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Connect Me – Mobile App for Campus

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A B S T R A C T

The main goal of this project is to add mobility and automation to the student data management process of the educational institution. In a real-world setting, such as a college campus, information is in the form of notices, a handwritten handbook, or a verbal message that is distributed among students. Today, it is essential to use not only predictable forms of pronunciation but also new forms such as mobile phone technology to facilitate faster and easier communication between students. The communication method is Android. The main idea of this project is to implement an Android-based Mobile Campus application for the development of an educational institution and educational system. The application is used by students, teachers and parents. In the previous system, all information had to be viewed in a hard file or on a web page. At the same time, if you are looking for any information, it is too difficult to get it and it takes a lot of time to search for a specific website. Therefore, an application based on a smartphone using Android can be used to solve this problem, making this process easier, safer and error-free. This system provides more effective information. Once sensitive data is stored on the device, apps can ensure it's kept secure by encryption. Applications also exchange sensitive data with remote servers. The Android platform offers several algorithms for encrypting sensitive information. Some of these algorithms offer stronger cryptographic guarantees than others regarding data protection. Encryption algorithms are harder to break if there is more unpredictability in the random numbers generated for encryption. One way to bring unpredictability to Android is to use the Secure Random class. The need for encryption is twofold. First, encryption makes it difficult to read and use sensitive data stored by the application on the device. Second, encryption adds additional protection to sensitive data exchanged between applications and the remote server.

Keywords: Android , mobility, encryption, secure random.

1.INTRODUCTION:

In this era of mobile technology, most of our work depends on smartphones and their applications. Mobile apps provide clear solutions to many daily activities such as online food ordering, transportation, hospitalization and so on and provide convenience to users. Smartphones have simplified our lives by making us experience everything we need at our fingertips. We have come up with an application that meets the needs of students and faculty in the current market structure, using modern technologies such as Java, smartphone operating system, global positioning systems, etc to provide various solutions to the needs of the students in a university campus. "Mobile Website Based Android Application for Students" is an Android application that connects students and faculty with the university primarily through smartphones. The application has features such as homepage, about usop[]\45, research, education and training, incubator, information center, contact us, chatbot, navigation, news and notifications, view lecture notes, etc. Faculty members also have additional features such as sharing lecture notes and sending messages.

2. METHODOLOGY:

Students' campus life can be hassle-free by consolidating multiple functions under one platform. This app uses Gmail's integration with Firebase to authenticate users, for educational use only. The program also has an open Q&A forum to help students and teachers communicate. Use Firebase Cloud Messaging (FCM) to deliver real-time notifications and target users to students. Navigation is carried out with a GPS-based system that helps to find routes to different places on campus and is carried out using augmented reality as well as conventional navigation and a responsive chatbot for instant assistance, fostering seamless communication and convenience for students and teachers.

Module wise flow of the proposed system:

1.Login Screen: This function controls the behavior of the home screen, which is the home screen of the application. This screen has a login button that uses Gmail login with Firebase authentication.

2.Q&A Forum: This is an open forum where users (students/faculty) can ask questions. These questions can be answered by the student or the lecturer. The forum has fields like title, category, link (optional), question description.

3.Campus map: Campus map is done with the help of 3D model and 2D model for the direction. The campus map is a user centric application designed to facilitate seamless navigation across university campuses.

4.Chatbot: Developing a chatbot involves defining its purpose and capabilities, integrating natural language processing and backend systems for seamless interactions, and prioritizing user-friendly design. Thorough testing, optimization based on user feedback, and deployment to the chosen platform are crucial for a successful chatbot implementation.

