A

Project

On

Care With Curie : A Personal Healthcare Documentation App

For the partial fulfillment of the Course

Solving problem with Design Thinking and Innovation (CBCA208)

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Abstract

There is a need for easily accessible and effective healthcare documentation to close the gap between patients and healthcare providers. CWC (Care With Curie) addresses this critical gap by providing a comprehensive digital platform designed to enhance patient data storage and sharing. The project highlights the primary problems with current healthcare systems, including scattered healthcare records.

We created an easy-to-use application that uses user-focused design methodologies and trendy software engineering techniques to overcome these challenges. Personalized report graphs, SOS, Reminder features, and Little Curie, as our app's AI, are some of the main features.

The application was optimized and enhanced by regular review cycles that included mentors and health care students.

Modular architecture was used in the implementation to guarantee reliability, safety, and relatively simple maintenance. To ensure an easy user interface, numerous tests were conducted to verify the functionality and design elements.

Contents

Introduction

1.1 Background

Most members of our group were biology students who opted for BCA. We have studied for a year or two to be doctors to help in healthcare. Although our paths changed, we still wanted to do so by initial motives, and hence the industry was chosen.[1]

We went through the Google App Store to see what services do current Healthcare Apps provide and to see if we get any idea to work on. We then observed the problem of scattered documentation. This is mainly because our own childhood vaccination certificates were missing. These were required during University Registration, so the issue was not so hard to figure out.

In our team, we have members of various specializations such as Cloud Computing, AI, Cyber security, and blockchain, and with that, the solution seemed feasible. We also thought of providing consultation through AI but after team meetings decided to drop that idea due to an overhead risk of a wrong prescription.

1.2 Problem Statement

CWC (Care With Curie) helps in solving of some big problems in the healthcare. First, it helps to fix the dispersed health records. Health-related information is spread across doctors, hospitals, and other treatment centers. We were unable to bind them to a single location.

Second, we often face difficulties in future treatments by losing important details about our health or by losing our health records for many reasons, including changing doctors and hospitals.[2] The CWC aids in the loss of information.

Third, CWC helps in accessing past health records. During travel or in an emergency, we often face a situation where we need our health records suddenly.

Care with Curie is a simple app in which we can store all our health records in one place. It also uses AI, which helps with health management. It makes the healthcare faster and easier for all.

1.3 Objective

Our Project is a Personalized Healthcare Documentation Application. In simple words, it is an Android app that allows users to store their personal as well as their families' Medical Documents. These can then be used in a matter of a few clicks in any case of emergency or at any hospital.[3]

They can also get notifications for medicine reminder or a message whether a given elderly or person suffering from chronic disease in their family has their medicine. User can also send an Emergency SOS to mentioned contacts in case of any medical emergency.

1.4 Target Audience

Users who will benefit from the project include individuals, families, doctors, clinics, health-tech companies, and insurance companies. People's personal health records and health management, along with that of their families, benefit the most. As they need an easier and accessible way of storing health records, this will be more beneficial for those suffering from chronic conditions, the elderly, or children with frequent medical support or care.

CWC will be beneficial for doctors and clinics by providing them with complete health records and past treatment of patients[3]. This will improve further treatment. In Health technology, companies that are developing innovative solutions for healthcare can integrate our app's AI-powered platform to enhance their services.

Using CWC, insurance companies can access health records accurately, which will help in efficient claiming processes and provide more personalized insurance plans. These groups are the main target audience, as they face challenges directly with dispersed, inaccessible, and lost health-related data. CWC will be user-friendly healthcare management solution for all.

Tools & Technologies Used

- **Front-end:**
    * XML
- **Backend:**
    * Java
    * Python
- **Database:**
    * Firebase Real-time Database
    * Firebase Storage
- **AI Model and Frameworks:**
    * Quantized ollama
    * MPAndroidChart
- **Tools Used:**
    * Android Studio
    * VS Code
    * Jupyter
- **Other:**
    * Google Cloud Platform
    * Figma
    * Canva

System Architecture / Design

3.1 Website/Application Structure (Sitemap)

The application workflow, as shown in Fig3.1 begins with a splash screen; then, based on the user's login status, the user is directed to the home screen if already logged in; otherwise, they are taken to a welcome screen. where the user was asked to log in or sign up[4].

Once logged in, users obtain the home screen, which is the central hub. From there, they can view the report, add documents (via camera or PDF), trigger an SOS alarm to send SMS notifications, interact with a chatbot for query handling, and update their profile information.

The document uploads were validated to ensure successful submissions. Finally, users have the option of logging out. All authentication and upload processes are managed securely through Google Cloud's Firebase services.

