller.
LED: Indicates the status of the transmitter.

Operation: When an RFID tag is scanned by the RFID module, the tag's unique identifier is read and sent to the Atmega 8951 microcontroller.

The microcontroller verifies the validity of the RFID tag.

If the tag is valid, the microcontroller transmits the tag's identifier to the receiver's Bluetooth module using the UART communication protocol.

Simultaneously, the LED on the transmitter is turned ON to indicate successful booking.

Receiver Design: Atmega 8951 Microprocessor: Receives booking data from the transmitter andcontrols the table booking status.

Bluetooth Module: Receives data from the transmitter's Bluetooth module. LEDs: Each LED corresponds to a specific table and indicates its booking status.Microcontroller Flag: Stores the booking status of each table.

Operation: When the receiver's Bluetooth module receives booking data from the transmitter, itsends the data to the Atmega 8951 microcontroller.

The microcontroller identifies the table associated with the received data.

The microcontroller sets the flag corresponding to the identified table to "ON," indicating that thetable is booked.

The LED associated with the booked table is turned ON, signifying its unavailability for the next 15 minutes.

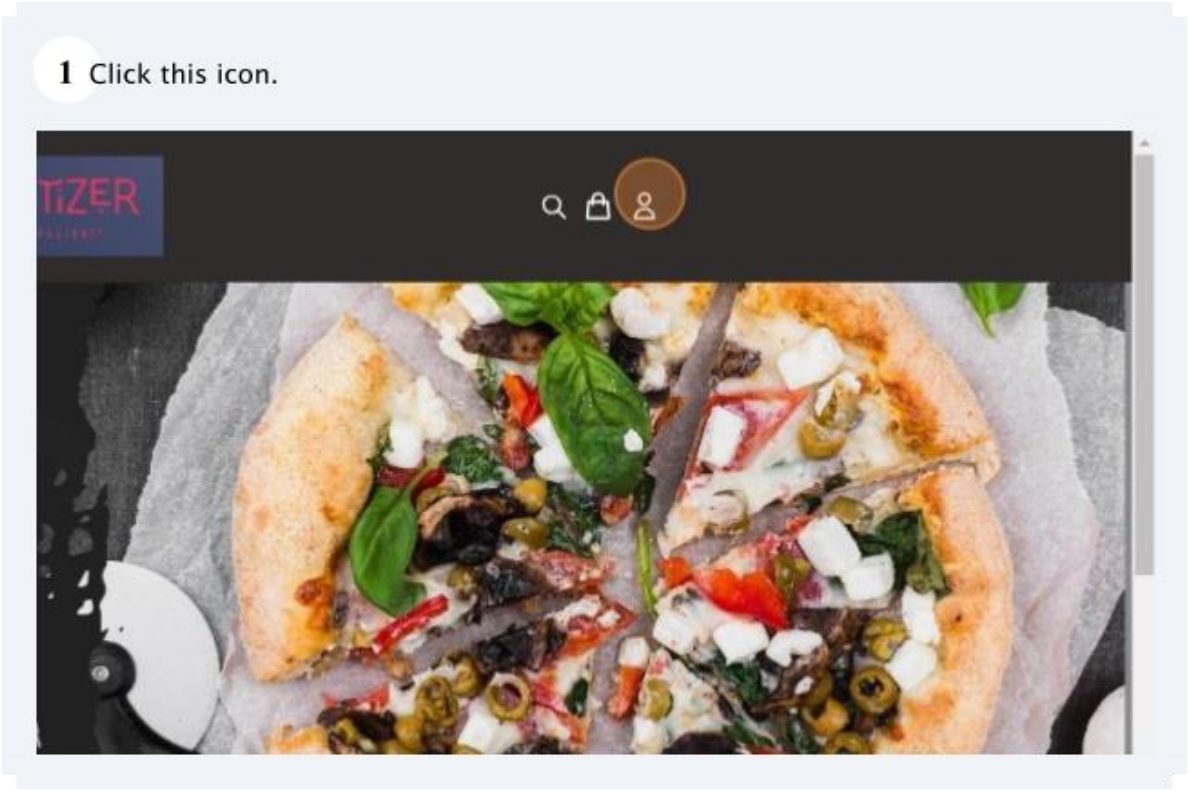
Overall System Functionality: An authorized user scans their RFID tag on the transmitter.The transmitter transmits the tag's identifier to the receiver via Bluetooth.

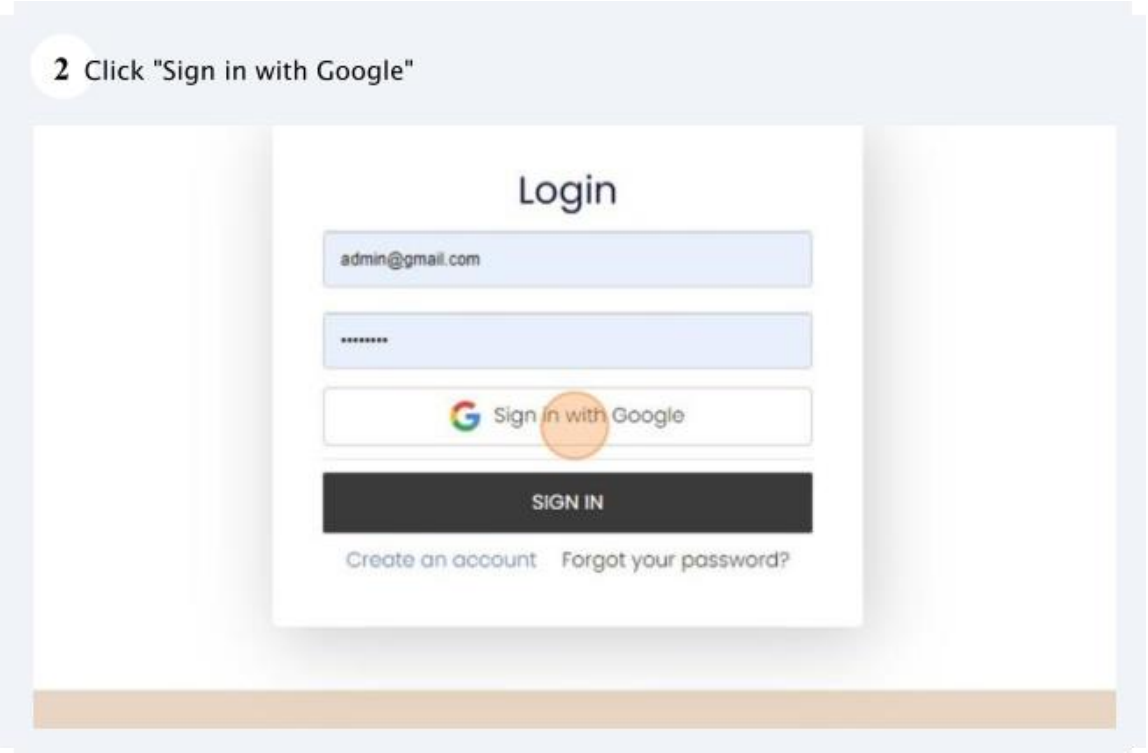
The receiver identifies the corresponding table and turns ON its LED, indicating a successful booking.

The booked table remains unavailable for 15 minutes.

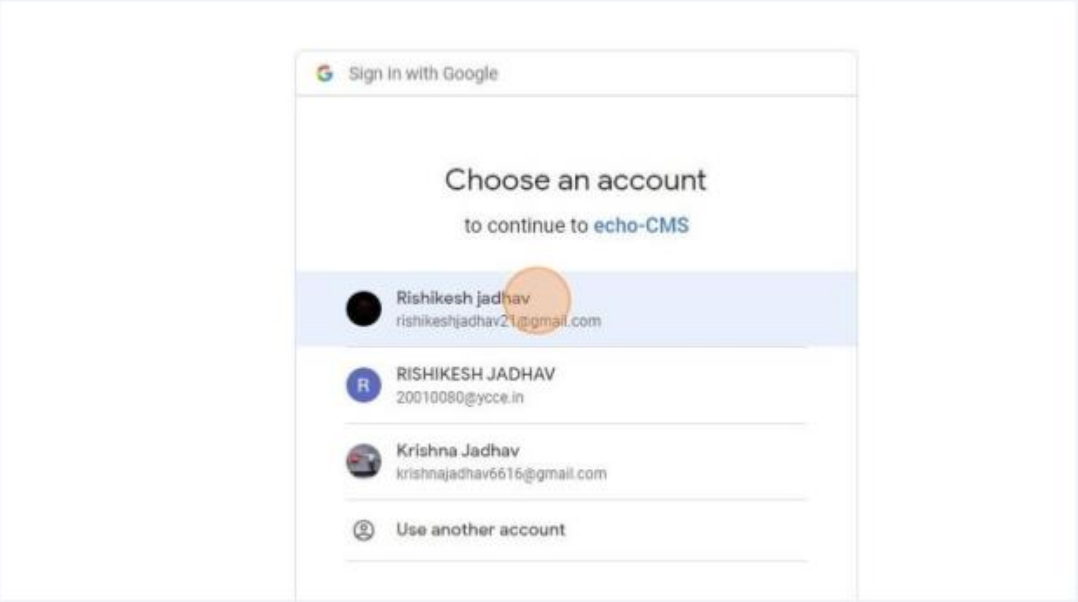
2.2 WORKING OF SOFTWARE MODULE:

This how student/Faculty members can order their food from Appetizer web Application



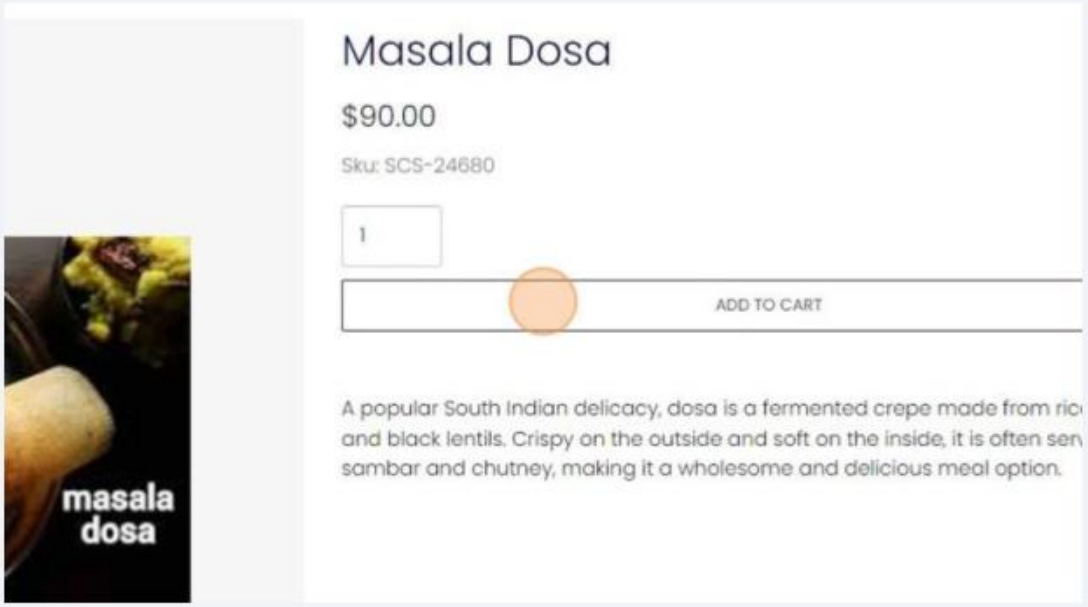


3 Click "Rishikesh jadhav"

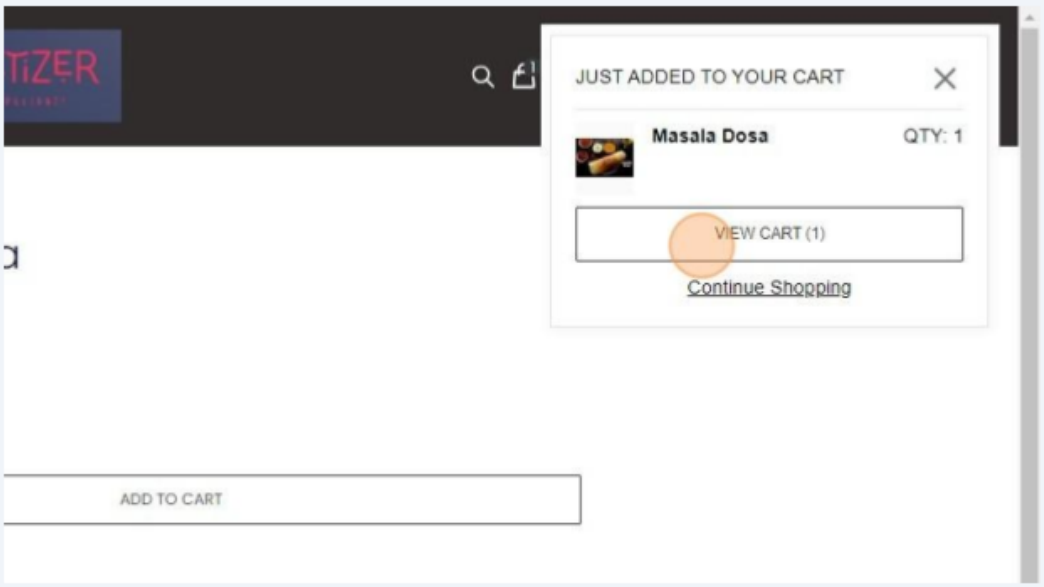


4 Click this image.

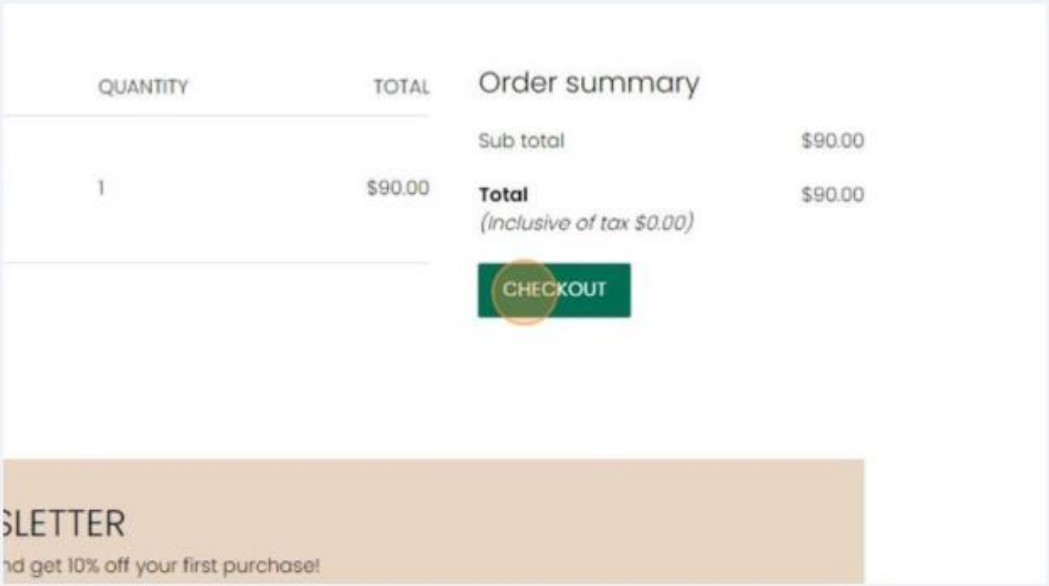
5 Click "ADD TO CART"



