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CALMA: A Personalized Android-based Salon Appointment Booking System

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Abstract

Amidst the hustle and bustle of modern life, discovering moments of calm and self-nurturing is a precious indulgence. The CALMA salon appointment application is a revolutionary solution designed to bridge the gap between tranquility and the beauty and grooming industry. The research aims to provide users with an intuitive, user-friendly, and informative platform that seamlessly integrates the technologies of Flutter, Figma, Firebase, Spring Boot, and MySQL. CALMA goes beyond being an application; it is a personalized beauty concierge that simplifies the journey of self-pampering. In a world where beauty and well-being are vital, CALMA seeks to redefine the way users connect with salon services. It empowers individuals to make choices that reflect their unique style and preferences while providing invaluable support to local salons. With CALMA, beauty meets tranquility, and the path to self-pampering is clearer than ever before. The research proposes an innovative way to use a customized Android-based system to expedite the booking process for beauty salon services. Calls or walk-ins are frequently used in the antiquated process of scheduling salon appointments, which can be ineffective and time-consuming. A smartphone application called CALMA is suggested as a solution to this problem. It enables users to quickly set up appointments, choose particular services, and get tailored recommendations based on their preferences and prior encounters. Through utilizing Android device capabilities and connecting them with backend salon administration systems, this solution seeks to increase user pleasure, boost salon productivity, and eventually change the way appointments for beauty services are made.

Keywords: Beauty salon, appointment system, android application, personalization, user experience, efficiency

INTRODUCTION

The need for a variety of salon services, from haircuts and styling to skincare treatments and massages, has led to a notable expansion in the beauty business in recent years. The procedure for making appointments at beauty salons is still primarily based on phone calls or in-person visits, even with this increase in demand [1]. This antiquated method frequently results in lengthy wait times, scheduling conflicts, and lost opportunities for clients and salon owners alike. Innovative solutions that use technology to improve the overall customer experience and expedite the reservation process are desperately needed to address these issues [2]. The proposed research offers an Android-based personalized service reservation system named CALMA for beauty salons that aims to transform appointment scheduling and management. Our solution seeks to offer consumers

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a smooth and customized booking experience while equipping salon owners with tools to enhance client satisfaction and optimize their operations by utilizing mobile technology and data-driven personalization approaches. CALMA is a personal entryway to a world of beauty and wellbeing, not just a tool for scheduling salon appointments. CALMA is an application that transforms how we interact with salons and take care of ourselves. It is powered by the dynamic combination of Flutter, Figma, Firebase, Spring Boot, and MySQL. The technologies used in our application are:

- *Flutter:* The core of our app, CALMA is built using Flutter, ensuring a responsive and delightful user experience. User can find that the app effortlessly adapts to their devices, whether they are on a smartphone or tablet.
- *Figma:* The beauty of users' digital experience begins with the eyes. The intuitive and visually appealing design of CALMA is crafted using Figma. Every element, every color, and every pixel is designed with taking users' interest in mind.
- *Firebase:* Data is at the heart of the proposed application and it is stored and managed with precision using Firebase. The android application, the salon appointments preferences and notifications are secure and seamlessly integrated into the CALMA experience.
- *Spring Boot:* The magic behind the scenes happens with Spring Boot. It handles the intricate dance of data, ensuring that users' appointments and the services they desire are just a tap away.
- *MySQL:* Data from nearby salons to appointment slots, is stored in a robust MySQL database. It is a digital treasure trove that ensures users' experience is as swift as it is serene.

The proposed system finds salons that are close by that have received excellent reviews with ease, to guarantee a delightful encounter. Get comprehensive information about salon service costs, encouraging openness and well-informed decisions. Examine each salon's whole menu of services; consider each one as a brushstroke on users' self-care painting. Locate timeslots that work well for users' schedule to make the booking process less stressful. Set aside the times that work best for users, so they can schedule their appointments for beauty and well-being in a way that suits their comfort level.

LITERATURE SURVEY

In prior studies on salon administration and reservation systems have mostly concentrated on PC and web-based solutions. Although these solutions have shown some degree of efficacy, they frequently fall short of the accessibility and convenience provided by mobile devices. Furthermore, in the salon reservation systems that are now in place, the idea of personalization, which is vital for improving customer engagement and satisfaction and has received comparatively little attention.