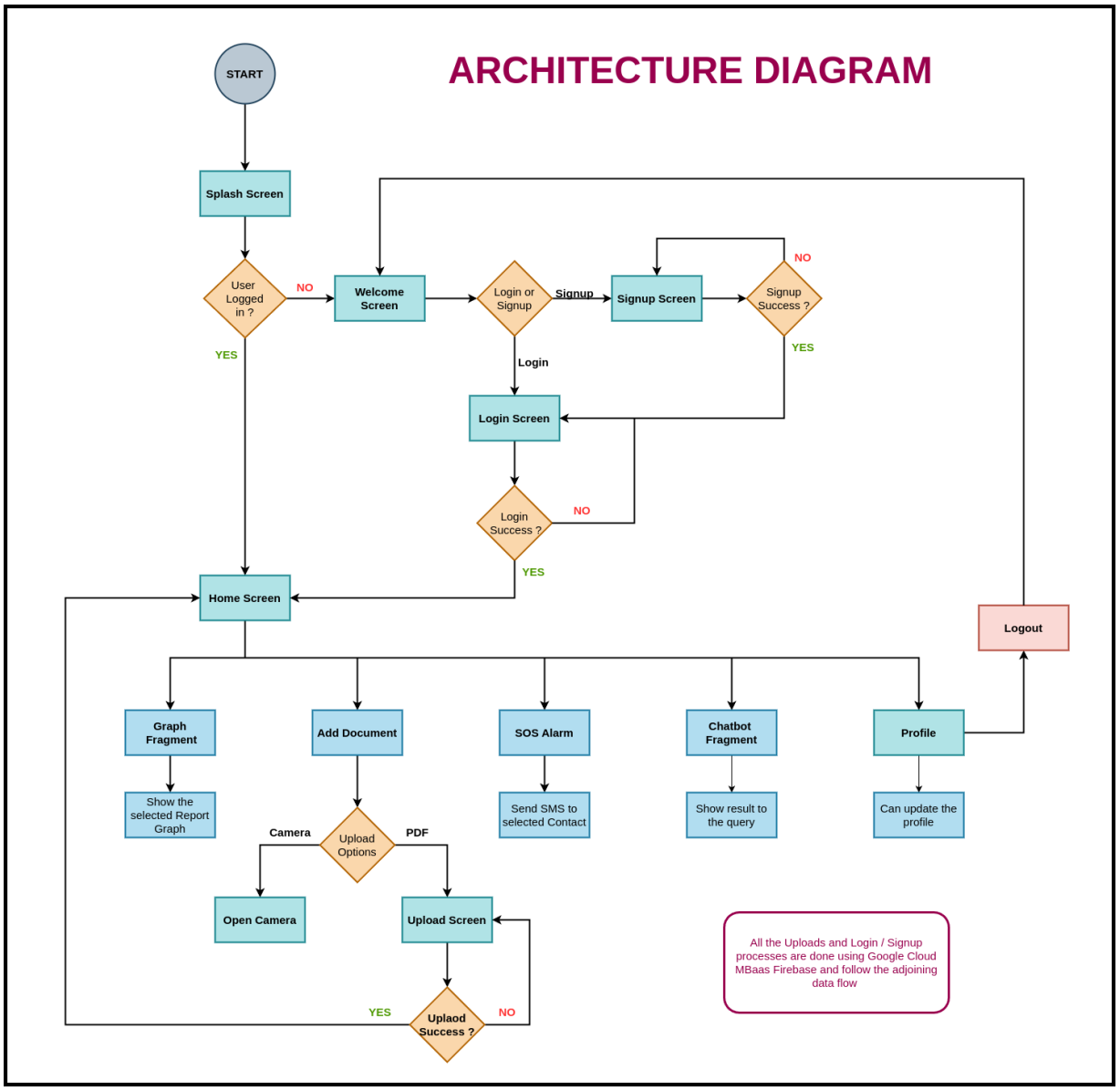

Figure 3.1: Application Architecture Diagram

3.2 Wireframes / Mockups

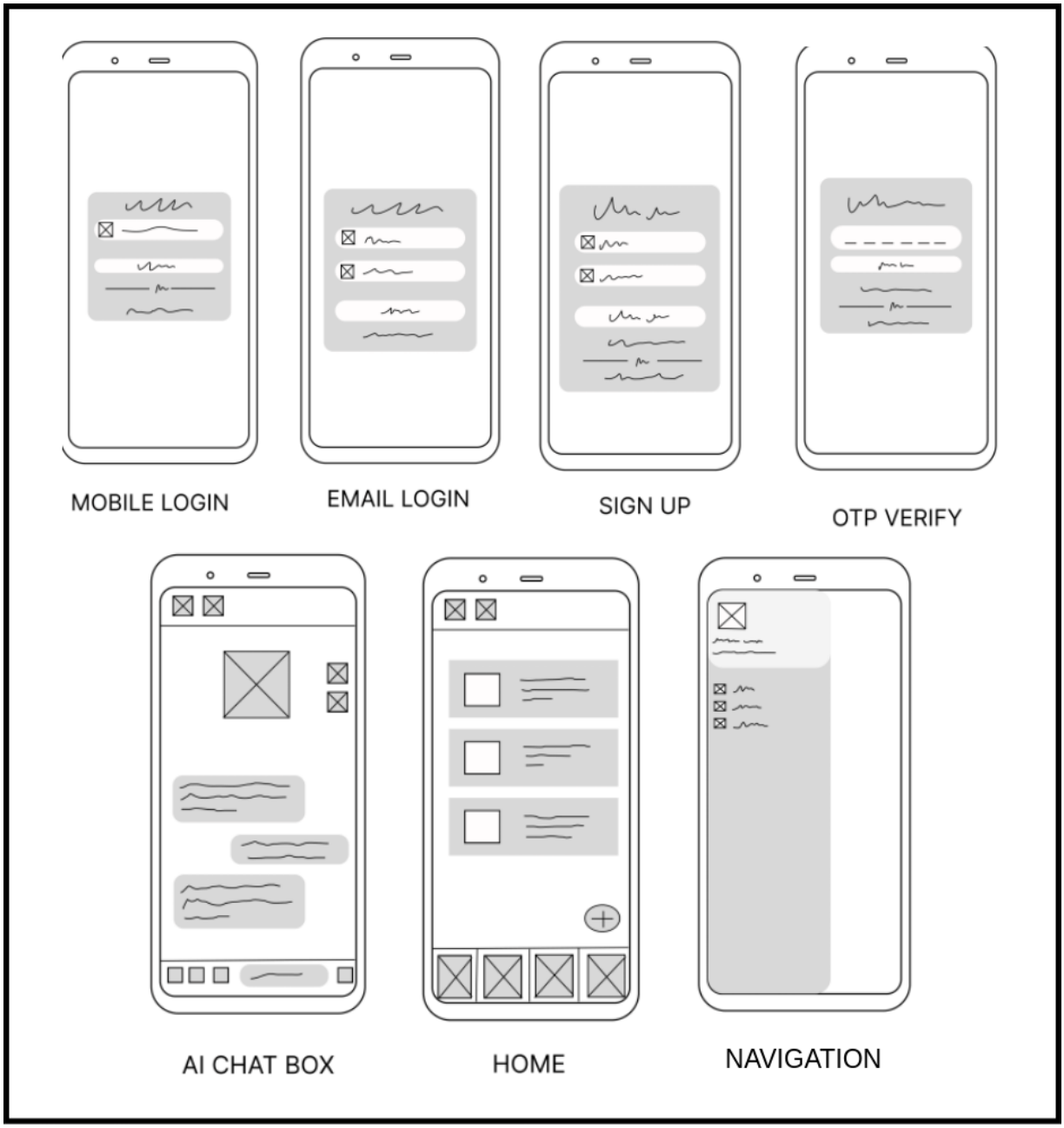

Figure 3.2: Wireframes

3.3 UI/UX Decisions

User interface, that is, UI of our healthcare application Care with Curie, focuses on designing user-centered applications by prioritizing simplicity, accessibility, and usability. The characteristics of user-centered design are accessibility, usability, efficiency, feedback, and clarity[5]. The CWC is accessible and usable as it has clear navigation along with a bottom tab bar for

home, Graphs, documents upload, Chat bot as little curie, and SOS, ensuring ease of movement. It is efficient because it has emergency features such as added contact and call emergencies that are well displayed, reducing the response time in urgent situations.
Feedback and clarity include receiving frequent visual feedback on performing actions, such as adding or editing emergency contacts. It ensures transparency.

3.4 Database Design

The database consists of four main entities as shown in fig3.3 e.i.: User, Family, Photo, and DOC.

- The **User table** stores personal details such as full name, email, phone number, date of birth (DOB), and address. Each user is uniquely identified by User_Id (Primary Key).
- The **Family table** records information about the user's family members, including email, name, phone number, and date of birth. Each family member has a unique Family_Id and is associated with a User_Id (Foreign Key) to establish a relationship with the corresponding user.
- The **Photo table** holds user profile photo data, where each photo is identified by a Pid (Primary Key) and linked to a user via User_Id (Foreign Key). The table also stores the Photo URL.
- The **DOC table** manages documents uploaded by users. Each document contains a DOC Id (Primary Key) and is related to a user through User Id (Foreign Key). The table includes the fields for the document's name (DOC-Name), date of upload (DOC-Date), and URL (DOC-URL)[6].

The User also has a one-to-many relationship with Doc and Family to ensure the safety and security of the individuals and their documents.