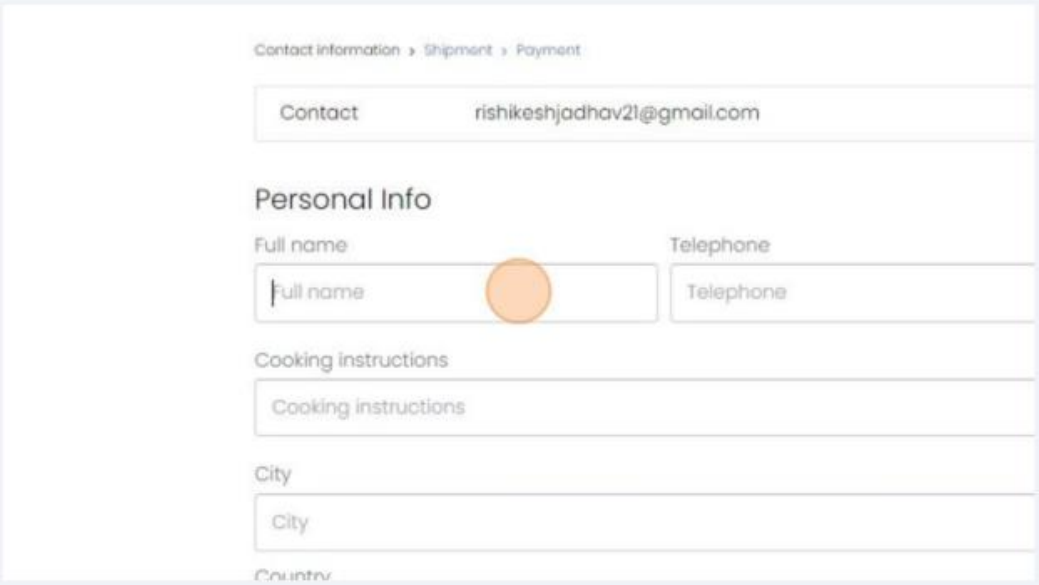
6 Click "VIEW CART (1)"



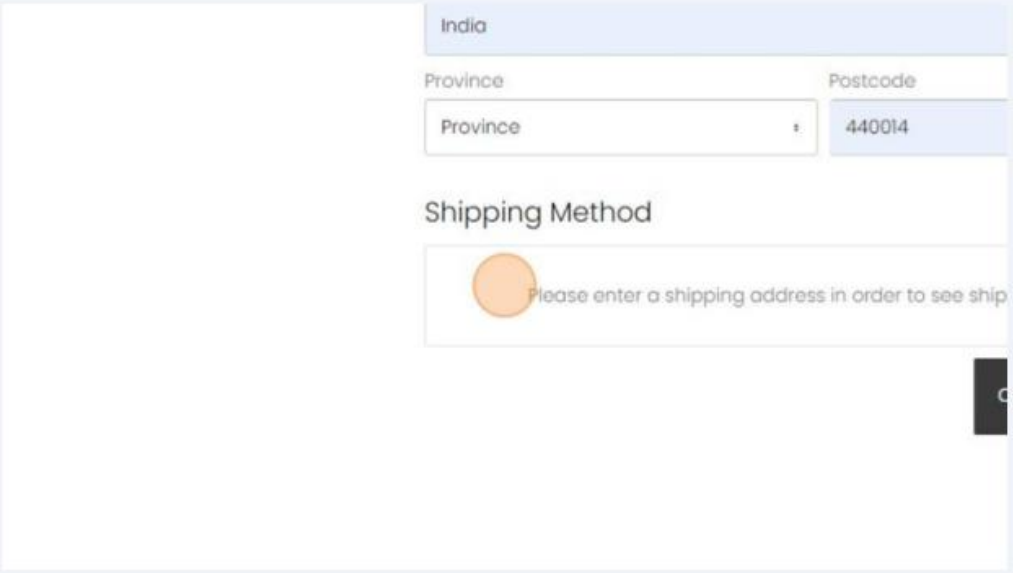
7 Click "CHECKOUT"



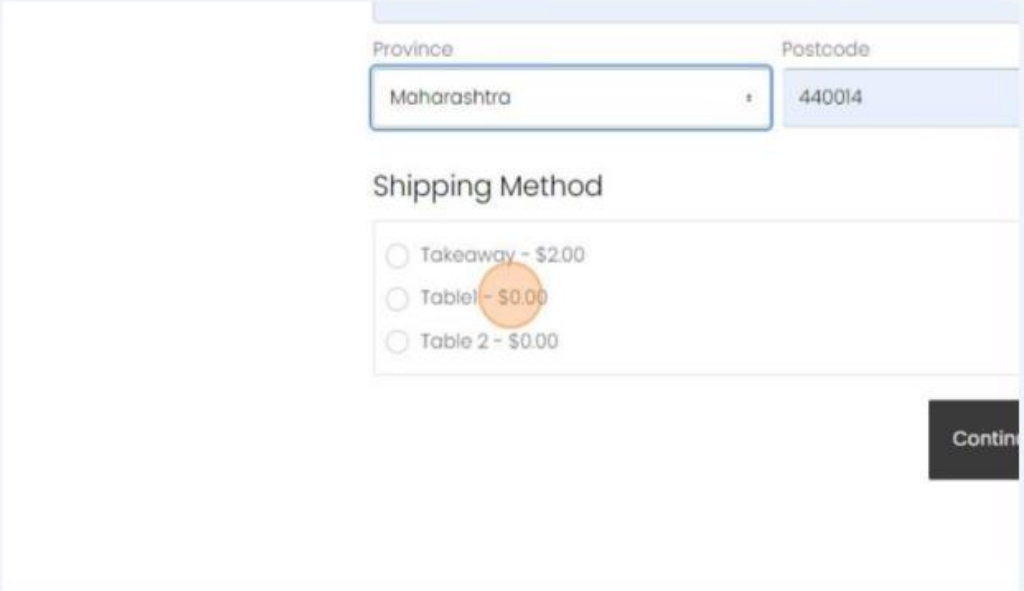
8 Click the "Full name" field.



9 Click "Please enter a shipping address in order to see shipping quotes"

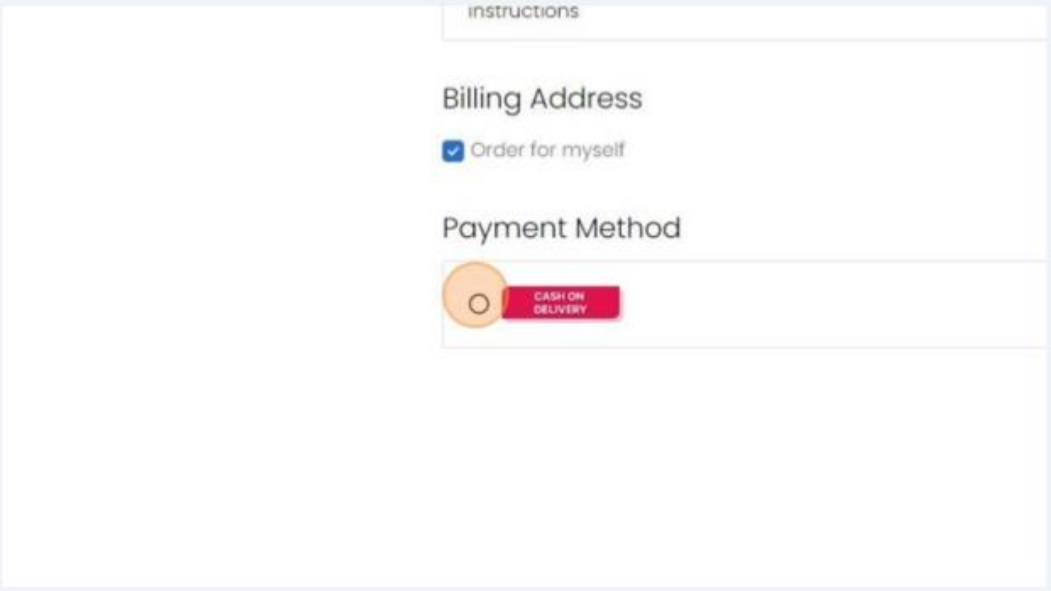


10 Select "Shipping Methood"

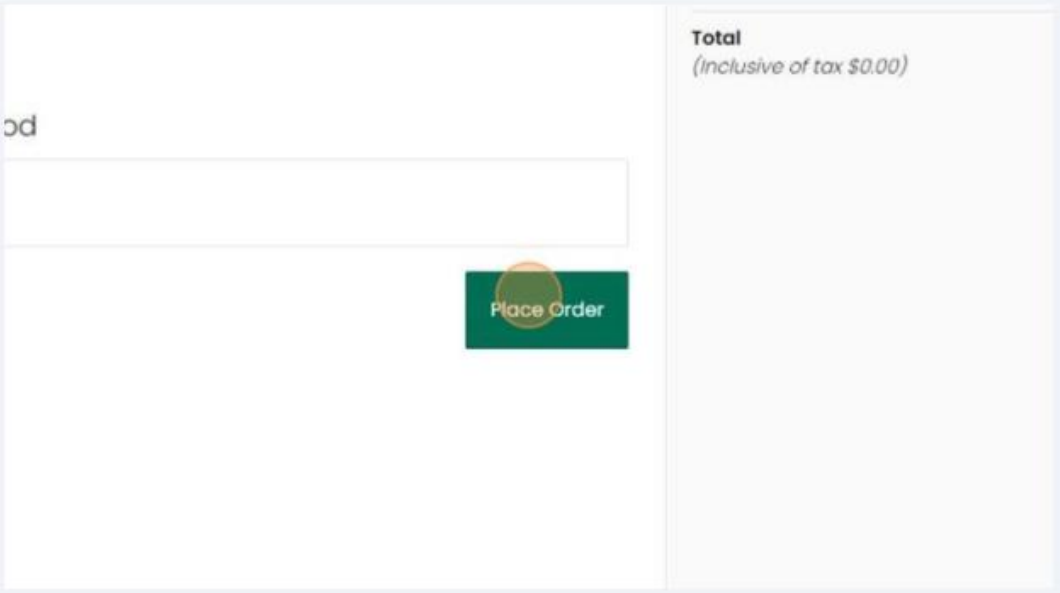


11 Click "Continue to payment"

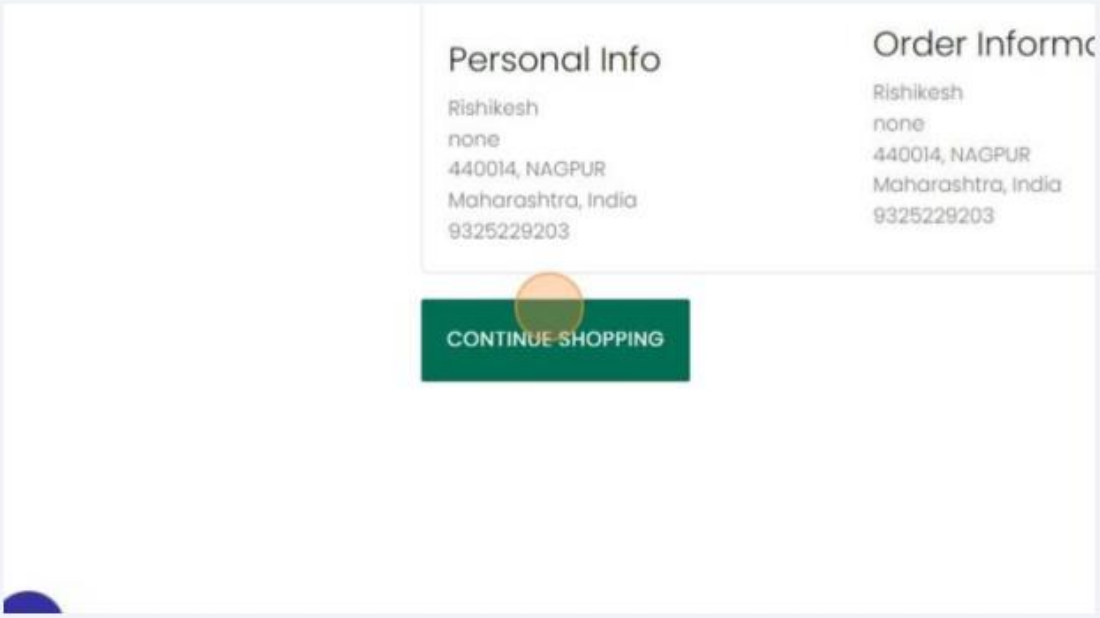
12 Click this icon.



13 Click "Place Order"



14 Click "CONTINUE SHOPPING"



CHAPTER-3

HARDWARE AND SOFTWARE

(Details)

3.1 HARDWARE:

3.2 PCB DESIGN:

Hardware Design Workflow:

Schematic Capture: Circuit design and PCB layout were crafted using Proteus PCB design software. This involved creating a detailed schematic diagram representing the electrical connections and components.

Fabrication: Screen Printing: The schematic was transferred onto the PCB using a process called screen printing, creating the conductive pathways for electrical signals.

Drilling: Precise holes were drilled in specific locations to accommodate component leads and mounting hardware.

Component Placement: Components were carefully placed on the PCB, aligning their leads with the corresponding footprints designed in the schematic.

Soldering: To ensure reliable electrical connections between the component leads and the copper tracks on the PCB, soldering was used. This involved melting a metal alloy (solder) to create a permanent conductive bond.