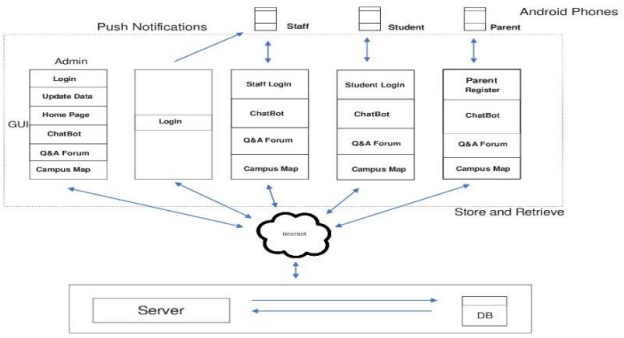

Fig 2.1: Methodology flow diagram

3.SYSTEM DESIGN:

3.1 Architecture Diagram:

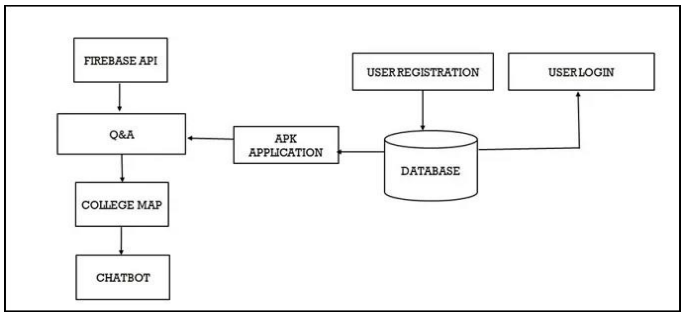

Fig 3.1.1: Architecture Diagram

The app's backend is powered by Firebase, which supports user registration, login, and data storage. Users can register and log in, with their credentials stored securely in Firebase. The app includes a Q&A feature where users can post and respond to questions, with all information stored in Firebase's database. The APK is the Android package file for distributing and installing the app. The app itself interacts with Firebase for authentication and data retrieval, and may also display a college campus map and offer a chatbot for user interaction. The Firebase Realtime Database stores all relevant data, ensuring seamless functionality across the app.

3.2 Usecase diagram:

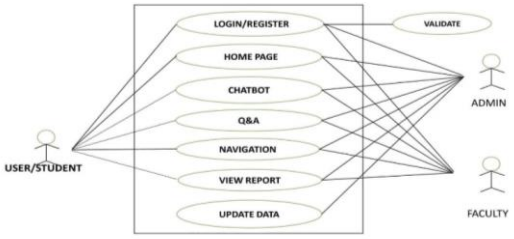

Fig 3.2.1: Usecase diagram

The system features three main actors: Users/Students, Faculty, and Admin. Users can log in, view their reports, and update personal data. Faculty members have similar access but can also update student data. The Admin oversees the system, managing user registration, validation, and overall administration. Key use cases include Login/Register, Home Page navigation, report viewing, data updating, a chatbot for assistance, a Q&A forum for user interaction, and user information validation. The interactions between these actors and use cases are depicted by lines, illustrating their roles and activities within the system.

3.3 Activity diagram:

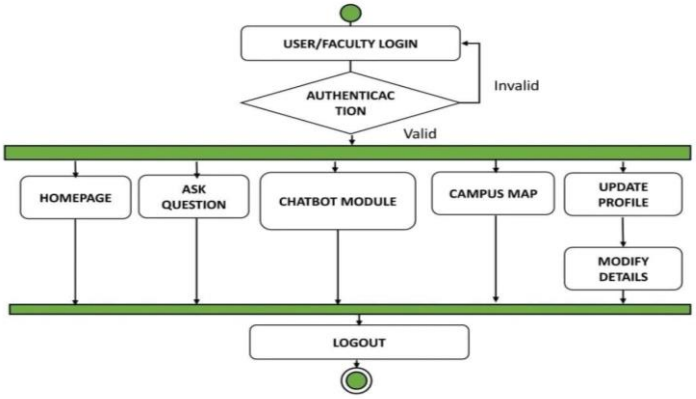

Fig 3.3.1 Activity Diagram

The activity diagram outlines key user interactions within the system, focusing on user login and profile updates. Users start by entering their credentials for authentication; if successful, they proceed to the homepage, otherwise, they retry logging in. Once logged in, users can update their profile information, which the system saves, and then log out. Additionally, users can navigate to activities for asking questions, interacting with a chatbot, and viewing a campus map, each facilitating different aspects of user engagement within the application.