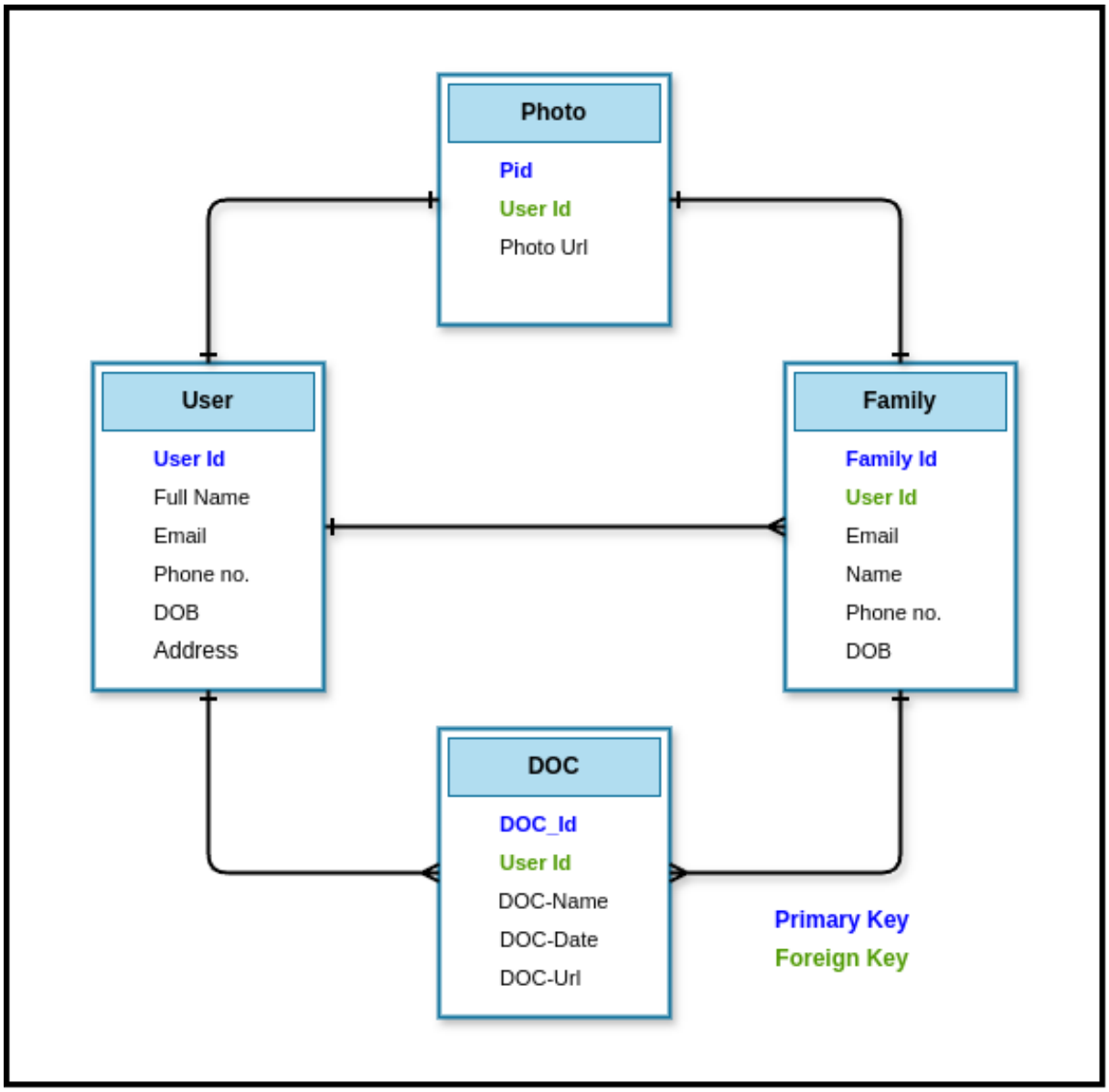

Figure 3.3: Database / ER Diagram

Implementation / Development

4.1 Pages Developed

Eleven Android pages or intents were created for this project. Each page is responsible for specific actions. This can be seen in the screenshot section of this chapter.

- **Splash Screen**: Displays the initial loading screen and checks user login status to route them appropriately.
- **Welcome Screen**: Offers options for user login or sign-up.
- **Login Screen**: Allows existing users to log into their accounts. See fig 4.1
- **Sign up Screen**: Enables new users to register by providing required details. See fig 4.3
- **Home Screen**: Serves as the main dashboard, granting access to core functionalities.
- **Add Document Screen**: Provides options to upload documents either via the camera or by selecting a PDF file. See fig 4.7
- **Upload Screen**: Manages and confirms successful document uploads or prompts retry in case of failure. See fig4.8
- **Profile Screen**: Displays and allows updates to the user's personal profile information. See fig4.2
- **SOS Alarm Screen**: Sends an emergency SMS to a selected contact.
- **Chat-bot Fragment**: Allows users to interact with a chat-bot for query resolution. See fig 4.6
- **Graph Fragment**: Displays selected graphs and user-related report data. See fig 4.5
- **Logout Functionality**: Allows users to securely log out of the application.

All the screens were developed using **Android Studio**, integrated **Firebase Authentication**, and **Cloud Storage** for backend support.

4.2 Key Features

- **Lifelong Health Documentation**

  Carry your health history with you, safely stored and easy to access whenever you need it.

- **Personalized Assistance**

  Get thoughtful health support and gentle reminders tailored to you and your family's needs.