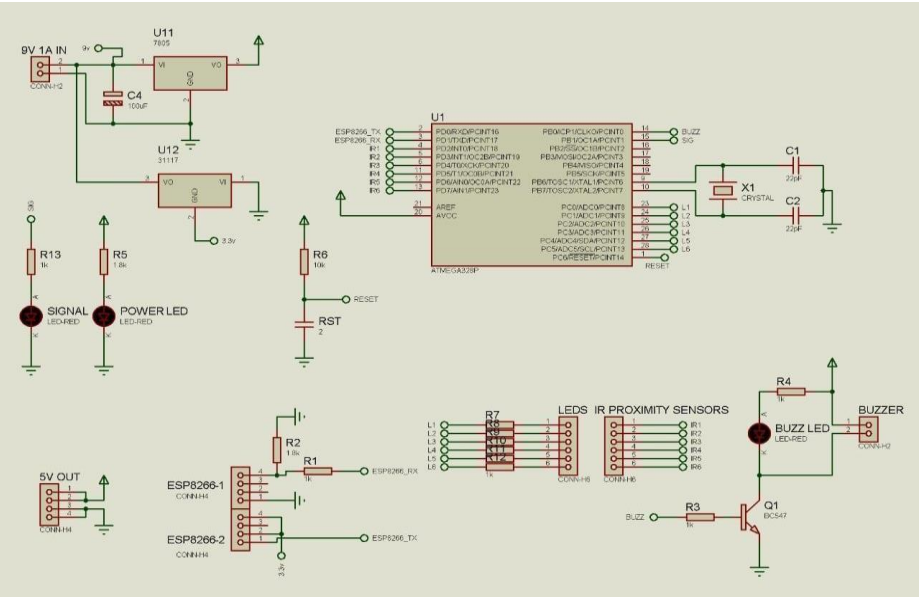


Fig. 4.1: Circuit Diagram

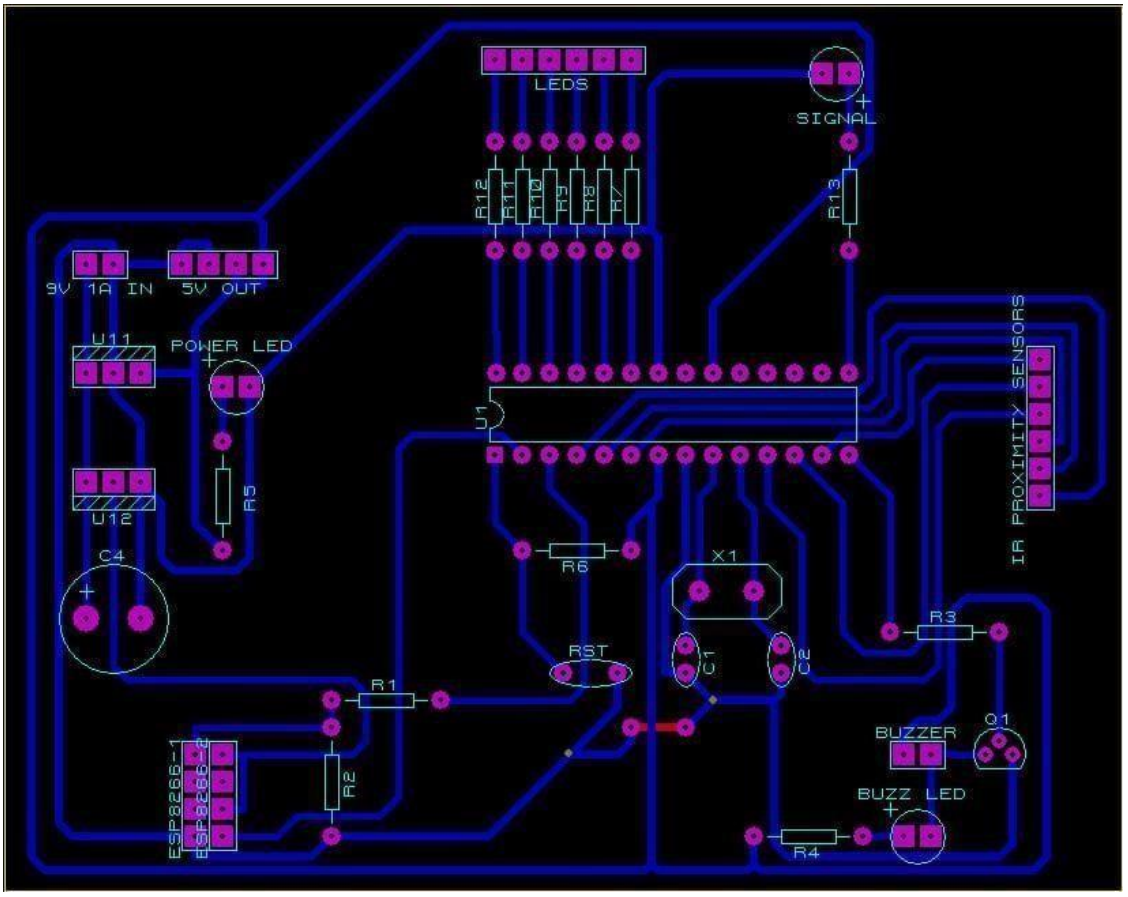


Fig. 4.2: PCB Design

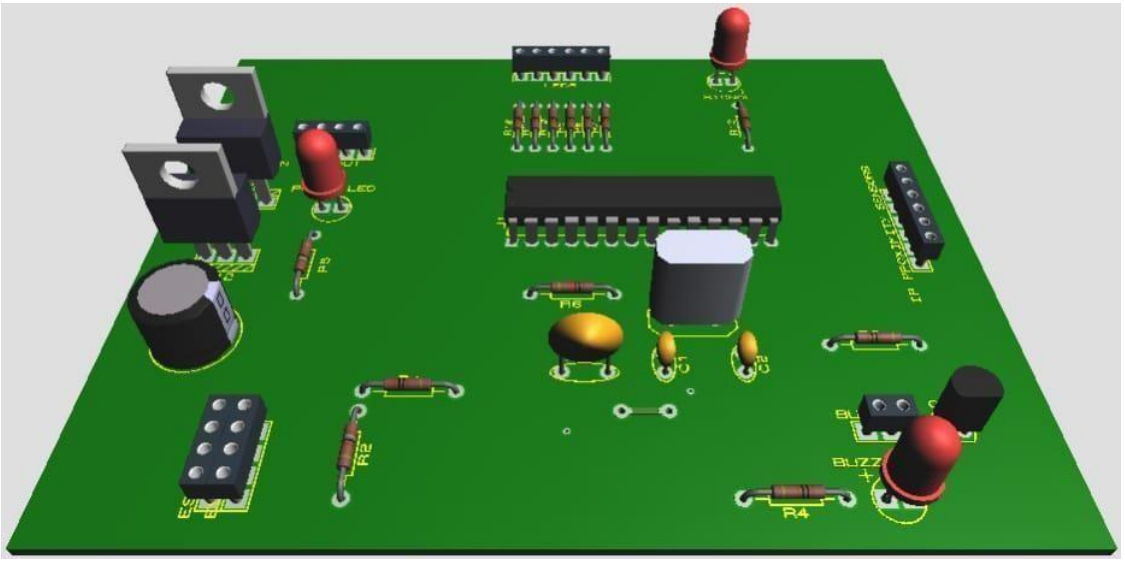


Fig. 4.3: 3D View of Complete Mounted PCB

3.3 SOFTWARE TOOL

Programming of micro-controller IC is done using Arduino Software (IDE). The open-source Arduino Software (IDE) makes it easy to write code and upload it to the controller IC. It runs on Windows, Mac OS X, and Linux. The environment is written in Embedded (C++) and based on Processing and other open-source software.

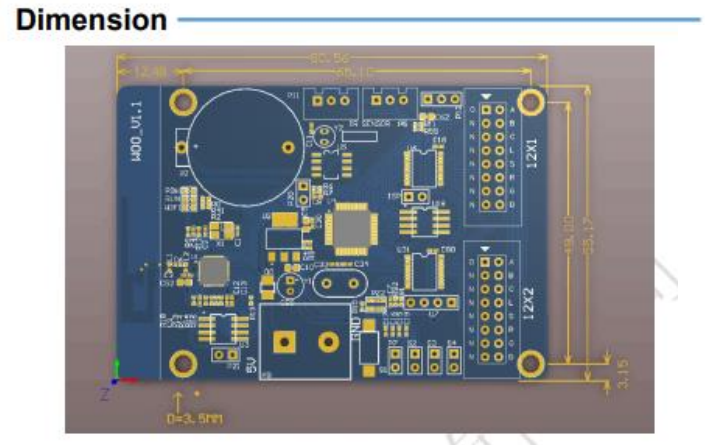
The web application is designed using Appetizer App which is an online application designing tool for food and table ordering. With the help of this tool, we can design the look of our application according to our need like number of screens, background colors, labels options etc. The programming and functioning of the application are done using PERN STACK which can be done and is a part of Appetizer App.

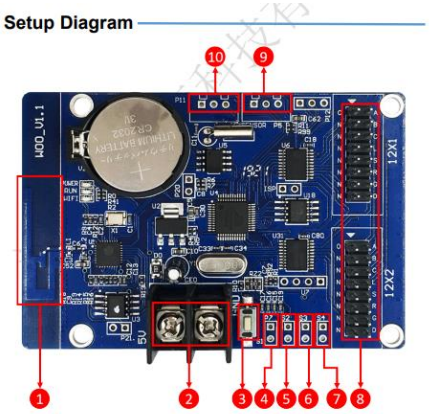
3.4 HARDWARE DESCRIPTION

The Hardware in this project is PCB part, on which we have mounted all the dc components and interfaced the micro-controller IC.

3.5 SINGLE COLOR WI-FI CONTROL CARD HD-W00

W00 is a low cost, high cost-effective single color Wi-Fi controller, easy to operate, better display information, supports variety kinds of single-color display. For the door lintel screen, store screen and other places information display. Application software: HD2018, HD2020 and LedArt (APP)





1. Wi-Fi antenna, Connect the computer or mobile phone through Wi-Fi
2. to send parameters and programs
3. Power connector, Connect 5V power supply

4. S1 test button, click to switch screen test status
5. P7：Connect the brightness sensor
6. S2：Connect the point switch, switch to next program, the timer starts, count plus
7. S3：Connect the point switch, switch the previous program, timer reset, count down
8. S4：Connect the point switch, program control, timing pause, count reset
9. HUB12: Connect the display
10. P5：Connect the temperature/humidity sensor
11. P11：Connect the IR, by remote control

Technical Specifications

Control range	Single color：320*32，640*16
FLASH Capacity	2M Byte
communication	Wi-Fi（within 15meters）
Program Quantity	Max 1000pcs，Can play by time section or control by buttons
Area Quantity	20areas with separate zone, and separated special effects and border
Display Showing	Text, timing, temperate, humidity, Count, Lunar calendar
Display	Sequence display, button switch, remote control
Clock Function	1、Support Digital Clock, Dial Clock, Lunar Time 2、Countdown, Count up, Button Countdown, Count up 3、The Font, size, color and position can be set freely 4、support multiple time zones
Extended Equipment	Temperatures, Humidity, IR Remoter, Photosensitive sensor, etc.
Automatic Switch screen	Support timer switch machine
Dimming	Support three brightness adjustment mode

TECHNICAL SPECIFICATIONS

1. Wi-Fi on board, Eliminate installation trouble

2. Support program border, regional border settings, custom borders

3. A variety of action display

4. Support for simple animations word

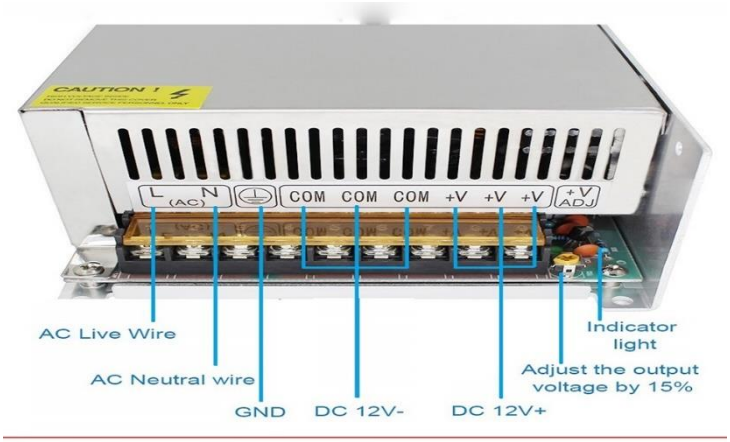
5. More than 40 kinds of text effects display

6. Support temperature, Humidity, IR remoter

7. Countdown, count up, Button Countdown, Count up

3.6 DC 12V 83A 1000W Power Supply

Switching Power Supply AC 110V/220V to DC 12Volt 83Amps Industrial Transformer Converter SMPS

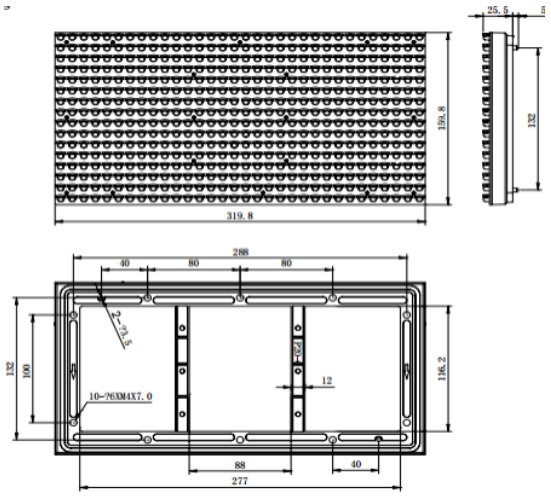


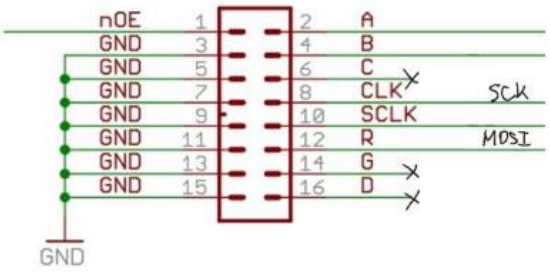
Parameter

- Input: AC 100V~120V / 200V~260V 50/60Hz
- Output Voltage: DC 12V (±10% adjustable)
- Output Current: 83.4A max
- Output Wattage: 1000W max
- Fix Screw Hole Diameter: 2.5mm (0.1inch)
- Working temperature: -10℃ ~50℃ （-50 ℉ ~ 122℉）
- Storage temperature: -20℃ ~ 60℃ （-68 ℉ ~ 140℉）
- Environmental humidity: 10-95%

3.7 P10 LED MATRIX 16*32 LED DISPLAY

The P10 single color is a high brightness, lower power consumption, long life time display module. Designed for semi-outdoor use.