Deshmukh *et al*. designed an online application specifically for beauty salons [3]. Their aim was to digitize and streamline various aspects of salon management, such as appointment scheduling and product sales. The program offers several key features. Appointment scheduling allows customers to book their salon appointments online, reducing the need for phone calls and manual scheduling. Online product sales enable customers to purchase beauty products directly from the salon's website. Customer reviews provide valuable feedback for both the salon and its staff. Technologies used to build and support the program, technologies like MySQL and PHP are used for database management and backend functionality. WordPress is utilized for front-end development, providing a user-friendly interface for both customers and salon staff. Google Calendar integration facilitates efficient appointment scheduling and enhance the overall customer experience. By providing an easy-to-use online platform, the program aims to increase efficiency and customer satisfaction. By digitizing various aspects of salon management, Swapnali Beauty Parlor offers several benefits. It saves time for both customers and salon staff by eliminating manual processes. The ultimate goal of Swapnali Beauty Parlor is to provide a comprehensive online solution for beauty salons. By offering a range of features and leveraging modern technologies, the program aims to enhance the overall efficiency and effectiveness of salon operations.

Jamodkar *et al*. proposed an appointment system, and the purpose of the developing the "SalonSync Innovative Appointment system" was to facilitate commerce between salon service provider and the client who wants to avail the service [4]. It was a native Android application specifically designed for booking salon appointments. SalonSync primarily focuses on scheduling "haircuts" with various styles offered by expert hair stylist from the listed salons. The technologies utilized in SalonSync include Flutter for app development, firebase for real database and authentication for client validation. Additionally, if the client does not want to give his/her credentials then he can schedule the appointment as guest. SalonSync conducts a comparative study with previous existing systems such as SuperSalon (web/android/iOS), "MySalon Hair Studio" (web/android/iOS) and "JeffLee the hair company" web based application and make an appearance how their system fulfils the uniqueness of the system. They did not mention which SDLC method they used during the development the system; after reviewing the system development process, they followed the waterfall model because it is best for the small-scale project. They also mentioned the Functional Requirements and their functionality of the system and they depicted the Use Case and Class diagram of their system. In the implementation and testing phase, they showed how they implement and test their system. Testing is the process of finding as many as errors as possible in the provided system. SalonSync provides a special function to the administrator i.e., Manage Notification. In manage notification module, SalonSync allows the administrator to create and delete the notification; if there are any emergency updates, the administration can inform the client by using manage notification module.

Husna *et al.* proposed a system that responds to the growing trend of online businesses and the increasing demand for spa services [5]. It aims to simplify the process of booking spa appointments through an intuitive online platform. The system was identified as a web-based spa management application with booking scheduling capabilities. It emphasizes the convenience for both clients and spa owners, allowing them to manage appointments and track customer satisfaction effectively. The methodology involves four main phases: Admin, Customer, Owner, and Stylist. Admin Phase manages the entire system and acts as a bridge between customers, spas, and stylists. Customer Phase allows customers to register, browse services, make reservations, and provide feedback. Owner Phase enables spa owners to register their businesses, manage employees, access customer data, and handle invoices. Stylist Phase facilitates stylists in managing appointments and working hours according to client requirements. Their system utilizes ASP .net technology, follows MVC architecture, and uses Visual Studio for development. The backend is supported by Microsoft SQL Management for data storage.

Application Design: The system is designed using programming languages such as C#, HTML, CSS, and SQL. It includes database design, user interface design, and reservation functionality. The user interface allows customers to register, login, select services, and make payments. The system enhances user experience by providing a seamless booking process and convenient payment options. The Online Spa Booking System offers a convenient and efficient way for users to book spa appointments online. It saves time and effort for both customers and spa owners, enhances service delivery, and encourages customer feedback and engagement.

Vaishali and Aarti highlight in their research about the inefficiencies of traditional salon management methods, including manual appointment scheduling, customer management, and resource allocation [6]. These methods often lead to errors, delays, and customer dissatisfaction. They proposed Smart Hair Salon Management System which is based on an embedded system architecture, which integrates various hardware and software components to automate salon operations. It utilizes microcontrollers (specifically the AT89c51), GSM modules, RTCs, LCD displays, 4×4 keypads, and personal computers. Their system aims to streamline processes such as appointment booking, customer registration, service allocation, and real-time monitoring of salon activities. The AT89C51 microcontroller serves as the main control element, providing processing power and interfacing with other hardware components. The GSM module facilitates communication between the salon and customers via SMS messages, allowing for appointment scheduling and notifications. The MAX 232

acts as a logic level converter, enabling communication between the microcontroller and GSM module. The LCD display provides visual feedback to customers and staff regarding salon schedules, service availability, and other relevant information. The RTC ensures accurate timekeeping for scheduling appointments and managing salon operations. Their system undergoes rigorous testing to validate its functionality, reliability, and scalability under various operating conditions. Their Smart Hair Salon Management System represents a promising solution for addressing the challenges faced by traditional salon management methods. By integrating advanced hardware components with robust software programs, the system offers comprehensive solutions for streamlining salon operations and improving customer satisfaction. Further research and development efforts can focus on enhancing system functionality, compatibility with additional hardware platforms, and addressing emerging trends in salon management technology.