- **Health Insights & Progress Tracking**

  See your health journey come to life with simple, meaningful graphs that help you stay on track.

- **Family Health Management**

  Take care of your loved ones effortlessly by managing all family health records in one secure place.

- **Smart Reminders & Family SOS Alerts**

  Never miss a medication and be ready in emergencies with quick SOS options for your family.

- **Allergy & Chronic Care Records**

  Keep important details like allergies and chronic conditions organized for better, faster care.

- **Secure Data Privacy**

  Your health information stays safe and private, protected with top-level security standards.

4.3 Code Structure Explanation

1. Frontend (User Interface)

The user interface is primarily developed for Android using **Java** and **XML**.

Screens and Navigation: Different sections like Profile, Health Insights, and SOS Alerts are organized into Activities and Fragments. Smooth navigation connects Home, Family Management, and Health Records for a seamless user experience.

- **Layouts and Design:** Forms, health graphs, emergency buttons, and login pages are created using XML layouts to ensure a clean and intuitive design.

2. Backend (Application Logic and Management)

This layer manages the app's logic — handling health records, reminders, accounts, and emergency services.

- **Core Java Classes:**
  - `HealthDocument.java` — manages the storage and retrieval of medical history.
  - `ReminderManager.java` — handles the creation and monitoring of health reminders.
  - `SOSService.java` — manages emergency notifications for family members.
  - `UserAccount.java` — takes care of user and family account data.
- **Health Analysis Support:**
  - `AIHelper.java` — provides basic personalized health advice.
  - `GraphGenerator.java` — generates visual health progress graphs.

3. Database (Data Storage and Retrieval)

User information, health records, and alert settings are securely stored using **SQLite** or **Firebase**.

- User profiles
- Medical history records
- Medication reminders
- Family and emergency contacts
- Allergy and chronic condition records

4. APIs and External Tools

The app integrates external services for enhanced functionality.

- **Notification System:** APIs send medication and appointment reminders.
- **Emergency Services:** APIs manage quick SOS alerts to family contacts.
- **Graph Visualization:** Libraries like `MPAndroidChart` are used for creating intuitive health graphs.

5. Security Measures

Handling sensitive health data requires strict security standards.

- **Data Protection:** All user information is encrypted both at rest and in transit.
- **Authentication Systems:** Secure login features including password protection.

6. Health Insights and Smart Suggestions

Beyond data storage, Care with Curie provides thoughtful insights.

- Analyzes health trends and patterns.
- Offers gentle health improvement suggestions.
- Detects early signs of potential health risks based on user history.