Features:

- 1/4 duty scan drive
- Brightness:3500nits to 4500nits
- Max Power Consumption: 20W
- DC 5V Voltage Input
- Constant Voltage Drive
- IP65 Waterproof
- 1W Pixel Configuration
- High Viewing Angle
- High Contrast Ratio with a perfect louver/cover

3.8 MICRO-CONTROLLER IC (ATMEGA 328P)

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with2K bytes of Flash programmable and erasable read-only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology

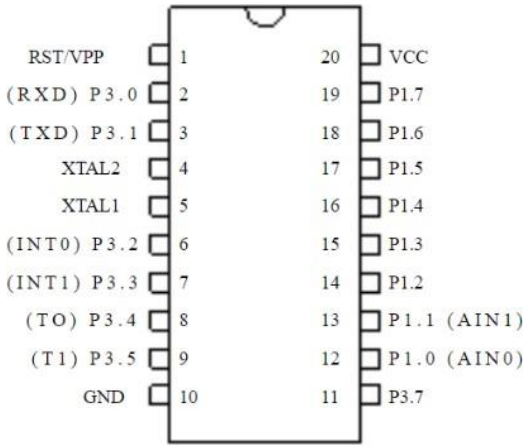


Fig.4.4: ATMEGA328P Microcontroller **Fig.4.5: ATMEGA328P Pin-out**

and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C2051 provides the following standard features: 2K bytes of Flash,128 bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C2051is designed with static logic for operation down to zero frequency and supportstwo software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

Technical Specifications

Parameter	Value
CPU type	8-bit AVR
Maximum CPU speed	20 MHz
Performance	20 MIPS at 20 MHz[2]
Flash memory	32 KB
SRAM	2 KB
EEPROM	1 KB
Package pin count	28 or 32
Capacitive touch sensing channels	16
Maximum I/O pins	23
External interrupts	3
USB interface	No

Applications

There are hundreds of applications for ATMEGA328P:

- Sensor Interfaces

Data Acquisition and Processing Motor Control (DC and Stepper) Communication and Networking Human-Machine Interface (HMI) Educational and Hobbyist Projects:

- Robotics
- Home Automation
- Data Logging and Analysis

Weather Station

- Line Follower Robot

Remote Control Device

Music Player

The ATmega89C251 is a versatile and powerful microcontroller suitable for various applications. Its combination of low cost, ease of use, and rich features has made it a popular choice for hobbyists and professionals alike.

3.9 BLUETOOTH MODULE (HC-05):

The Bluetooth module HC-05 is a commonly used as serial communication module used for wireless communication based on Bluetooth technology. It's regularly used in electronics projects, robotics, and various applications where a wireless connection between devices is needed. The HC-05 facilitates communication between microcontrollers, such as Arduino boards, and other devices like smartphones or computers, enabling data transfer over short distances without the need for cables.

Fig: HC-05 Bluetooth Module

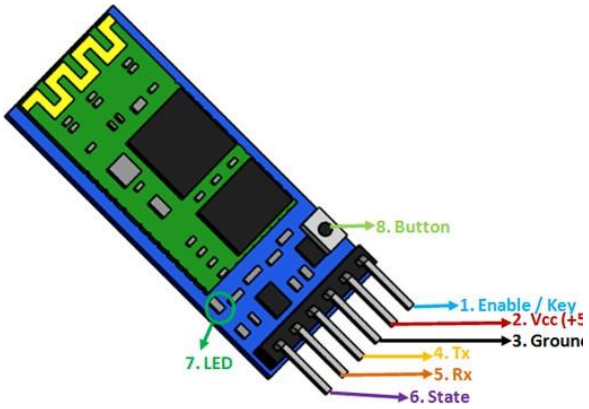


fig: HC-05 Bluetooth Module Pinout

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has a footprint as smallas 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

HC-05 Default Settings:

- Default Bluetooth Name: “HC-05”
- Default Password: 1234 or 0000
- Default Communication: Slave
- Default Mode: Data Mode
- Data Mode Baud Rate: 9600, 8, N, 1
- Command Mode Baud Rate: 38400, 8, N, 1
- Default firmware: LINVOR

SPECIFICATIONS

HARDWARE FEATURES:

- Operating Voltage: 4V to 6V (Typically +5V)
- Operating Current: 30mA
- Range: <100m
- Works with Serial communication (USART) and TTL compatible
- Follows IEEE 802.15.1 standardized protocol
- Uses Frequency-Hopping Spread spectrum (FHSS)
- Can operate in Master, Slave or Master/Slave mode
- Can be easily interfaced with Laptop or Mobile phones with Bluetooth
- Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.

SOFTWARE FEATURES:

- Slave default Baud rate: 9600, Data bits:8, Stop bit:1, Parity: No parity.
- PIO9 and PIO8 can be connected to red and blue led separately. When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2 times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PIN CODE:"1234" as default.
- Auto-reconnect in 30 min when disconnected because of beyond the range of connection.

Pin configuration:

Pin Number	Pin Name	Description
1	Enable / Key	This pin is used to toggle between Data Mode (set low) and AT command mode (set high). By default, it is in Data mode
2	Vcc	Powers the module. Connect to +5V Supply voltage
3	Ground	Ground pin of module, connect to system ground.
4	TX – Transmitter	Transmits Serial Data. Everything received via Bluetooth will be given out by this pin as serial data.
5	RX – Receiver	Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth
6	State	The state pin is connected to an on-board LED, it can be used as feedback to check if Bluetooth is working properly.
7	LED	Indicates the status of Module • Blink once in 2 sec: Module has entered Command Mode • Repeated Blinking: Waiting for connection in Data Mode • Blink twice in 1 sec: Connection successful in Data Mode
8	Button	Used to control the Key/Enable pin to toggle between Data and command Mode

Applications:

1. Wireless communication between two microcontrollers
2. Communicate with Laptop, Desktops, and mobile phones
3. Data Logging application
4. Consumer applications
5. Wireless Robots
6. Home Automation

3.10 IC7805

Voltage regulators are very common in electronic circuits. They provide a constant output voltage for a varied input voltage. In our case the 7805 IC is an iconic regulator IC that finds its application in most of the projects. The name 7805 signifies two meaning, “78” means that it is a positive voltage regulator and “05” means that it provides 5V as output. So, our 7805 will provide a +5V output voltage.

The output current of this IC can go up to 1.5A. But the IC suffers from heavy heat loss hence a Heat sink is recommended for projects that consume more current. For example, if the input voltage is 12V and you are consuming 1A, then (12-5) * 1 = 7W. This 7 Watts will be dissipated as heat.

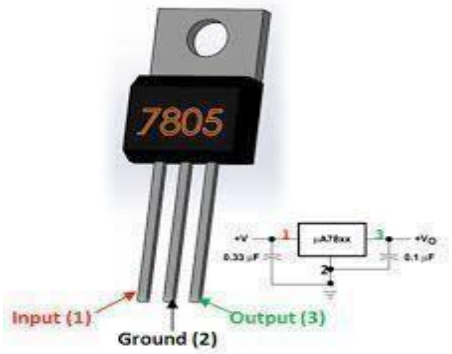


Fig.4.8: IC 7805

Pin Configuration

Pin Number	Pin Name	Description
1	Input (V+)	Unregulated Input Voltage
2	Ground (Gnd)	Connected to Ground
3	Output (Vo)	Outputs Regulated +5V

Table.4.3: Pin Configuration of IC 7805

Features

- 5V Positive Voltage Regulator Minimum Input Voltage is 7V Maximum Input Voltage is 25VOperating current (IQ) is 5mA
- Internal Thermal Overload and Short circuit current limiting protection is available.
- Junction Temperature maximum 125 degree CelsiusAvailable in TO-220 and KTE package

Application

- Constant +5V output regulator to power microcontrollers and sensors in most of the projects
- Adjustable Output Regulator
- Current Limiter for certain applications Regulated Dual Supply
- Output Polarity-Reversal-Protection Circuit

3.11 RESET SWITCH

In electronics and technology, a reset button is a button that can reset a device. On video game consoles, the reset button restarts the game, losing the player's unsaved progress. On personal computers, the reset button clears the memory and reboots the machine forcibly. Reset buttons are found on circuit breakers to reset the circuit. This button can cause data corruption which is why it often doesn't exist on many machines. Usually, in computers and other electronic devices, it is present as a small button, possibly recessed into the case or only accessible by a pin or similarly thin object, to prevent it being pressed accidentally.

Fig.4.9: Reset Switch

3.12 CERAMIC CAPACITORS

Ceramic capacitors are the common types of capacitors used in most of the electrical instruments as they are more reliable and cheaper to manufacture.

These capacitors consist of ceramic or porcelain discs and are said to exist in a non-polarized form which is used in various types of industries. Ceramic material is known to be an excellent dielectric because of its poor conductivity and an efficient supporter of the electrostatic fields.

A fixed value type of capacitor where the ceramic material within the capacitor acts as a dielectric is the Ceramic Capacitor. This capacitor consists of a greater number of alternating layers with ceramic and a metal layer which acts as an electrode. The composition of this ceramic material in this capacitor talks about the electrical behavior along with its applications.

Fig.4.10: Ceramic Capacitor

Ceramic Capacitor Polarities

It is important to understand that capacitor polarity is one of the essential points to be considered while connecting capacitors in an electric circuit. Capacitors can be classified into two groups based on their polarity:

- Polarized capacitor
- Non-polarized capacitor

When a capacitor is polarized, it will have two terminals, and they are known as anode and cathode. These terminals are considered while connecting them in a circuit.Whereas when the capacitor is non-polarized, there is terminal involved and therefore can be used in either way.

The ceramic capacitor is a non-polarity device which is found commonly in every electrical device and the dielectric material that is used in the capacitor is a ceramic material. Non-polarity device means the capacitor has no polarities.

Application

The applications of ceramic capacitors:

Transmitter stations.

Induction furnaces.

High voltage laser power supplies.

Power circuit breakers

3.13 ELECTROLYTIC CAPACITOR

An electrolytic capacitor definition is, it is a polarized capacitor whose anode has a higher or more positive voltage than the cathode. As the name suggests it is a polarized capacitor and an electrolytic capacitor function is, it uses an electrolyte to operate with a higher or more positive voltage on the anode than the cathode. Therefore, the anode terminal is denoted with a positive sign, while the cathode with a negative sign. Applying a reverse polarity voltage of 1 to 1.5 volts may destroy the capacitor and dielectric and the result is hazardous, leading to an explosion or fire. An electrolytic capacitor uses an electrolyte, in the form of solid, liquid or gel – serves as cathode or negative plate to achieve much higher capacitance per unit volume. On the other hand, a positive plate or anode made of metal acts as an insulating oxide layer formed through anodization. This allows an oxide layer to work as the dielectric of the capacitor.

Depending on the anode and electrolyte structure, the electrolytic capacitance values tend to get influenced. With non-solid electrolyte, electrolytic capacitors display a wider deviation for frequency and temperature ranges than the solid electrolytes.

The electrolytic capacitor's basic unit is expressed as microfarad (μF). In the datasheets prepared by manufacturers, the capacitance value is mentioned as rated capacitance (CR) or nominal capacitance (CN). These are the values for which the capacitance is being designed.

The electrolytic capacitors are the large, cylindrical structure, which is polarized and has higher capacitance.

Fig.4.11: Electrolytic Capacitor

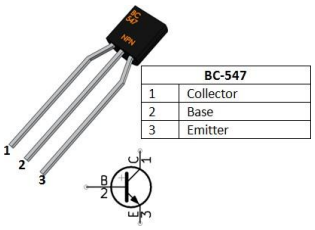
Application

- Reducing voltage fluctuations in filtering devices.
- Smoothing the input and output to a filter.
- Noise filtering or decoupling in power supplies.

3.14 BC-547 TRANSISTOR

BC547 is a NPN transistor hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. BC547 has a gain value of 110 to 800, this value determines the amplification capacity of the transistor. The maximum amount ofcurrent that could flow through the Collector pin is 100mA, hence we cannot connect loads that consume more than 100mA using this transistor. To bias a transistor, wehave to supply current to base pin, this current (IB) should be limited to 5mA.

When this transistor is fully biased then it can allow a maximum of 100mA to flow across the collector and emitter. This stage is called Saturation Region and the typical voltage allowed across the Collector-Emitter (VCE) or Base-Emitter (VBE) could be 200 and 900 mV respectively. When base current is removed the transistor becomes fully off, this stage is called as the Cut-off Region and the Base Emitter voltage could be around 660 mV.



BC-547	
1	Collector
2	Base
3	Emitter

Fig.4.12: BC-547 Transistor

Pin Configuration

Pin Number	Pin Name	Description
1	Collector	Current flows in through collector
2	Base	Controls the biasing of transistor
3	Emitter	Current Drains out through emitter

Table.4.4: Pin Configuration of BC-547 transistor

Application

- Driver Modules like Relay Driver, LED driver etc.
- Amplifier modules like Audio amplifiers, signal Amplifier etc.
- Darlington pair

3.15 BUZZER

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perfect Board and even on PCBs which makes this a widely used component in most electronic applications. There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered willmake a Continuous Beep. sound, the other type is called a readymade buzzer which
will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But the one shown here is most widely used because it can be customized with help of other circuits to fit easily in our application. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommendedto use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.