The research paper by Alamsyah *et al*. focuses on the development and functionality of the “Get Haircut” Application, an Android-based application designed to address the increasing challenges faced by salons and barbershops in handling customer orders and transactions [7]. The application is built using the React Native framework and PHP programming language. It aims to simplify the process of receiving orders from customers online and managing queue number data, service data, and related information. The Rational Unified Process (RUP) development method is utilized in creating the application. The paper highlights the rapid growth of mobile technology and the increasing use of Android-based smartphones, emphasizing the need for reliable and efficient mobile applications. It also discusses the challenges faced by the salon and barbershop business in Cirebon, particularly in managing customer queues, uncertain waiting times, and the impact of the pandemic on business operations. Furthermore, the implementation process of the application is outlined, including instructions for customer use. The authors discuss the potential benefits of the "Get Haircut" Application in enhancing digital marketing for salons and barbershops and increasing revenue. The paper concludes by highlighting the potential of the application to facilitate customer access to salon and barbershop services. Overall, the paper provides a comprehensive overview of the development process and functionality of the "Get Haircut" Application, addressing the specific challenges faced by salons and barbershops in managing customer orders and transactions.

Wenny’s research focuses on addressing the challenges faced by beauty salons during the COVID-19 pandemic, particularly the risks of virus transmission to both customers and staff [8]. The study implemented a digital service program at Melati Salon & Sulam, which offers semi-permanent makeup, to accommodate social distancing requirements while prioritizing customer convenience. Their research introduced an online booking appointment system using the Setmore platform, leading to an increase in the number of online bookings and improved work efficiency for employees. The study highlights the transformation of people's lifestyles due to the pandemic, with a significant portion of the Indonesian population utilizing digital services. Their research utilized observational techniques, interviews, and documentation to gather information from Melati Salon & Sulam. The project involved training employees and implementing the online booking system, which was designed and explained in detail using the Setmore application program. Their findings demonstrate that customers found it easier to book services without having to wait for a response from the salon's admin, leading to increased satisfaction. The use of the WhatsApp Business Account further improved the performance of replying to admin chats, and a landing page was created to provide a comprehensive link for the salon's business tools.

The research paper by Qaffas and Barker presents the development and evaluation of an innovative online appointment management system tailored for higher education institutions [9]. The system aims to streamline the appointment-setting process, offering convenience and efficiency to students, lecturers, and staff members. Extensive research into web application development and existing appointment management systems, laying the groundwork for the project. Thorough analysis of data requirements and system architecture, ensuring user-friendly design and seamless functionality.

Implementation of intuitive web pages for registration, project selection, and appointment booking, with rigorous testing to ensure reliability and usability. Comprehensive system evaluation involving real users and field studies, providing valuable insights into performance and user satisfaction. Future considerations for system enhancement and integration with existing university infrastructure. In essence, this system represents a significant advancement in appointment management within higher education, offering a modern solution to traditional scheduling challenges. Its user-centric design and robust functionality promise to revolutionize the appointment experience for students and faculty alike.

Anjarsari and Farida proposed their study that aimed to develop an Android-based reservation system using Rest API technology to address inefficiencies in beauty salon bookings, with a focus on enhancing customer experience and operational efficiency [10]. The waterfall model was employed, encompassing requirement analysis, system design, implementation, testing, deployment, and maintenance stages. The developed application streamlines the reservation process, offering an intuitive interface for customers to book and pay for services online. Functional tests were conducted to identify and rectify potential issues, ensuring the application's reliability and performance. Despite successful implementation, the system lacks certain features such as a flexible cancellation mechanism and integration for customer feedback, which could enhance user satisfaction and salon evaluation. Future iterations should prioritize the addition of advanced features such as flexible cancellation options and mechanisms for collecting customer feedback and salon ratings. Continual improvement and refinement of the application are essential to address existing shortcomings and meet evolving user expectations. Their study presents a significant advancement in the beauty salon industry through the development of an efficient reservation system. While successful in its implementation, further enhancements are warranted to optimize user experience and support the industry's continued growth and development.

Malik and Marat, in their research explain how they developed the Less-ON mobile app [11]. They utilized Lean UX methodology to ensure a user-centered approach throughout the process. The authors created distinct versions of the app for teachers and students, focusing on key user interactions such as logging in, navigating menus, messaging, and managing profiles. By prioritizing these interactions, the researchers aimed to deliver an intuitive and seamless user experience. They evaluated the prototypes using the System Usability Scale (SUS), a well-known metric for assessing usability. The SUS scores indicated that the app demonstrated good usability, confirming the effectiveness of their design approach. Furthermore, the authors carefully analyzed feedback from testing sessions and incorporated it into iterative improvements of the user interface. They also referenced various studies and methodologies related to user experience design, usability testing, and mobile app development, enriching the discussion with insights from the broader research landscape. In summary, the researchers emphasize the importance of prioritizing user needs and preferences in the design process, highlighting the iterative nature of user interface refinement and the significance of leveraging established methodologies for evaluation and improvement. Through their comprehensive exploration of the Less-ON development process and adherence to user-centric design principles, the authors offer valuable insights for practitioners and researchers in the field of mobile app design and development.