4.4 Screenshots

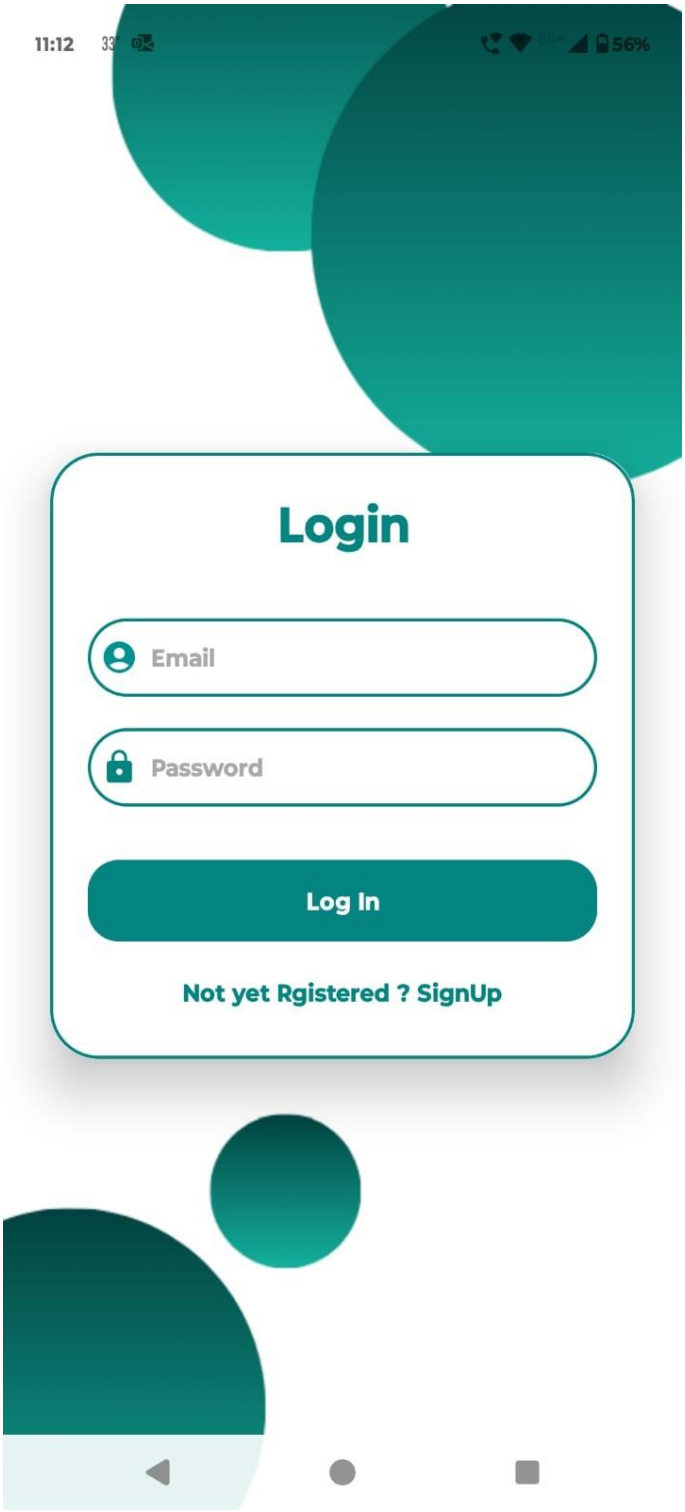

Figure 4.1: Email Login

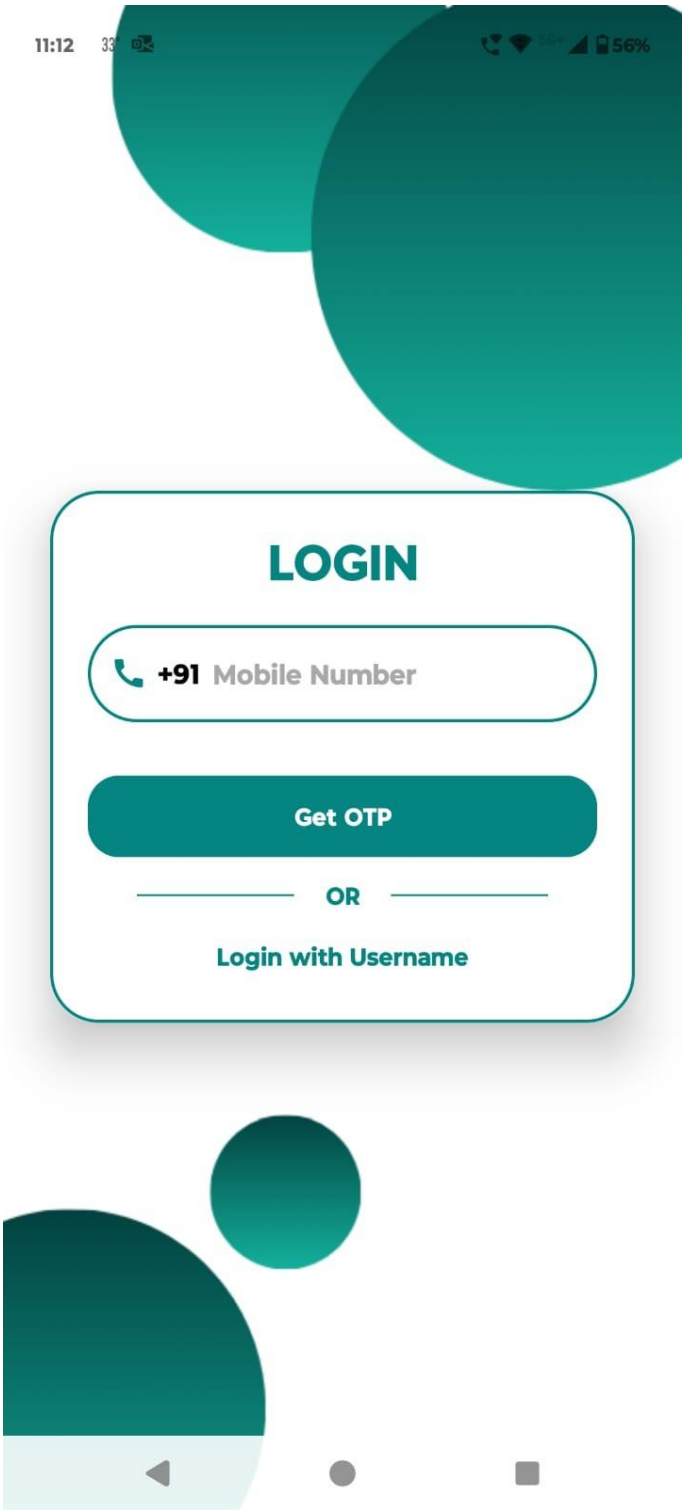