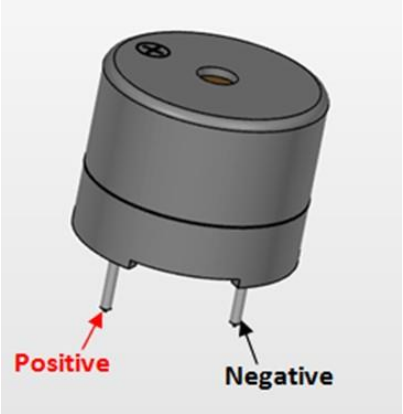


Fig.4.13: Buzzer

Application

- Alarming Circuits, where the user must be alarmed about something
- Communication equipment's
- Automobile electronics
- Portable equipment's, due to it

3.16 SOFTWARE

3.17 TECHNOLOGY STACK

“Appetizer” was developed with Node and PostgreSQL. The project is divided into 2 parts: the backendand the frontend. It is a monolithic application, which means that the backend and the frontend are in thesame project. “Appetizer” provides both REST API and GraphQL API for the frontend to communicatewith the backend. These technologies are composed of the following components:

NodeJS

Node.js is an open-source server-side runtime environment built on Chrome's V8 JavaScript engine. It provides an event driven, non-blocking (asynchronous) I/O and cross-platform runtime environment forbuilding highly scalable server-side application using JavaScript

PostgreSQL

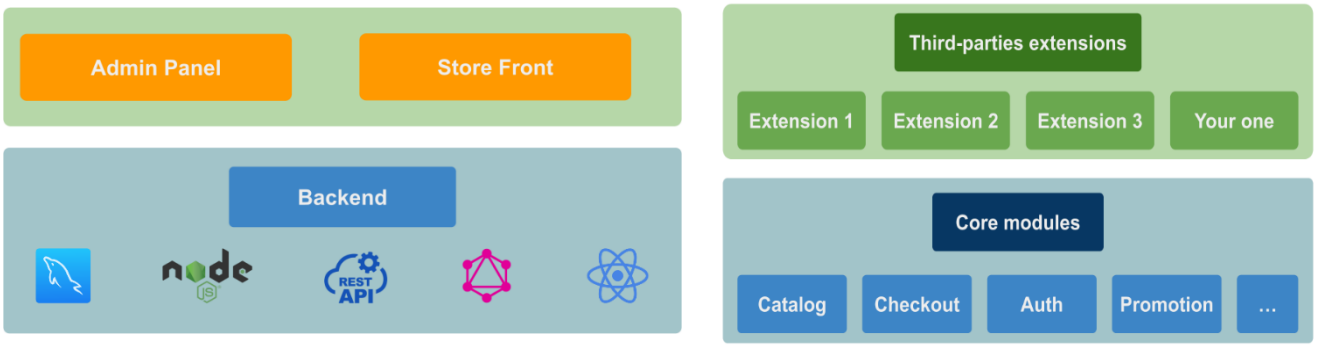
PostgreSQL is a powerful, open-source object-relational database system. It has more than 15 years ofactive development and a proven architecture that has earned it a strong reputation for reliability, dataintegrity, and correctness. Appetizer requires PostgreSQL 13 or higher.

React

React is a free and open-source front-end JavaScript library for building user interfaces based on UIcomponents. Appetizer implements server-side rendering of React components with hydration to provide a fast, performant experience and SEO optimization.

GraphQL

GraphQL is a query language for APIs and a runtime for fulfilling those queries with your existing data.Appetizer uses GraphQL and React to build a flexible and extensible front-end.



3.18 MODULE SYSTEM

"Appetizer" is a modular application and it supports modularity. It means that all functionality is implemented and Food Ordering in components that are known as Modules.

A module is a logical group – a directory containing controllers, services, views – that are related to a specific business feature. In keeping with Appetizer's commitment (module) to optimal modularity, a module encapsulates one feature and has minimal dependencies on other modules.

```
├── .evershop
├── .log
├── config
│     ├ default.json
├── extensions
├── media
├── node_modules
├── themes
├── package-lock.json
└── package.json
```

3.19 PROJECT FOLDER STRUCTURE

“Appetizer” project contains node modules, caching files, configuration files, media, and extension. Let us look to the directory structure.

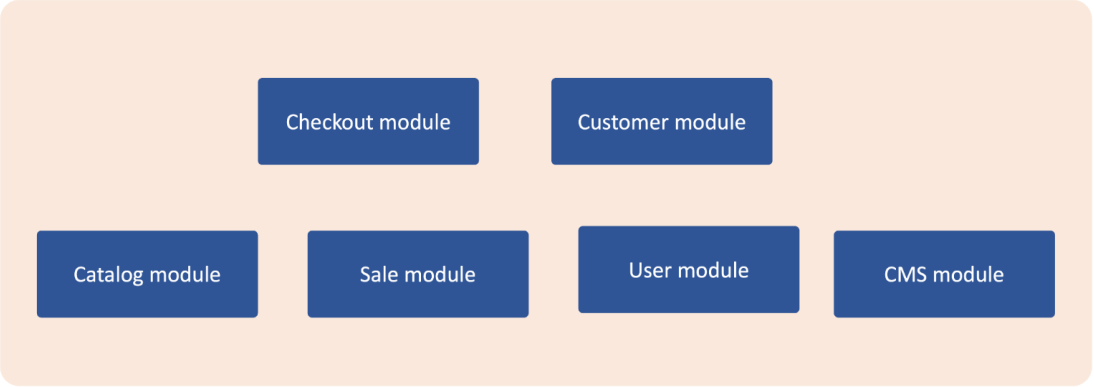
3.20 MODULE OVERVIEW

Appetizer is a modular application and it supports modularity. It means that all functionality is implemented and delivered in components that are known as Modules.

A module is a logical group – a directory containing controllers, services, views – that are related to aspecific business feature. In keeping with appetizer’s commitment to optimal modularity, a module encapsulates one feature and has minimal dependencies on other modules

Modules and themes are the units of customization in appetizer. Modules provide business features, with supporting logic, while themes strongly influence user experience and storefront appearance. Bothof them have a life cycle that allows them to be installed, deleted, and disabled. From the perspective of both merchants and extension developers, modules are the central unit of appetizer organization.

The purpose of a module is to provide specific product features by implementing new functionality or extending the functionality of other modules. Each module is designed to function independently, so theinclusion or exclusion of a particular module does not typically affect the functionality of other modules.



A module is a directory that contains 5 parts:

1. Api: The Api contains a list of the RESTful Api and its middleware functions and routedefinition.
2. Page: The pages folder contains list of pages. This folder contains the route definition,middleware function and the React components for UI rendering.
3. Migration: The migration folder contains the database migration files used for module installation and upgrade. Normally, we need this when our module needs to create a new tableor add a new column to an existing table.
4. Services: The services folder contains JavaScript class/function that provides some functionality.
5. bootstrap.js file. This file will be executed once the application is starting.
6. packages.js file. An extension can have its own dependencies. We will use the NPM workspaceto manage the dependencies of the extension.

Module Folder Structure

There are two types of modules:

1. Core module: Those modules are developed and maintained by the Appetizer team. They arein @Appetizer/Appetizer/src/modules
2. Extension: Those modules developed by a third party/developer. They are in the ‘extensions’ folder at the root level. We will learn more about the extension in the next sections.

Our Admin Panel, drawing heavy inspiration from Shopify, is meticulously crafted using React, offering a comprehensive suite of tools to efficiently manage your store operations. Designed with extensibility and customization in mind, our panel empowers developers to seamlessly integrate new functionalities without necessitating

3.21 ADMIN PANEL - ORDER DASHBOARD

modifications to the core source code.

Key Features:

QUICK LINKS

- Dashboard: Provides an overview of vital store metrics and performance indicators.
- New Product: Streamlines the process of adding new products to your inventory.
- New Coupon: Facilitates the creation and management of promotional coupons for your customers.

CATALOG

- Products: Enables comprehensive management of your product catalog, including editing, organizing, and tracking.
- Categories: Offers tools for categorizing products, enhancing navigation and user experience.
- Collections: Allows the creation and management of curated collections tailored to specific customer segments.
- Attributes: Provides flexibility in defining product attributes, facilitating accurate product descriptions, and filtering options.

SALE

- Orders: Centralizes order management, from processing and fulfillment to tracking and customer communication.

CUSTOMER

- Customers: Provides insights into customer data and behavior, enabling targeted marketing strategies and personalized experiences.

PRODUCT REVIEW

- Reviews: Manages customer reviews and ratings, fostering trust and transparency in your product offerings.

PROMOTION

Coupons: Offers a platform for creating and distributing promotional coupons, driving sales and customer engagement.

CMS

Pages: Facilitates the creation and management of content pages, enhancing brand storytelling and SEO optimization.

SETTINGS

1. STORE SETTING:
    - Configure your store information: This section allows you to set up and manage essential details about your store, such as its name, address, contact information, and any other pertinent information that customers may need to know.

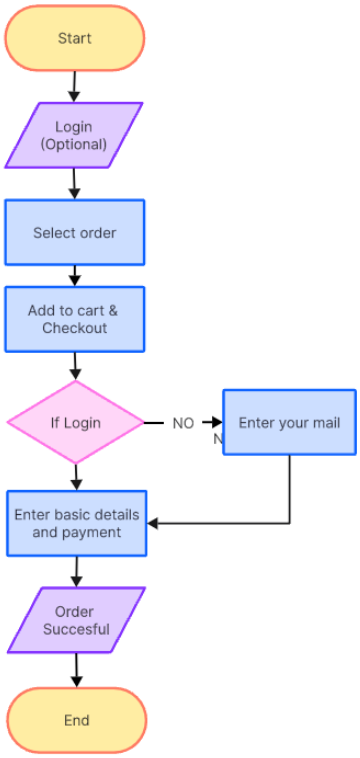
2. PAYMENT SETTING:
    - Configure the available payment methods: Here, you can specify the payment methods that your customers can use to make purchases on your store. This includes options such as credit/debit card payments, PayPal, Stripe, and any other payment gateways you wish to integrate.

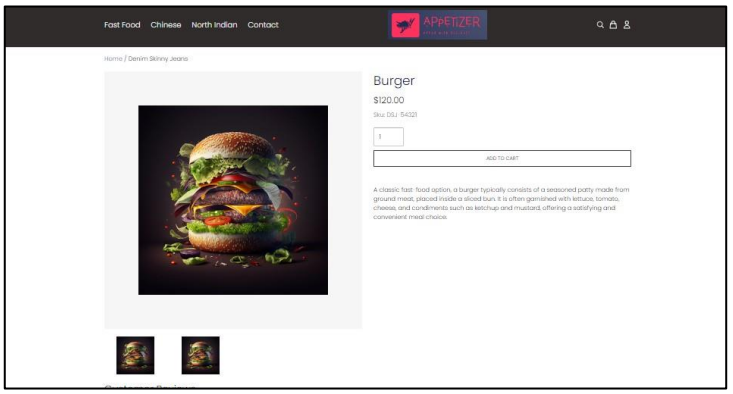
3. SHIPPING SETTING:
    - Where you ship, shipping methods, and delivery fee: In this area, you can define the regions or countries where you offer shipping services, as well as the specific shipping methods available to your customers (e.g., standard shipping, express shipping). Additionally, you can set shipping rates or fees based on factors such as order weight, destination, or total order value.

4. TAX SETTING:
    - Configure tax classes and tax rates: This section enables you to set up tax rules and rates applicable to your products based on your store's location and the jurisdictions where you conduct business. You can define different tax classes for various types of products and specify tax rates according to local regulations or customer location.

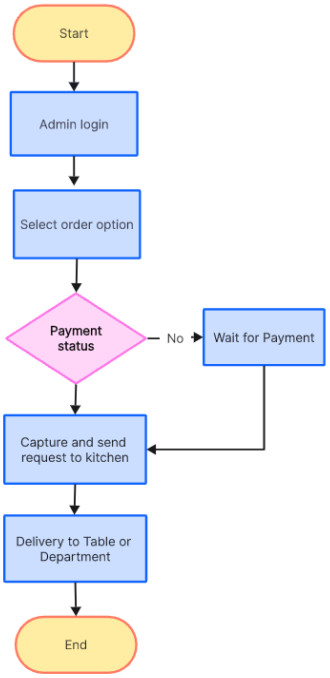
Front store view - React GraphQL Ecommerce

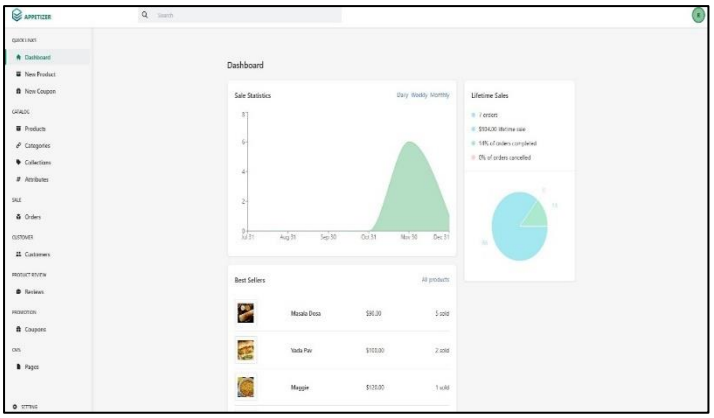
The Appetizer frontend is designed to optimize storefront customization, with highly extensible themesbeing the central customization mechanism.



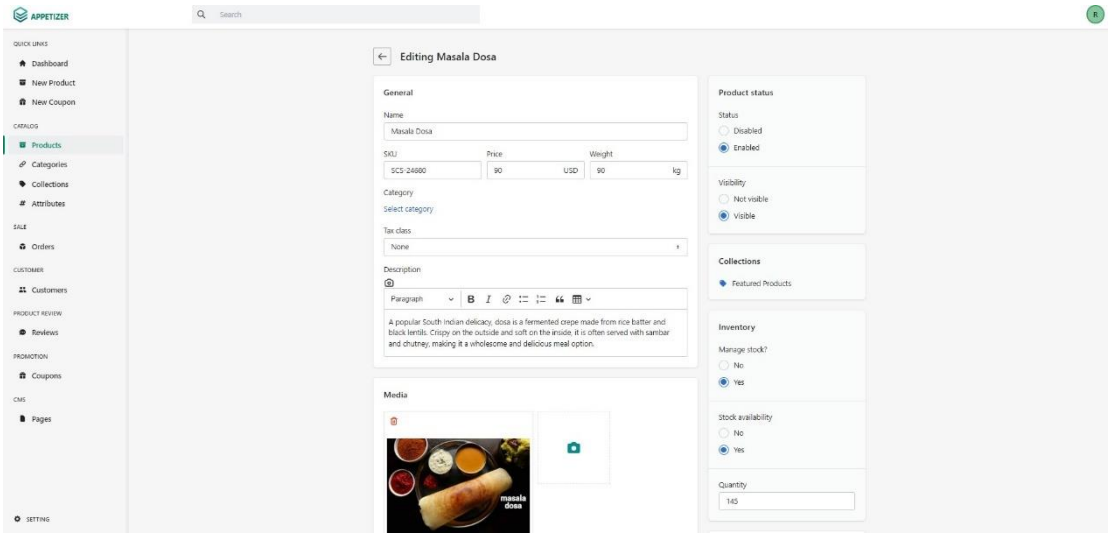


Admin Panel view





3.22 SYSTEM REQUIREMENTS



Node.js

To install Appetizer, you must have Node.js version 14 or above

NPM

NPM version 7 or higher (which can be checked by running node -v).