Junghwan’s paper talks about how colors affect the way people in India buy things [12]. It says it is really important for companies to understand what colors Indian people like so they can sell more stuff and make customers happy. Even though it does not talk about a specific system like CALMA, it says that when businesses choose colors for things like booking appointments at salons, they should think about Indian culture. This means picking colors that Indian people like and understand. The paper also says there are some problems with how colors are used now, but it gives ideas on how to fix them, especially by understanding how colors make Indian people feel. It says that if companies use the right colors, it can make Indian customers like their products more and want to buy them. It also talks about how different cultures see colors differently and how this affects what people buy. Overall, this research is helpful for companies that want to do well in India. It gives them good ideas on how to make products that Indian people will like and buy, which can help them do better in the Indian markets.

Maged *et al.*, in their research, proposed an adaptive e-learning system using semantic web technology to recommend personalized learning content to learners [13]. The system addresses the limitations of traditional e-learning by providing relevant and adaptive learning experiences. The proposed system combines content-based filtering and collaborative filtering techniques to overcome the cold start problem and improve recommendation accuracy. It employs two systems: one for initial course recommendations and the other for ongoing progress tracking and evaluation. The research demonstrates the effectiveness of the proposed approach through experiments in a seaport's training context, resulting in a significant reduction in training time. The system improves information retrieval and enhances e-learning experiences by converting the search technique from syntactic to semantic search. The research contributes to the field of adaptive e-learning by providing a solution that improves the relevance and effectiveness of learning content recommendations using semantic web technologies.

METHODOLOGY

Requirement Analysis

Identify and document the specific requirements of the application, including user stories, features, and functionalities. Conduct market research to understand user preferences, competition, and industry trends.

Design Phase

Utilize Figma for UI/UX design. Create wireframes and mockups for the application's user interface. Ensure a visually appealing and intuitive design.

Development

Use Flutter for front-end development. Implement the user interface based on the Figma designs. Employ Spring Boot for back-end development. Develop the server-side logic, API endpoints, and database connections. Utilize Firebase for implementing push notifications for reminders and updates.

Deployment

Deploy the application on a web server or cloud platform to make it accessible to users. Ensure scalability and reliability in the production environment.

Data Management

Use MySQL for database management: Store and manage user profiles, salon data, appointment records, and reviews.

User Engagement

Implement strategies to engage users. Send push notifications for appointment reminders, promotions, and updates. Gather user feedback to continually improve the application.

Security Measures

Implement security protocols. Ensure data privacy and secure transactions. Employ encryption for sensitive data.

Continuous Improvement

Use data analytics to monitor user behavior, track booking trends, and identify areas for enhancement. Regularly update the application to address user feedback and provide new features.

Marketing and Promotion

Develop a marketing strategy to increase the visibility and user adoption of the application. Use digital marketing channels and social media platforms to promote CALMA. This methodology, based on Spiral software development principles, will help you efficiently plan, develop, and manage the CALMA salon appointment application.

PROPOSED SYSTEM

System Architecture

In the proposed system, users are presented with a streamlined interface crafted using Flutter, facilitating effortless discovery and booking of salon appointments. Seamlessly integrated, Spring Boot manages the robust backend operations, ensuring efficient processing of user interactions. Crucial data, including user profiles and salon information, is securely stored and managed within MySQL. Firebase enhances user engagement through timely push notifications for appointment reminders. Hosted on Azure, the platform offers scalability and reliability to accommodate varying user demands. User authentication is fortified using JWT, ensuring secure access. Figma aids in the creation of an aesthetically pleasing user interface. Continuous refinement is driven by data analytics, while encryption fortifies data security, exemplifying our commitment to a professional and user-centric salon booking experience. Here is the procedural explanation of system architecture as shown in Figure 1.

- *Front-end development with Flutter:* Provides an aesthetically pleasing and intuitive user interface. Ensures a seamless user experience for booking salon appointments.
- *Back-end Logic with Spring Boot:* Handles server-side logic and API endpoints. Manages efficient data processing and retrieval.
- *Database Management using MySQL:* Facilitates storage and retrieval of crucial data, including user profiles, salon information, appointments, and reviews.
- *Push Notifications with Firebase:* Enhances user engagement through timely appointment reminders and updates.
- *Hosting on Azure:* Offers scalability and reliability to meet varying user demands.
- *User Authentication with JWT:* Ensures secure access using phone numbers as credentials.
- *UI/UX Design with Figma:* Enables the creation of visually appealing and user-friendly interfaces. Continuous Improvement through Data Analytics: Monitors user behavior and preferences for ongoing enhancement of the system. Security Measures including Encryption: Safeguards sensitive data and transactions, ensuring data privacy and integrity.