3.4 Block diagram:

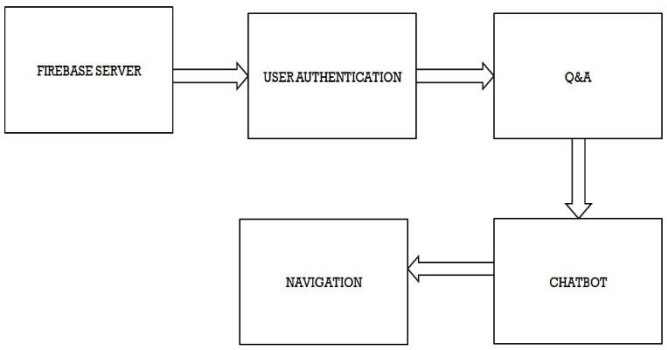

Fig 3.4.1 : Block diagram

The block diagram presents a high-level overview of a web application built on Firebase, a backend-as-a-service platform offering authentication, databases, storage, and analytics. It includes user authentication through traditional and social logins, navigation menus and links for seamless user movement within the app, a Q&A feature for user interactions and obtaining answers, and a chatbot for simulating conversations to provide support and answer queries. This setup highlights the integration of Firebase with key functionalities to deliver a cohesive and interactive user experience.

3.5 Sequence diagram:

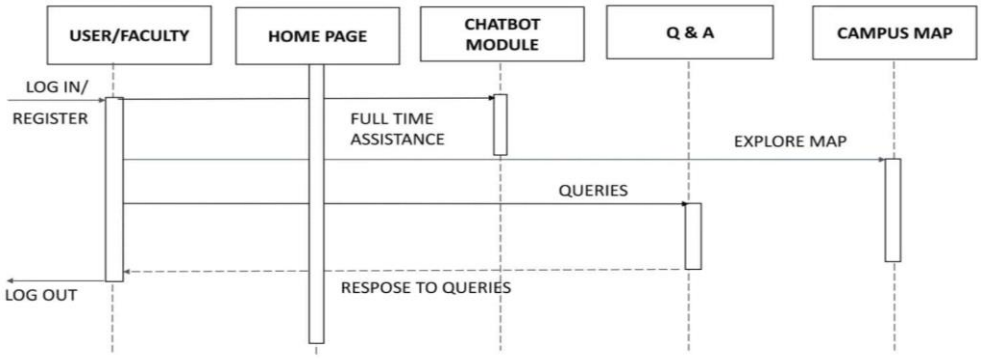

Fig 3.5.1: Sequence diagram

The sequence diagram details the login process for a web application involving several system components: User/Faculty, Web Browser, Web Server, and Database. The user starts at the login/register page, enters their credentials, and the web browser sends this information to the web server. The server forwards the credentials to the database for validation. If the credentials are valid, the database sends a success message back to the server, which then prompts the web browser to display the homepage. If the credentials are invalid, a failure message is sent back to the web browser, which then displays an error message to the user.