Figure 4.2: Mobile Login

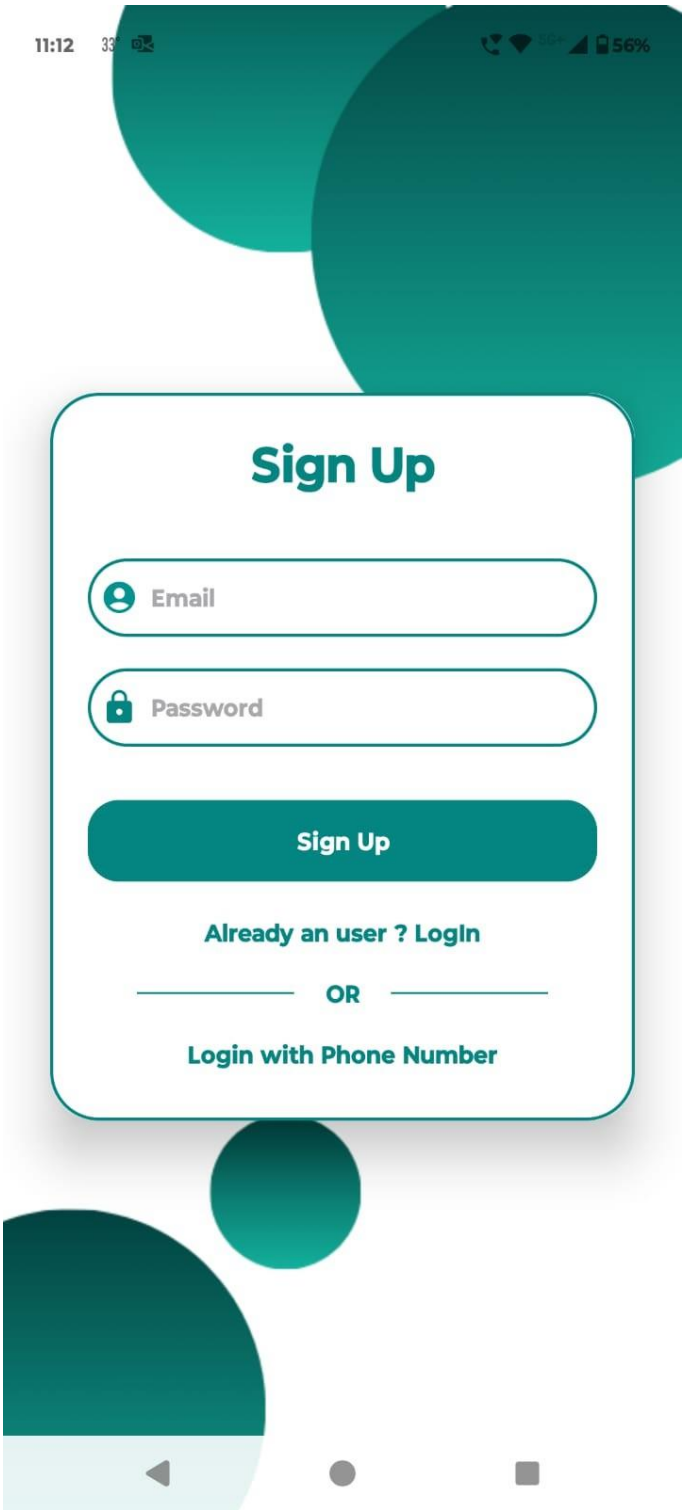

Figure 4.3: Sign-up Page

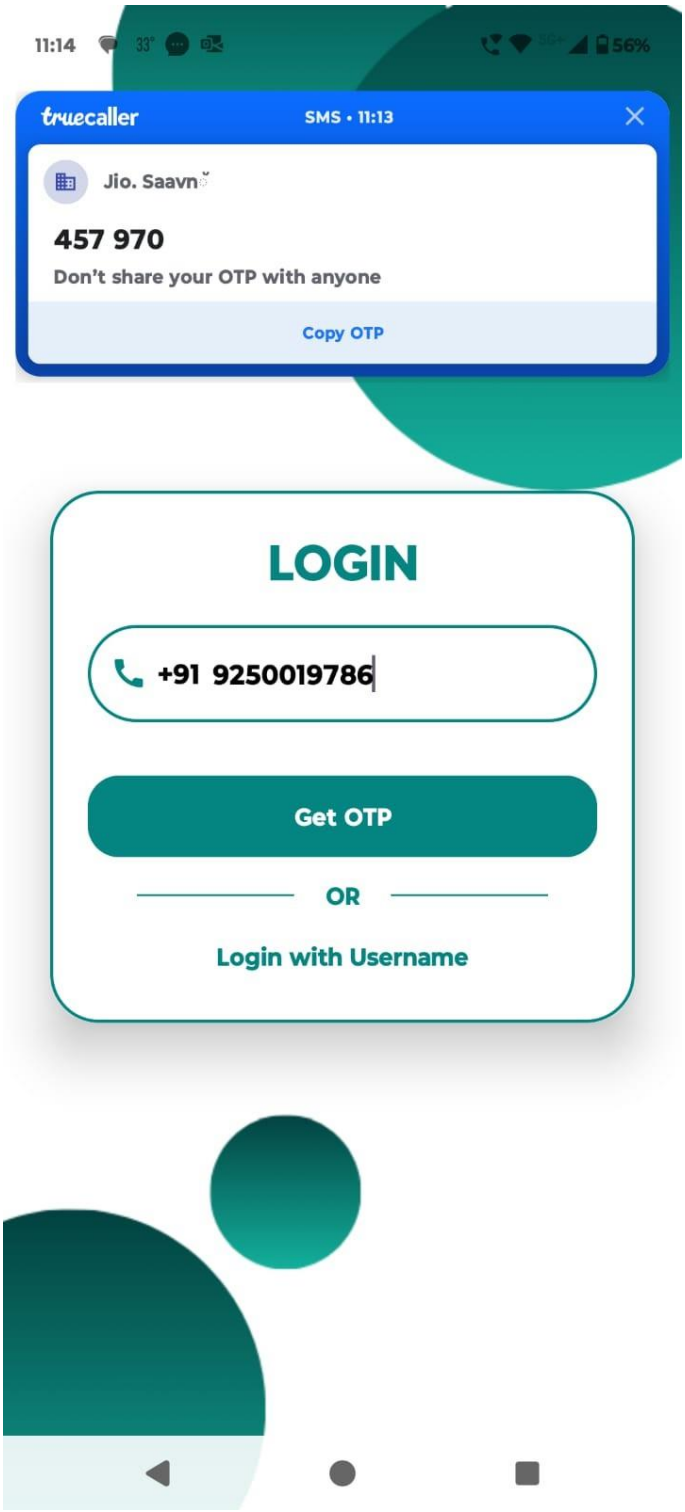