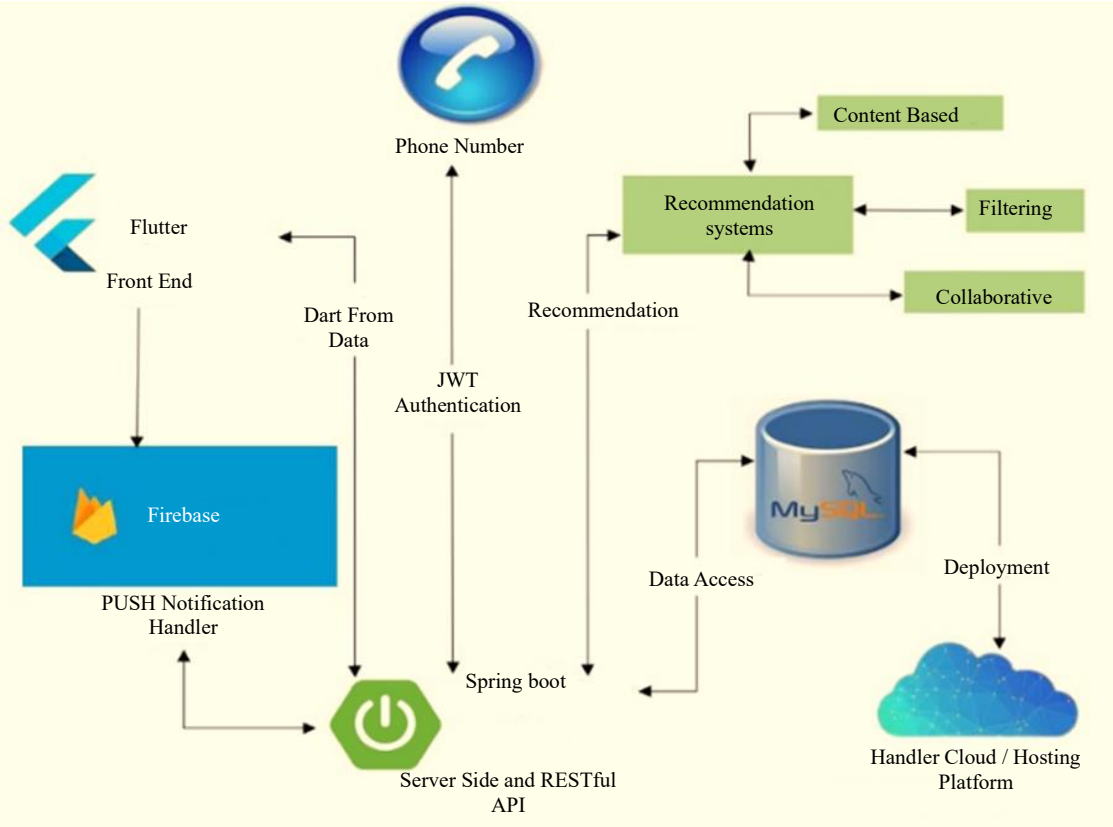

Figure 1. System architecture.

Use Case Diagram

CALMA an innovative appointment booking system contains 11 main use cases as shown in the Figure 2. They are: login, services, schedule appointment, select services, confirm appointment, receive confirmation, push notification, payment, rating, cancel appointment and update system. The system druggies include salon staff, developers and customers. Each of the druggies interacts with the use case to show the connection and limitations of the system features. It illustrates the interactions between the system and two types of actors: customers and salon staff.

Customers Entity

Schedule appointments (both new and existing customers) can select services, confirm appointments, cancel appointments, update their information (existing customers only), receive appointment confirmations and push notifications, rate the salon and its staff, and pay for services (possibly through the system).

Salon Staff Entity

Schedule appointments, access and manage services, view and manage appointments, receive payments and push notifications.

Developer Entity

Makes new updating.