Database

PostgreSQL 13 or higher.

VS Code IDE:

VS CODE IDE Latest.

3.23 CONFIGURATION GUIDE

In Appetizer, some of the configurations can be done from the admin panel like Payment method, Shipment method, Taxes…, we will focus on the configuration from the config/ directory. This directory contains the configuration files for the application.

Under the hood, Appetizer makes use of config package to handle the configuration.

3.24 CONFIGURATION FILE LOCATION

Configurations are JSON files stored in configuration files within a directory named config located atthe root level of your application.

3.25 CONFIGURATION AND DEPLOYMENT ENVIRONMENT

Configuration files can be overridden and extended by environment variables.

For example, you can overwrite the configuration for your production store by below steps

Create a new configuration file named production. Json in the config directory.

Add your configuration for production

3.26 WHAT GOES INTO A CONFIGURATION FILE?

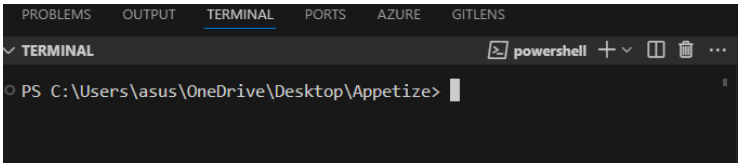
A configuration file is a JSON file that contains the configuration for the application. The configurationfile is divided into sections, each section contains a group of configuration items.

The high-level overview of the configuration file can be categorized into:

- Shop configuration
- Extension configuration
- Catalog configuration
- Pricing configuration

3.27 APPETIZER COMMAND LINES

Appetizer comes with several command lines which help you to develop and launch your store.Below is the list of available commands



INFO: If you want to skip the minimization process, you can run npm run build skip-minify command

This command starts your store in production mode. You need to run Appetizer build before running this command.

npm run start

Appetizer Dev Command:

This command will start your store in development mode.

npm run dev

Appetizer Debug Command:

This command will start your store in production mode and enable the debugging.

npm start --debug

Appetizer Build Command:

This command builds the React components and make your store ready for production. The built components will be stored in the. Appetizer folder.

npm run build

Appetizer Admin User Create Command

You can use this command to create a new admin user.

npm run user:create email "user email" --password "user password" --name "user name"

npm run user:changePassword email "user email" --password "new password"

3.28 APPETIZER ROUTING SYSTEM

In the realm of web development, routing serves as the backbone of how an application responds to client requests directed at specific endpoints. These endpoints are typically defined by Uniform Resource Identifiers (URIs) or paths, along with accompanying HTTP request methods such as GET, POST, PUT, or DELETE. In our framework, Appetizer, we leverage the robust capabilities of Express.js for handling routing tasks efficiently.

Express.js Integration:

Express.js stands out as a minimalist yet powerful web application framework for Node.js, renowned for its flexibility and scalability in building web applications and APIs. Its middleware architecture and streamlined routing mechanism make it an ideal choice for managing HTTP requests and structuring the backend logic of our application.

Routing in Appetizer:

Within the Appetizer framework, routing plays a pivotal role in directing incoming requests to the appropriate handlers or controllers based on predefined URI patterns and HTTP methods. Whether it's retrieving data, processing form submissions, or serving static assets, our routing system ensures that each request is routed to the corresponding endpoint for seamless execution.

Middleware Pipeline:

One of the key features of Express.js is its middleware pipeline, which allows for the sequential execution of middleware functions before reaching the final route handler. This modular approach enables us to encapsulate common functionalities such as authentication, request logging, error handling, and more, streamlining the development process and enhancing code maintainability.

3.29 WHAT IS MIDDLEWARE?

Let us look the below diagram

In the above flow, we have a request triggered from the end-user. That request will be received and proceed by a list of middleware functions, after all of the middleware functions are executed a responseobject containing the webpage data will be sent to the client.

Middleware are functions that execute during the lifecycle of a request to the server. Each middlewarehas access to the HTTP request and response for each route (or path) it's attached to. Middleware can be written to perform a variety of tasks. For example, a logging middleware might log all incoming requests to your application or authenticate an incoming user.

Appetizer middleware type

In Appetizer, there are 4 types of middleware functions

1: Application-level middleware

2: Admin-level middleware

3: Front Store-level middleware

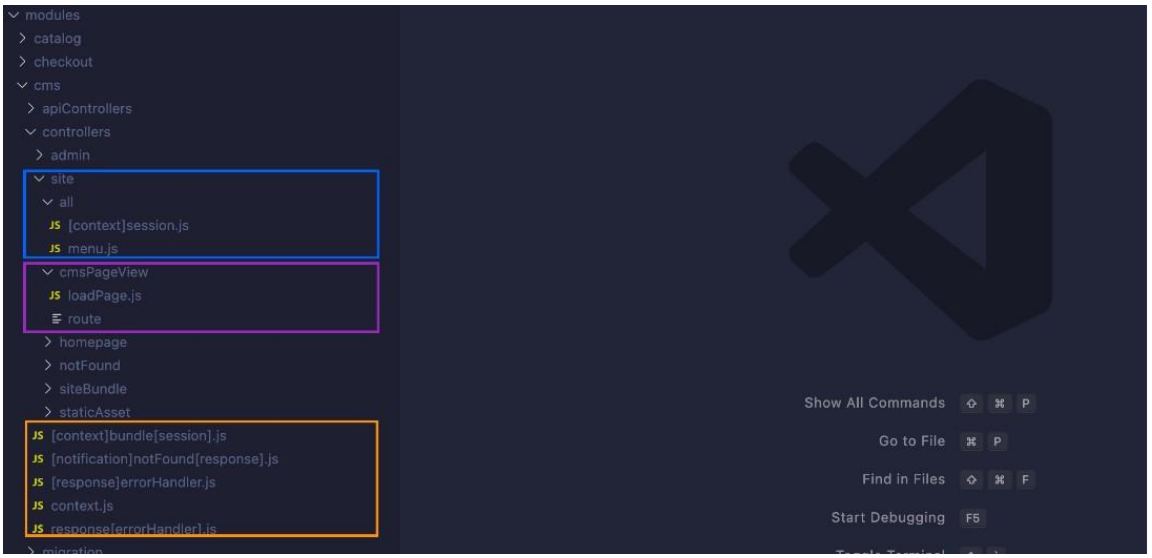
4: Routed-level middleware

Middleware function

Middleware is a function that have access to maximum 4 arguments

1. request object: The HTTP request object.
2. response object: The HTTP response object.
3. delegate array: The list of returned value from previous middleware functions.
4. next: The function to call the next middleware.

Middleware and route



RESTful API Routes

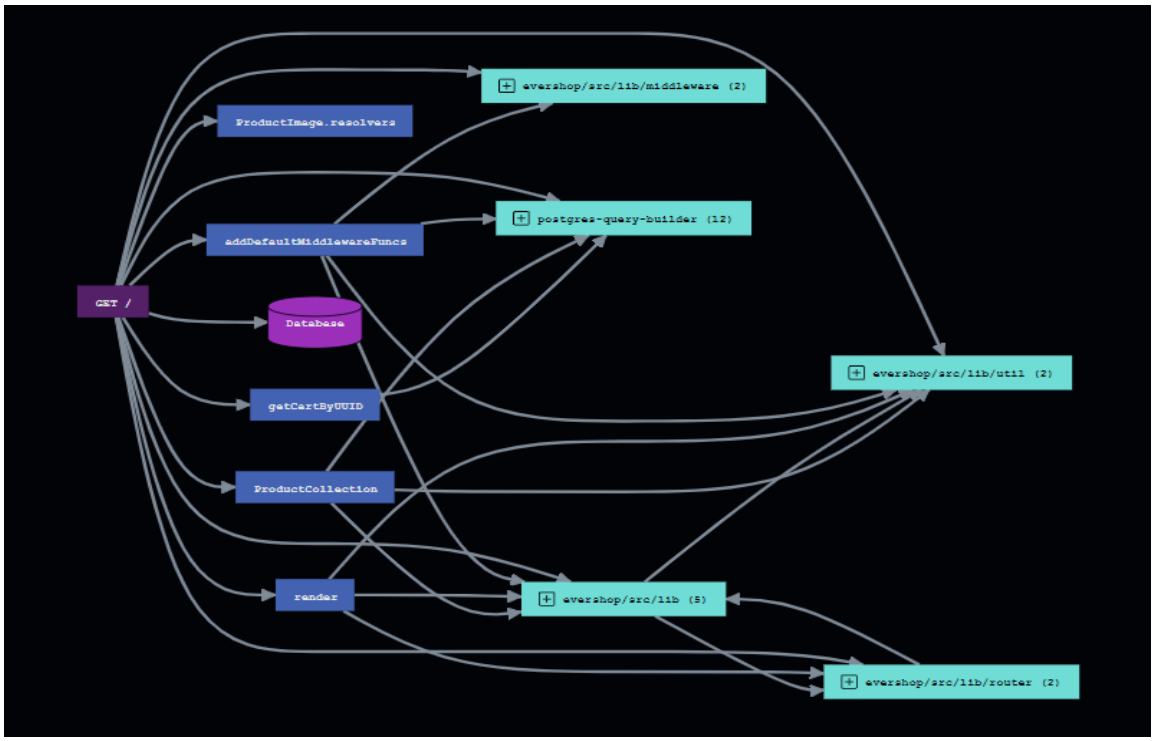
In software development, RESTful APIs are a common approach for designing web services that adhere to the principles of Representational State Transfer (REST). These APIs are typically organized within specific folders in a project structure, often named "API" or similar.

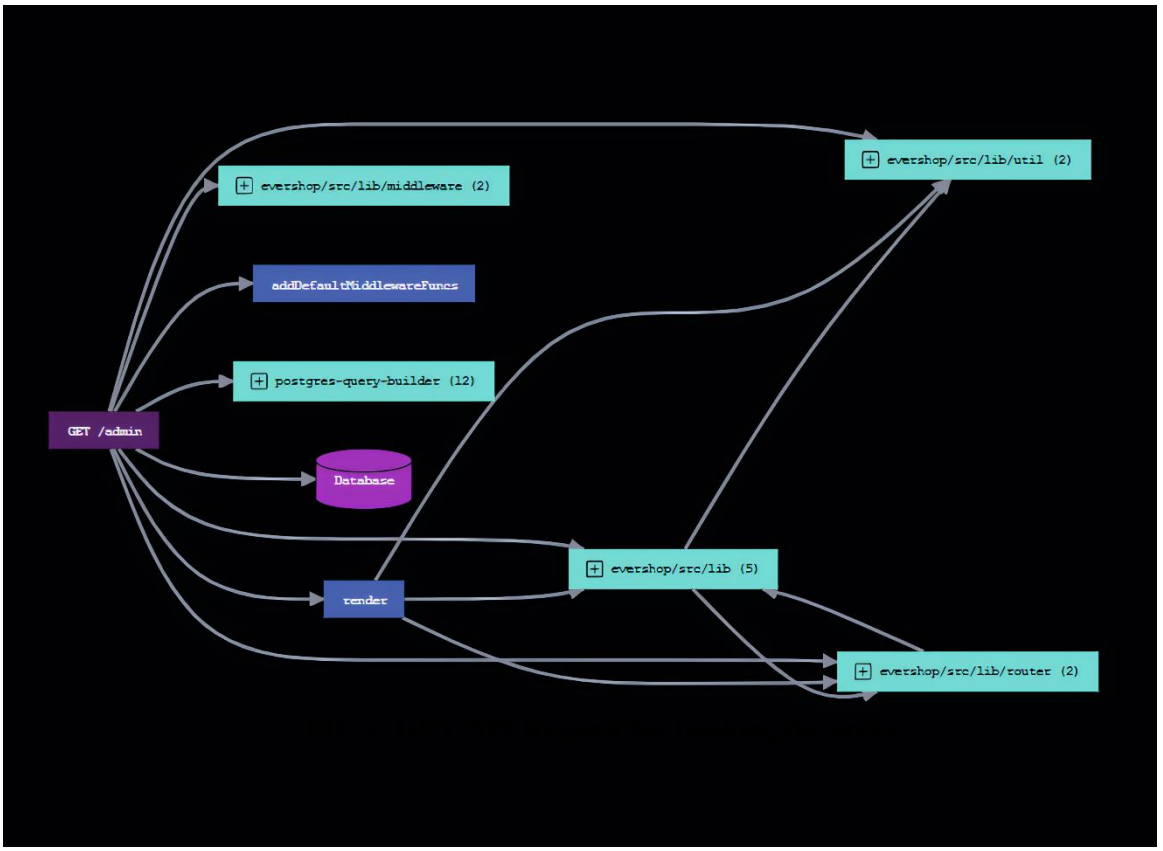
For instance, within a modular architecture, each module may have its own API folder where RESTful endpoints are defined. Let's take the catalog module as an example. Within its API folder, you might find various endpoints, each representing a different functionality or resource.

One such endpoint could be for retrieving orders using the HTTP GET method. This endpoint would typically return a representation of orders in a format like JSON or XML. Additionally, there might be visual representations or documentation accompanying these endpoints to aid developers in understanding their functionality and usage.

Overall, this structure helps maintain a clear separation of concerns and facilitates the organization and maintenance of the API codebase within a larger software project.

As in fig a and fig b we can see how API is act when it receive an order and how admin will confirm and execute the order


evershop/src/lib/middleware (2)
ProductImage.resolvers
postgres-query-builder (12)
addDefaultMiddlewareFuncs
GET /
Database
evershop/src/lib/util (2)
getCartByUUID
ProductCollection
render
evershop/src/lib (5)
evershop/src/lib/router (2)


evershop/src/lib/util (2)
evershop/src/lib/middleware (2)
addDefaultMiddlewareFuncs
postgres-query-builder (12)
GET /admin
Database
evershop/src/lib (5)
render
evershop/src/lib/router (2)

3.30 GRAPHQL SYSTEM

Graphql is a query language for your API, and a server-side runtime for executing queries by using atype system you define for your data.
In Appetizer we make use of Graphql for server-side data fetching and API for the font-end to consume.

Graphql organization in Appetizer

In Appetizer, every module has its own graphQL folder. The graphql folder contains the type definitionand resolvers for the module. Let's take a look at the graphql folder structure of the catalog module.

What is a migration script?

Every extension can have its own database schema migration scripts. When you install an extension, those migration scripts are executed automatically and the database schema is upgraded.

The migration scripts are in the migration's directory of your extension. One migration script is asingle file providing a single function that is executed when the migration script is executed.

```
module.exports = async function (connection) {
  // Your migration script goes here
};
```

3.31 POSTGRESQL DATABASE

Appetizer uses PostgreSQL as a database storage. Appetizer requires PostgreSQL 13 or higher.