3.6 Dataflow Diagram:

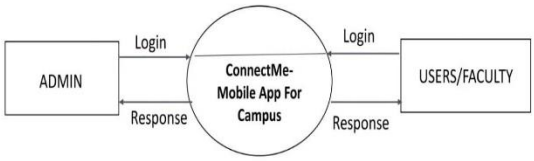

Fig 3.6.1: Level 0 DFD

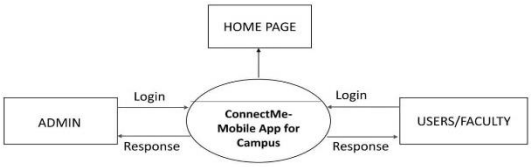

Fig 3.6.2 Level 1 DFD

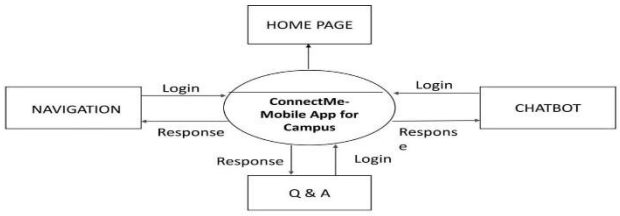

Fig 3.6.3 Level 2 DFD

1.Level 0 DFD: In the fig 3.6.1 for the ConnectMe mobile app illustrates how data moves through the system, focusing on basic communication within a college campus. Key components include the Admin, who manages the app via a separate interface, and the central ConnectMe Mobile App for Campus. Users and Faculty must log in to access app features, with login credentials presumably stored in a database (not depicted in the DFD). The system processes login requests and responds by granting or denying access, facilitating secure user interaction with the app.

2. Level 1 DFD: In the fig 3.6.2 ConnectMe mobile app depicts how data flows within the system, highlighting its process components for a college campus communication app. The diagram centers on the ConnectMe Mobile App, with two primary user categories: Users and Faculty, who must log in to access features. The Admin manages the app via a separate interface. Login credentials, though not shown in the DFD, are stored in a database. The system processes login requests and responds by granting or denying access, ensuring secure interaction with the app.

3. Level 2 DFD: In the fig 3.6.3 for the ConnectMe mobile app illustrates detailed data flow within the college campus communication system. Starting at the Home Page, users must log in, with credentials verified by the system (stored in a database not shown). From the Home Page,

users can navigate to the Chatbot or Q&A features. The Chatbot interacts with users, answering questions and providing customer service, while the Q&A section allows users to ask and receive answers to questions. The system responds to user actions by providing information and completing tasks through these features.

4.HOW DOES THE SYSTEM WORKS?

The Firebase Realtime Database lets you build rich, collaborative applications by allowing secure access to the database directly from client-side code. Data is persisted locally, and even while offline, Realtime events continue to fire, giving the end user a responsive experience. When the device regains connection, the Realtime Database synchronizes the local data changes with the remote updates that occurred while the client was offline, merging any conflicts automatically. The Realtime Database provides a flexible, expression-based rules language, called Firebase Realtime Database Security Rules, to define how your data should be structured and when data can be read from or written to. When integrated with Firebase Authentication, developers can define who has access to what data, and how they can access it.The Realtime Database is a NoSQL database and as such has different optimizations and functionality compared to a relational database. The Realtime Database API is designed to only allow operations that can be executed quickly. This enables you to build a great real-time experience that can serve millions of users without compromising on responsiveness.

5. CONCLUSION:

The implementation of the chatbot feature within the web application involves several key steps to ensure its functionality and usability. By creating a separate module specifically dedicated to the chatbot feature and leveraging vanilla JavaScript for the chatbot logic, we can design a robust and efficient system. Integrating Firebase for storing chat history, if needed, enhances the user experience by allowing users to view past conversations and resume interactions seamlessly. Designing the chat interface using HTML and CSS ensures a visually appealing and user-friendly experience. Implementing functionalities such as sending and receiving messages, handling user queries, and providing real-time responses enhances the interactivity and usefulness of the chatbot feature. The system offers reliability, time savings and easy control. Students and their parents will also view results, attendance and curriculum details using this application. Also students can view details, notifications anywhere and anytime. The application will greatly simplify and speed up the result preparation and management process. It provides high security and a system that reduces the work and resources required in traditional process. The proposed system provides the new way of computing and displaying an operations with responsive and attractive user-interface. Thus, on the basis of literature survey and by analyzing the existing system, we have come to a conclusion that the propose system will not only aid the automation to the college, but will also help to digitize the system and in turn help to deploy resources efficiently.

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