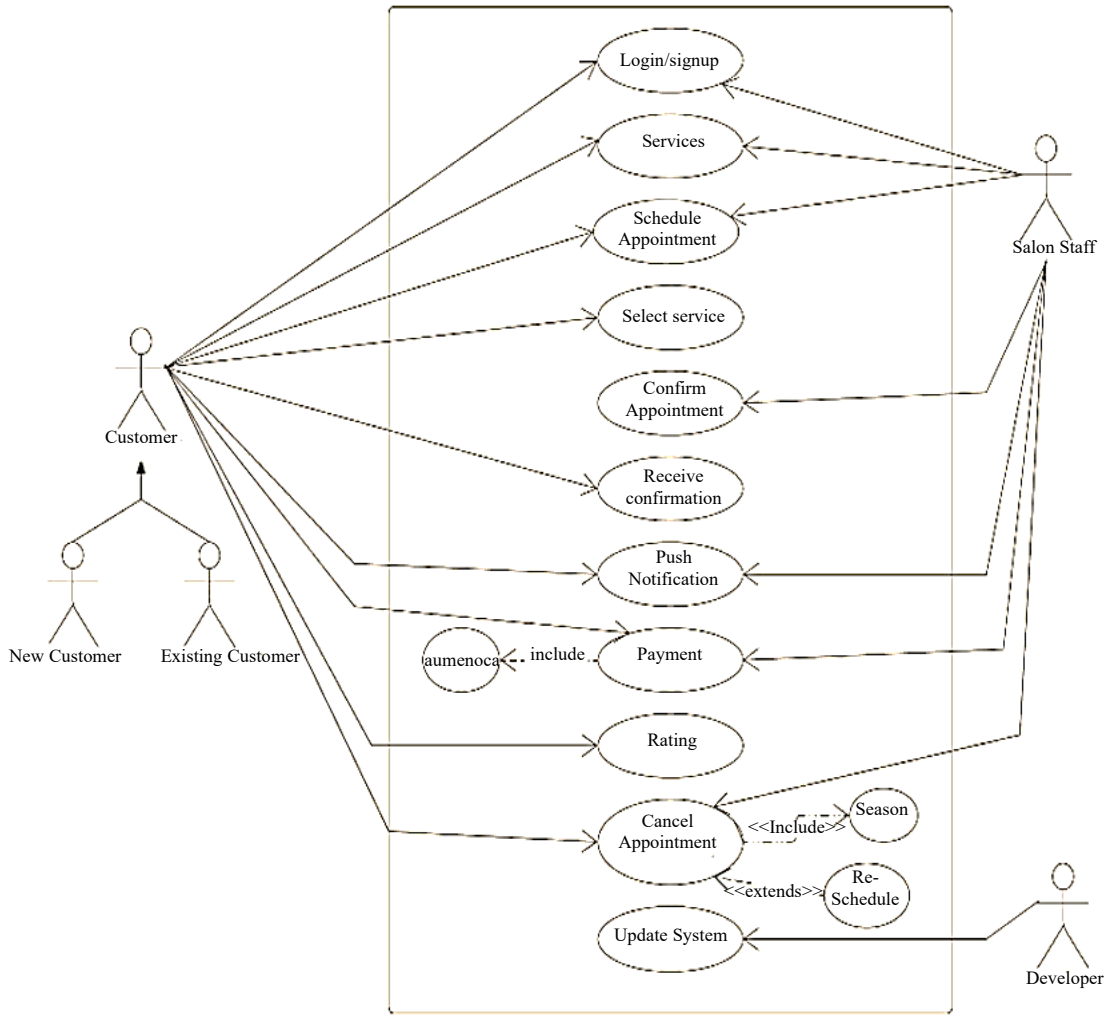

Figure 2. Use Case diagram of the proposed system CALMA.

USER INTERFACE AND RESULT

The CALMA application begins with a Splash screen displaying its name, then swiftly transitions to the Login screen where users can easily sign in as shown in the Figures 3 and 4.

Once logged in, users are directed to the Home Screen, featuring some offers and a comprehensive list of services like haircuts and facials. Beneath these offerings, users find a collection of nearby salons for convenient selection. The bottom navigation bar, positioned for easy thumb access, facilitates seamless navigation across the app. It features some options such as a search button for exploring services and an Appointments button for accessing user's appointment history. Additionally, the Profile button within the navigation bar offers access to a variety of options, including favorites, settings, location info, and user information which enhances user control and customization as shown in Figures 5 and 6.

After selecting a salon or service, users are directed to a dedicated details page presenting comprehensive information, including pricing of the services offered by the salon. When users decide to book an appointment, they are guided through an easy process. Clicking the "Book Appointment" button leads them to a dedicated page featuring a user-friendly calendar UI, where they can effortlessly select their preferred date and time, contingent upon availability as shown in Figures 7 and 8.

After selecting the date and time, users confirm their appointment. Then they see a summary of the appointment, including date, time, services, and total cost. They choose a payment method like 'GooglePay' or 'PhonePe', complete the payment, and the appointment is booked smoothly as shown in Figures 9 and 10. This seamless experience streamlines the booking process, ensuring users can easily schedule appointments at their convenience. In this manner, the CALMA application offers users a seamless and convenient experience from start to finish, prioritizing the user experience throughout the entire process.