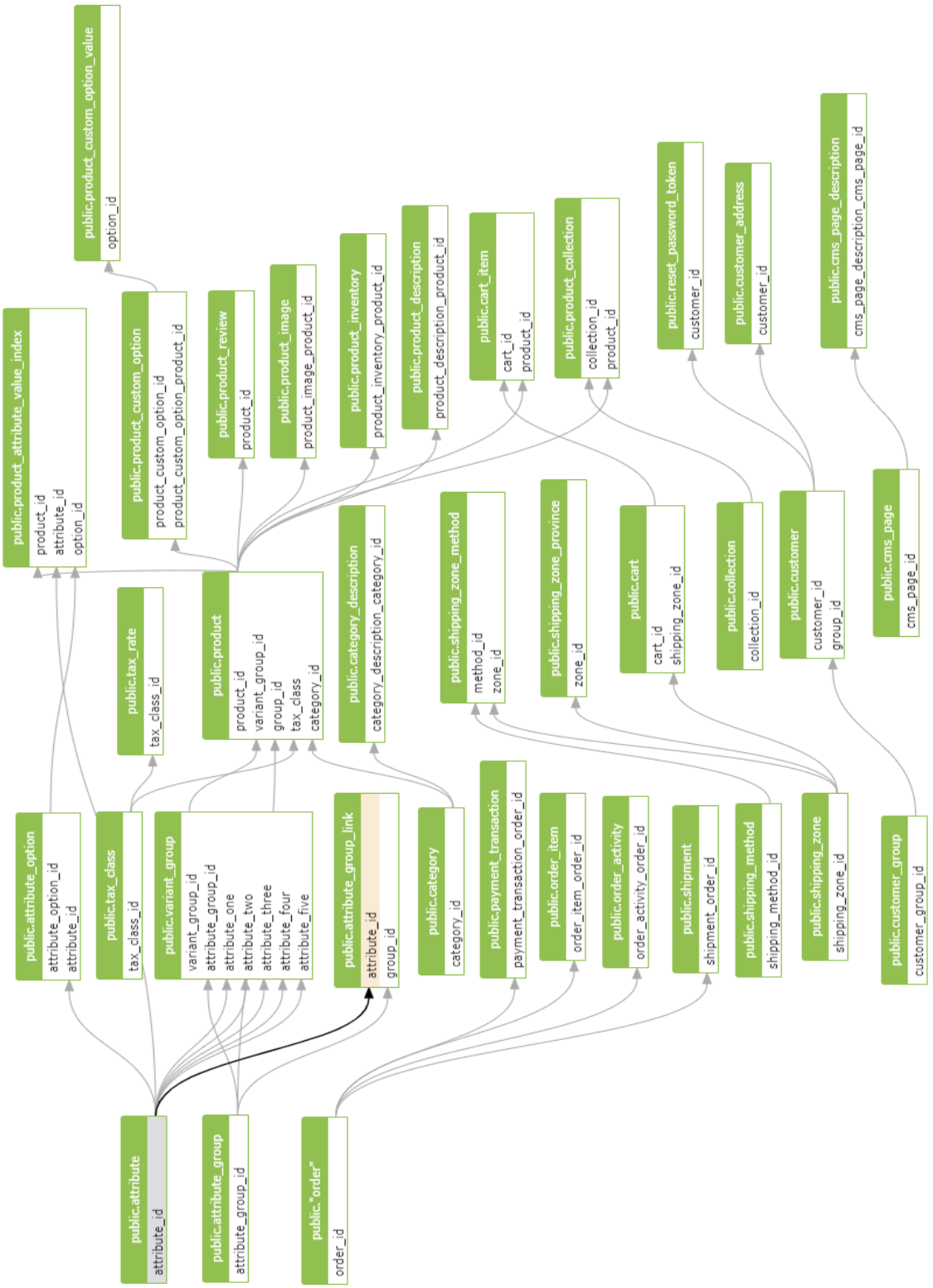
database	3	schema	6	table	91
view	13	column	777	relation	3895

What is PostgreSQL?

PostgreSQL is a powerful and popular open-source relational database management system (RDBMS)that is known for its robustness, scalability, and extensibility. It is one of the most advanced and feature-rich databases available, offering features such as support for complex queries, indexes, transactions, and advanced data types like arrays, JSON, and XML.

PostgreSQL is often used as a backend database for web applications, and it is frequently deployed onLinux, Unix, and Windows servers. It also has a strong reputation for data integrity, and is often the preferred choice for applications that require ACID (Atomicity, Consistency, Isolation, and Durability)compliance.

PostgreSQL is developed and maintained by a global community of open-source developers, and isreleased under the PostgreSQL License, a permissive free software license.



PostgreSQL Primary ID Visual SQLFlow Representation

CHAPTER-4

RESULTS AND DISCUSSIONS

4. RESULTS AND DISCUSSIONS

4.1 RESULTS

Most of the objectives had been fulfilled successfully and thus we are able to design a application of seat booking and food ordering web application. web application is designed, the application can book the seat in the cafeteria from the work desk itself and also orders the food Thus the designed system is helpful in saving the time of the employees working in the organization and also helps in reducing human efforts. It will replace the existing time-consuming process as it is easier and takes veryless time. Saving the time is very crucial for employees and we have made this project in order to save their time and comfort employees with their needs. The existing process was more time consuming required more human efforts and capital. The web application is portable, easy to use and also it is reliable.

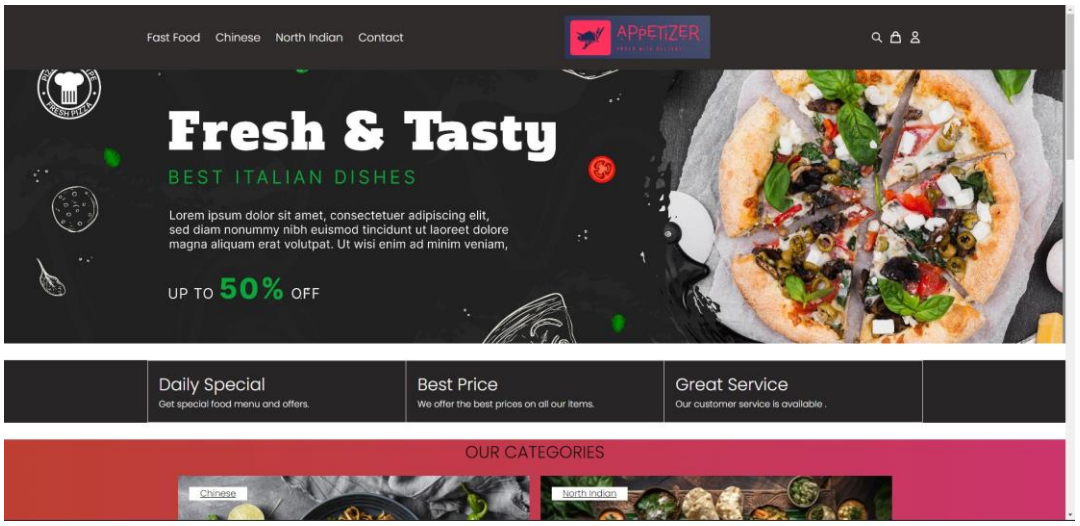


Fig.5.1: Appetizer Main Screen

The application is designed on the Appetizer App Inventor which is an online tool available for everyone. Figure 5.1 shows the working screen of Appetizer App. Here we can design our web application. We can input the details from the backend things like products its attributes, Categories, collection, daily special items, everyrequirement as our application demands and can accordingly design here by going

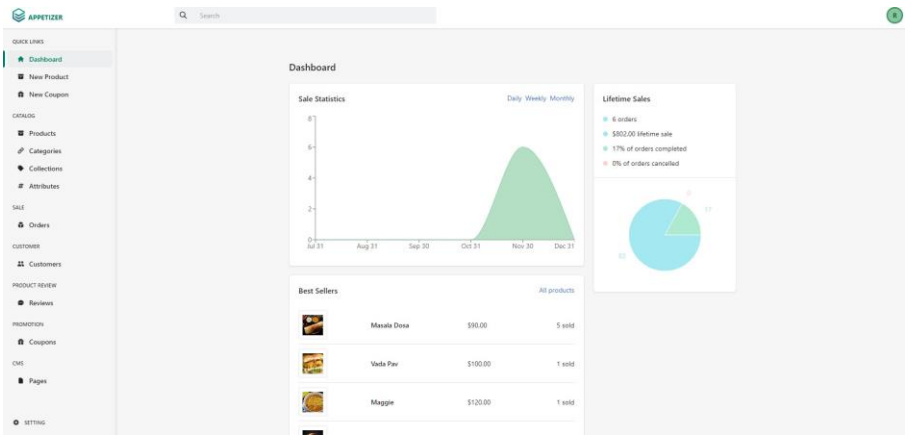


Fig.5.2: Admin Panel of the application

the design of the application is done, our web application and our proposed system is ready to use. Figure 3.3 shows the main screen of our web application which will take a few clicks to make your order. This screen will redirect us to the login page of the application. The user's name and the user password required to access the application one can get by just registering or just by doing the google login. One needs to enter the user's name and the user id to login into the application. Figure 3.4 shows the login page of the application. This login activity is a onetime process for an employee.Once an employee enters the credentials, it gets stored in the database of the application. As a result, an employee when handles the application for the second time from the same device; does not have to enter the credentials again and can directly book a seat

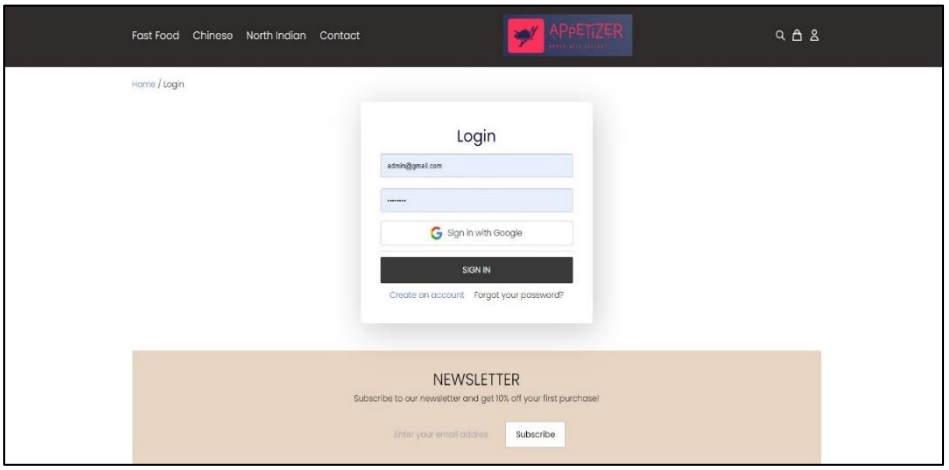


Fig.5.3: Login page of the application

Once the employee successfully logins into the application he/she can now can order the food and do its online payment. As he/she chooses the order fill the one-time details and as soon as payment done the employee will get the order conformation mail with is order id. Figure 3.5 shows the seat booking and food ordering screen.

Then the seat is booked and the food is ordered, as soon as order is ready the customer/employee will receive another mail and it order number will display on the screen so student can take its order or the order will dinero the faculty member or desire table.

4.2 FUTURE SCOPE

In future, by making certain enhancements like adding additional features and advanced technology which will make our application more user friendly, so that without any technical issues anybody can use it for food Additionally we are planning to provide order food anywhere from the campus facilities and also the feature to show the estimated time in which the food order will get ready. As our project is a mere prototype of what could be a future star in saving the time of the employees,

4.3 ADVANTAGES

- The Application is reliable and time saving.
- It is portable and cost efficient.
- Reduces human efforts.
- Online Payment
- Order management
- User friendly interface
- Order for friend
- Multiple Language Support

CHAPTER-5

SUMMARY AND CONCLUSION

5.1 CONCLUSION

With, saving more and more time, being the topmost concern of any employee working in an organization this web application has distinguished and clarified the advantage of digitization. This system, as it can be used in many institutions and organizations, but with few modifications, can be further developed and used on a large scale. The IoT Enabled Smart Cafeteria Management System will essentially improve the time management of the employees and the rush in the cafeteria. The system is fast and does not require any manual efforts. This entire view of the IoT Enabled Smart Cafeteria Management System discards the traditional way of forming queues in the cafeteria and introduces a digitized way of the cafeteria system.

5.2 SUMMARY

The IoT Enabled Smart Cafeteria Management System, exemplified by "Desk Dine," addresses the paramount concern of time-saving for employees within organizations. By leveraging digital solutions, this system revolutionizes cafeteria management, offering efficiency and convenience. Its adaptability for various institutions underscores its potential for widespread adoption, with potential for further enhancements to caterto large-scale usage. This innovative approach not only streamlines time management for employees but also alleviates cafeteria congestion, replacing traditional queues witha digitized framework. Overall, the system represents a significant step towards modernizing workplace amenities and enhancing employee satisfaction.

REFERENCES & LINKS

REFERENCES & Links

[1] https://Appetizer.io/docs/development/getting-started/introduction

[2] https://www.irjet.net/archives/V9/i7/ICIETET22/IRJET-V9I702.pdf

[3] https://github.com/PERNdotid/ui_zomato

[4] https://github.com/Shreyas1718/Zomato-Clone-UI

[5] https://github.com/chayxana/Restaurant-App.git

[6] AdithDev Reddy, Arindam Kumar Nath, Aditya T S, Anil Kumar, Alex Sebastian - Menu Guide: An AR Application for Smart phones International Research Journal of Computer Science (IRJCS) ISSN: 2393-9842 Issue 06, Volume 6 (June 2019) SPECIAL ISSUE - 5th International Conference - "ACCE – 2019".

[7] C. Prom& Rosy' , Dr. R. Ponnusamy2 - A Study on Hotel Reservation Trends of Mobile App Via Smartphone, IOSR Journal of Computer Engineering (IOSR-JCE) e- ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 19, Issue 4, Ver. VI. (Jul.-Aug. 2017), PP 01-08.

[8] Dr.Mitali Gupta - A Study on Impact of online Food delivery app on Restaurant business special reference to zomato and swiggy, International found of Research and Analytical Reviews, volome 6, Issure 1, Jan-March-2019, e ISSN 2348-1269, Print ISSN 2349-5138.