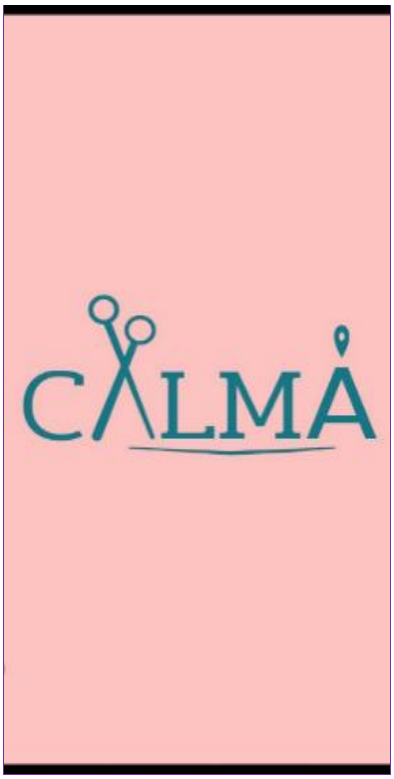

Figure 3. Splash screen.

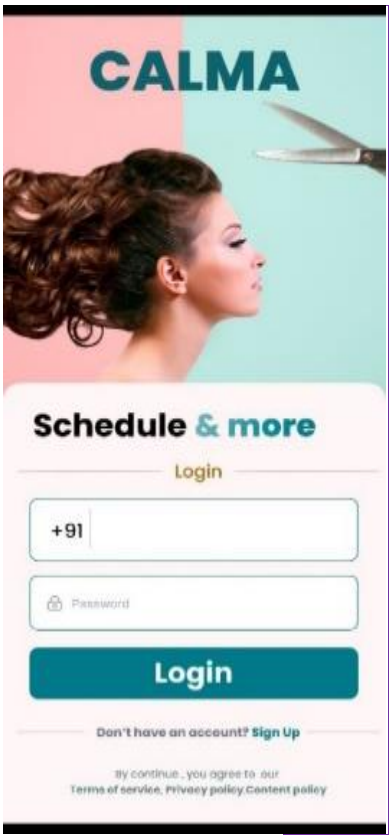

Figure 4. Login screen.

Figure 5. Home screen.

Figure 6. Profile page.

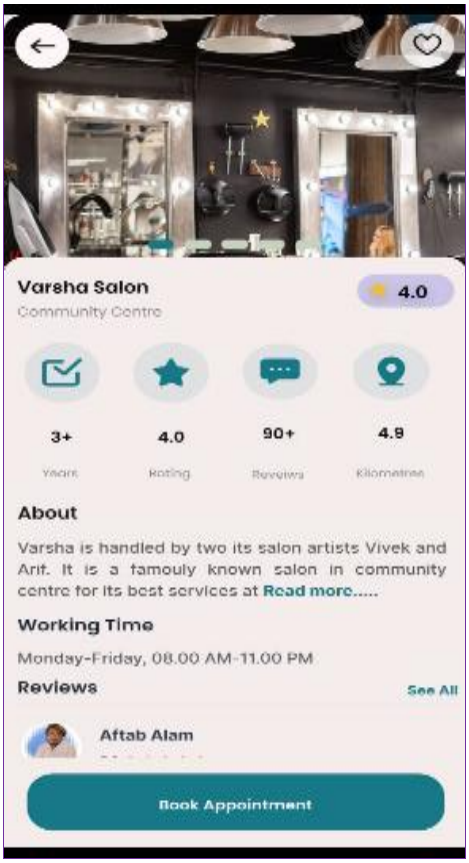

Figure 7. Home screen.

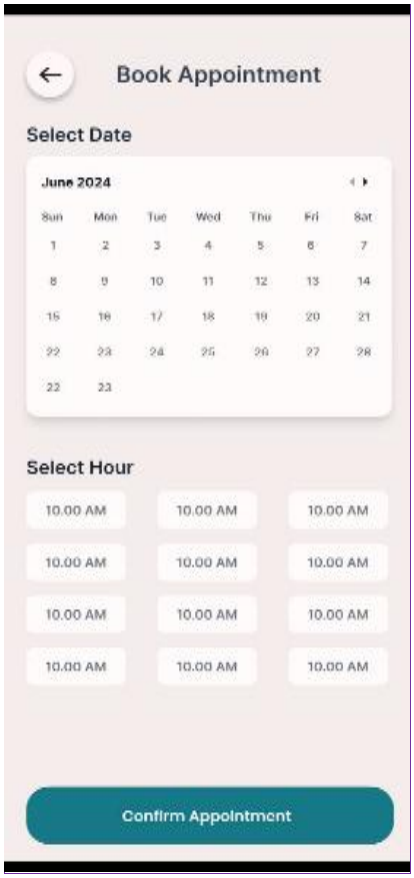

Figure 8. Profile page.

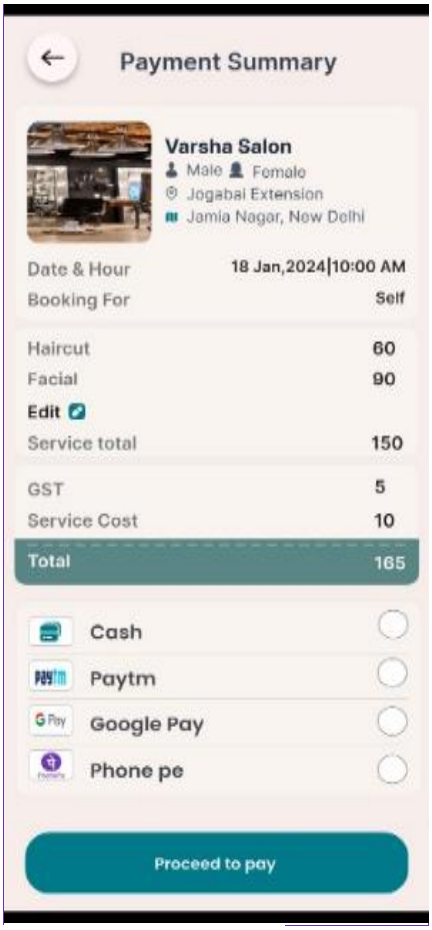

Figure 9. Home screen.

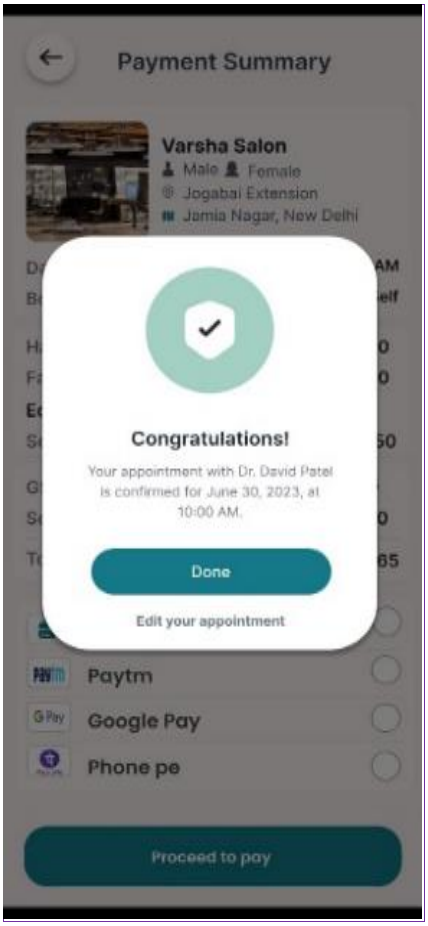

Figure 10. Profile page.

ADVANTAGES AND CHALLENGES

There are various benefits to the autonomous mobile-based salon appointment booking system [14, 15].

- *Convenience:* CALMA allows users to easily search for nearby salons, and book appointments online at range of available time slot, saving time and effort.
- *Transparency:* Users can access detailed pricing information for salon services, promoting transparency and informed decision-making.
- *Reliability:* CALMA utilizes a robust tech stack, including Firebase, Spring Boot, and MySQL, ensuring the security and reliability of user data and appointments.
- There are some challenges to the autonomous mobile-based salon appointment booking system.
- *User Adoption:* Encouraging users to switch from traditional booking methods to a new app can be challenging. CALMA will need to effectively market its benefits and build a strong user base.
- *Data Privacy and Security:* Handling user data responsibly is crucial. CALMA will need to implement robust security measures to protect user information and comply with data protection regulations.
- *Scalability:* As CALMA grows in popularity, it will need to ensure that its infrastructure can handle increasing user traffic and data volumes.

CONCLUSION AND FUTURE WORK

In conclusion, the development of a personalized Android-based salon appointment booking system offers promising opportunities for enhancing the efficiency and convenience of salon operations. The suggested method seeks to increase customer pleasure, expedite appointment scheduling procedures, and eventually support the expansion and prosperity of salon enterprises by utilizing mobile technology and customized features. Subsequent investigations could concentrate on augmenting the functionalities

of the system, incorporating supplementary attributes like online consultations and prognostic analytics, and carrying out extensive implementation and assessment trials to verify its efficacy in actual salon settings. In the fast-paced world of beauty and grooming, CALMA is a game-changer. It combines technology with tranquility, using Flutter, Figma, Firebase, Spring Boot, and MySQL to revolutionize how people connect with salon services. It is more than just an app; it is like having a personal beauty assistant. CALMA focuses on making things easy for users, from finding and booking appointments to managing them effortlessly. It also helps local salons grow by connecting them with more customers, boosting the local economy. With clear pricing and service details, CALMA builds trust with users and makes beauty services accessible to everyone. In today's digital age, CALMA fits perfectly with what people want: easy, hassle-free solutions for their beauty needs. That is why it is becoming a top choice for many.

In future work it intends to incorporate features such as real-time chat help, and predictive analytics for demand forecasting to further improve the system's capabilities. It is also wanted to investigate potential avenues for growing the platform to include more beauty-related activities including spa services, manicures, and makeup. All things considered, we think that sustained innovation in technology-driven salon management systems will be essential to determining the direction of the beauty business and promoting long-term expansion.

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