[9] Shahirah Mohamed Hatim, Nur Azmina Mohamad Zamani, Lily Marlia Abdul Latif Mahani Ahmadkardri , Normah Ahmad, Norhaslinda Kamaruddin Azham Hussain - E-FoodCart: An Online Food Ordering service, International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN :2278-3075, Volume-8, Issue-4 Feburary 2019.

[10] Shantashree Das, Debomalya Ghose – influence of online food delivery Apps on The operations of The Restaurant Business, International Journal Of Scientific and technology Research, ISSN 2277-8616, volume 8, Issue12, December 2019

SOCIAL UTILITY

FEATURES:

1.User Registration and Authentication:

- Allow employees to register using their organization email addresses and securely log in

2.Seat Booking:

- Enable employees to browse available seats in the cafeteria from their work desks and book seats for specific time slots.

3.Seat Availability Display:

- Show real-time occupancy and vacancy of seats in the cafeteria on the web application, allowing employees to make informed decisions about their seating preferences.

4.Order Placement:

- Provide a user-friendly interface for employees to browse the cafeteria menu, select items, customize orders, and place orders from their work desks.

5.Order Tracking:

- Implement order tracking functionality that allows employees to monitor the status of their orders, from placement to preparation to pickup/delivery.

6.Online Payment Integration:

- Integrate secure payment gateways to facilitate online payments for food orders, ensuring smoothand hassle-free transactions.

7.Menu Visibility:

- Display the cafeteria menu on the web application, ensuring that employees have full visibility of available food options and specials.

8.User Profiles:

- Allow employees to create and manage their profiles, including preferences, dietary restrictions, and payment methods for personalized ordering experiences.

9.Admin Dashboard:

- Provide administrative tools for cafeteria staff to manage seat bookings, update seat availability, add/remove menu items, and track order fulfillment.Technologies (using PERN Stack):

- Frontend: React.js for the user interface

- Backend: Node.js with Express.js for the server-side logic

- Database: PostgreSQL for storing user data, seat bookings, menu items, and orders

- Authentication: JWT (JSON Web Tokens) for secure user authentication

- Payment Integration: Stripe or PayPal for handling online payments

- Real-time Updates: WebSocket for updating seat availability and order status in real-time

- Deployment: Deploy the application on platforms like Heroku or AWS for accessibility.

Design Considerations:

- Responsive Design: Ensure that the web application is optimized for different screen sizes, including desktops, laptops, tablets, and smartphones.

- Accessibility: Adhere to accessibility standards to ensure that the application is usable by employees with disabilities.

- Security: Implement best practices for data encryption, secure authentication, and payment processingto protect user information and transactions.

- User Experience: Design an intuitive and user-friendly interface that makes it easy for employees to navigate, book seats, place orders, and track their orders.

Development Phases:

1. Planning and Design: Define requirements, create wireframes, and design the system architecture.

2. Development: Build frontend and backend components, integrate features, and conduct testing.

3. Deployment: Deploy the application to a production environment and monitor performance.

4. Maintenance and Updates: Regularly update the system with new features, security patches, and bug fixes based on user feedback and usage analytics.

So in our Final Year project By developing "Appetizer," you can significantly improve the cafeteria experience for employees, reduce inefficiencies associated with traditional order placement methods, and enhance overall workplace satisfaction.

CO-PO Mapping

Yeshwantrao Chavan College of Engineering Hingna Road, Wanadongri, NAGPUR - 441 110 Department of Electronics & Telecommunication Engineering CO-PO MAPPING (Session 2021-22)																	
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
VIII	ET2451 : Major Project	1	Design and analyze application based electronic systems.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		2	Implement core / multidisciplinary / industrybased electronics projects in cost effective manner.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		3	Communicate technical details effectively	3				3		3	3	3	3	3	3	3	3

APPENDIX I

INDUSTRIAL CERTIFICATE

Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

Department of Electronics and Telecommunication Engineering

Date: 25/09/2023

To,

Sanjay Panchdhane,
Manisha Systems,
2nd Floor, 54, Central
Bazar Road, Bajaj
Nagar, Nagpur,
Maharashtra 440010

Subject: Guidance for final year UG project in the department of Electronics and Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur

Respected mam,

We are the final year students of Electronics and Telecommunication Department, of Yeshwantrao Chavan College of Engineering, Nagpur. We are a group of 05 students we want to work on the project titled **"IoT Enabled Smart Cafeteria Management System".** We seek your guidance for the same. We request you to kindly accept our request for guidance of our project and it would be very great if you agree to be a industry co-guide for our project.
This letter is in accordance with the above request and is being sent with the consent of our project guide and HoD. Your acknowledgment for this collaboration would be highly appreciated.

Thanking you.

Projectees:

1. Pratyusha Balki
2. Tanishka Patel
3. Vedangee Gadgil
4. Rishikesh Jadhav

Dr. M. S. Narlawar
HoD ET Dept.

Project Guide:
Prof. Minal Patil

Manisha Systems
Career Designing Mantra

Date: 25/09/2023

Acceptance Letter for Project

To,
Head of the Department
Electronics &
Telecommunication, YCCE,
Nagpur.

Subject: Letter of acceptance of final year UG project.

Dear Sir,

I the Undersigned confirm my acceptance as a industry co-guide for the UG project titled **"IoT Enabled Smart Cafeteria Management System"** under the guidance of Project Guide name. I willprovide the necessary guidance for smooth completion of their project work.

Thanking You.

Name of the Students

1. Pratyusha Balki
2. Tanishka Patel
3. Vedangee Gadgil
4. Rishikesh Jadhav

MANISHA SYSTEMS NAGPUR

Sanjay V. Panchdhane

54, 2nd Floor, VNIT Road, Near Vodafone Store, Bajaj Nagar, Nagpur-440010.
Website : www.manishasystems.org Email : manishasystems.ngp@gmail.com

Manisha Systems
Career Designing Mantra

Date: 14/05/2024

Project Completion Letter

To,
Head of the Department
Electronics &
Telecommunication,YCCE,
Nagpur.

Subject: Completion of UG project

Dear Sir,

This is to certify that the following students of Electronics and Telecommunication department of Yeshwantrao Chavan College of Engineering have successfully completed final year project **IoT Enabled Smart Cafeteria Management System** for the academic session 2023-24.

Thanking You.

Name of the Students

1. Pratyusha Balki
2. Tanishka Patel
3. Vedangee Gadgil
4. Rishikesh Jadhav

Sanjay V. Panchdhane

MANISHA SYSTEMS NAGPUR

54, 2nd Floor, VNIT Road, Near Vodafone Store, Bajaj Nagar, Nagpur-440010.
Website : www.manishasystems.org Email : manishasystems.ngp@gmail.com

Yeshwantrao Chavan College of Engineering

Project Preliminary Investigation Report

Name of Department:

Electronics and Telecommunication

Name of Project Guide:

Prof. Minal Patil

Students Details:

Roll No.	Name of Student	Email ID	Mobile No.
20	Pratyusha Balki	pratyushabalki2712@gmail.com	8830287646
223	Tanishka Patel	tanishkapatel013@gmail.com	7721024516
227	Vedangee Gadgil	vedangee.gadgil02@gmail.com	9823697388
261	Rishikesh Jadhav	rishikeshjadhav21@gmail.com	9325229203

Title of the Project:

IoT Enabled Smart Cafeteria Management System

Area of Project Work:

Internet Of Things: PERN-POS Web Application development

Problem Statement:

First and foremost, both students and staff members are suffering greatly from the current system's inefficiencies and lengthy wait periods.

The institution may significantly cut these wait times by streamlining the ordering and payment procedures through an online platform, improving the cafeteria experience's overall effectiveness and convenience. This not only meets the immediate requirement for improved operations, but it also meets contemporary expectations for prompt, hassle-free service in a busy setting.

The suggested remedy also addresses a number of particular problems. Given their restricted availability between academic obligations, faculty members must have their orders delivered straight to designated tables with specific table numbers for a customized and effective dining experience.

Additionally, the decrease in errors along with real-time order tracking guarantees that orders are exact and prepared for pickup, reducing frustrations brought on by errors and improving transparency.

The solution's data and analytics component offer a chance for ongoing development by facilitating data-driven choices and better resource management. Additionally, the focus on cleanliness and safety through contactless ordering and payment methods coincides with modern health concerns, providing faculty and staff as well as students with a safer dining experience.

The need to solve inefficiencies, improve the customer and teacher experience, eliminate errors, use data for improvement, and sustain cleanliness and safety requirements drives the need for a solution to the cafeteria system problem. These upgrades not only meet immediate requirements but also establish the university as a progressive and competitive player in the campus food industry.

Prior Art (Patent Search):

Patent Application No.	Title of Patent	Existing Solutions (Abstract of Patent)
US10546344B2	Dynamically modifiable user interface	Examples are described for restaurant recommendation systems and methods for assisting a user or group of userswith discovering, locating, selecting, patronizing, and reviewing restaurants that match dietary restrictions/preferences and/or other contextual information for the user and/or group of users. In one embodiment, a restaurant recommendation system includes a communication interface for communicating with a user device of a user, a processor, and a storage device storing instructions executable by the processor to; compare user information including dietary restrictions of the user to restaurant information including menu items for a plurality of restaurants, select a restaurant from the plurality of restaurants based on menu items of the restaurant matching the dietary restrictions of the user, and provide a recommendation of the restaurant to the user.
KR102062888B1	System for Integration Management of Non-FacedFood Order Platform	The present invention relates to a system for integrally operating and managing a platform that a food ordered orders food in a non-face-to-face manner using a terminal capable of data communication and order application. Since the system enables an order to select or order food by searching a restaurant, a restaurant menu, and addition and deletion options of food materials by customizing with an order application installed in a cell phone or search, select, order, and pay for restaurant menu by a photograph of kiosk installed in restaurant, a tablet PC, or a QR code, the restaurant may reduce manpower for order and serving of food and enable quick food order and food reception by using order and payment for food and acquisition and use of points, stamps, and coupons in a non-face-to-face manner.
CA2883148C	Order delivery system and method	A method and system for tracking of a delivery of a menu item. The method includes receiving an order for the menu item from a customer interface, the order identifying a selected menu item and an address for the delivery; sending a request for preparation of the menu item; identifying an available delivery vehicle among a plurality of delivery vehicles; receiving a preparation completion notification indicating that preparation of the menu item has ended; dispatching the order for delivery, including an identification of the available delivery vehicle and the address; receiving a displacement notification indicating that the menu item is being displaced by the available delivery vehicle; retrieving geopositioned data representing a geographical position of the available delivery vehicle; sending a displacement notification to the customer interface including an indication of the geographical position of the available delivery vehicle.

Literature Review:

Title of Paper	Details of Publication with Date and Year	Literature Identified for Project
"Towards integrating IOT devices with theWeb"	10.1109/ETFA.2012.6489729 28 March 2013	IEEE
"Integration In thePhysical World In IoT Using Android Mobile Application"	14 January 2016	IEEE
"An IoT Based Smart Energy Management System"	December 2018	2018 4th International Conference on Computing Communication and Automation (ICCCA)

Current Limitations

1. User Adoption and Training: Introducing a new system may require a period of adjustment for both cafeteria staff and customers. Adequate training and support must be provided to ensure smooth adoption and minimize disruptions.
2. Maintenance and Updates: Over time, the system will require regular maintenance and updates to remain secure and functional. The institution must allocate resources and staff to manage these ongoing responsibilities.
3. Order Accuracy: While automation can reduce errors, there is still a potential for inaccuracies in orders, especially in cases where customization is allowed. Maintaining high order accuracy remains a challenge.

Proposed Solution

The proposed PERN stack solution seeks to completely overhaul cafeteria operations. The React.js-based user interface has a strong user authentication system for data protection. Online ordering and secure payment processing are convenient, and real-time order tracking increases transparency. Unique table allocations help faculty members by guaranteeing that food is brought to their tables.

With encryption and authorization checks in place, security is given first importance. Because of the system's capacity to scale, it can handle large order quantities during busy periods. For ongoing enhancement, a feedback mechanism encourages user participation. Staff at the cafeteria are equipped with an admin dashboard for effective management.

Regular upkeep and updates ensure durability, while extensive instruction and assistance make the move easier.

Objectives and Scope of Work

Objectives:

1. Efficiency Enhancement
2. Digital Transformation
3. Faculty-Focused Convenience

The scope of work for this cafeteria project is extensive and encompasses several crucial elements. It involves the development of a web-based cafeteria system using the PERN stack, emphasizing user-friendliness and efficiency in its design. Key functionalities include online ordering, secure payment processing, real-time order tracking, and a specialized feature for faculty members, offering table-specific delivery.

A pivotal aspect is ensuring the security of user data, payment information, and system integrity, while scalability is addressed to handle varying order volumes effectively. Furthermore, the scope extends to continuous maintenance, regular updates, and robust user support to maintain system reliability.

Feasibility Assessment:

I. Expected Outcomes of the Project

The anticipated outcomes of this project encompass the implementation of a highly efficient and user-friendly cafeteria system with online ordering and payment capabilities, resulting in improved customer satisfaction. Faculty members will benefit from a convenient table-specific delivery service.

II. Innovation Potential

A user- friendly interface with contactless payment option using smart watches/id card with automatic token generator for each order and ordering features such as voice assistance (Siri, ok google) based ordering in multiple languages.

III. Task Involved

- Development of prototype of project using P10(36x16) LED matrix board, node mcu ESP 32, RFC module,12 Volts DC power supply, WIFI card, prototype
- Next, we will interface our IoT based device with our web application with the help of RESTFULL API /WebSocket API with the module that will be operated with the web app we will develop.
- Testing for proper functioning and connectivity of components after embedding on pcb. Installing entire hardware component behind the P10 module and final checks for proper and expected output of the project to be done.

IV. Expertise & Facilities Required

Inhouse Expertise- for development of IoT interface hardware andsoftware both.
External Expertise- App and website environment development.

Inhouse and External facilities both relating to project hardware that includes sensors, P10, RF module, node mcu, connectors, supplies etc.

Milestones and Time Plan

	Task	AUG 2023	SEP 2023	OCT 2023	NOV 2023	DEC 2023	JAN 2024	FEB 2024	MAR 2024	APR 2024
Design	Conceptual Design	✓								
	Detailed design		✓							
	Design Modifications		✓							
	Final Design			✓						
Develop	Procurement (If any)		✓	✓						
	Prototyping			✓	✓					
	Modifications					✓				
Deliver	Testing and Validation					✓				
	Final Modifications						✓	✓		
	IPR / patent draft								✓	
	Thesis and Poster									✓

Name and Signature of Project Guide

Signature of HOD