Figure 4.4: OTP Received

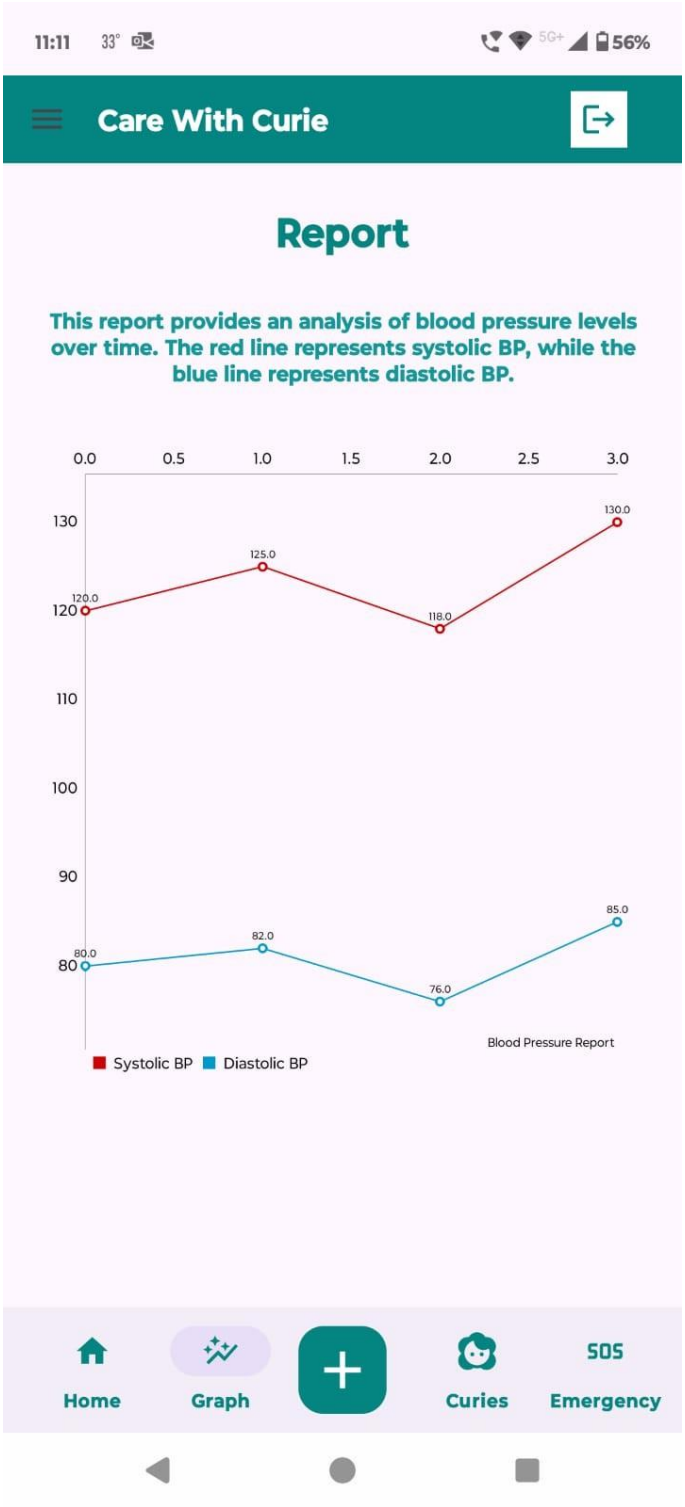

Figure 4.5: Graph Plotting from Report

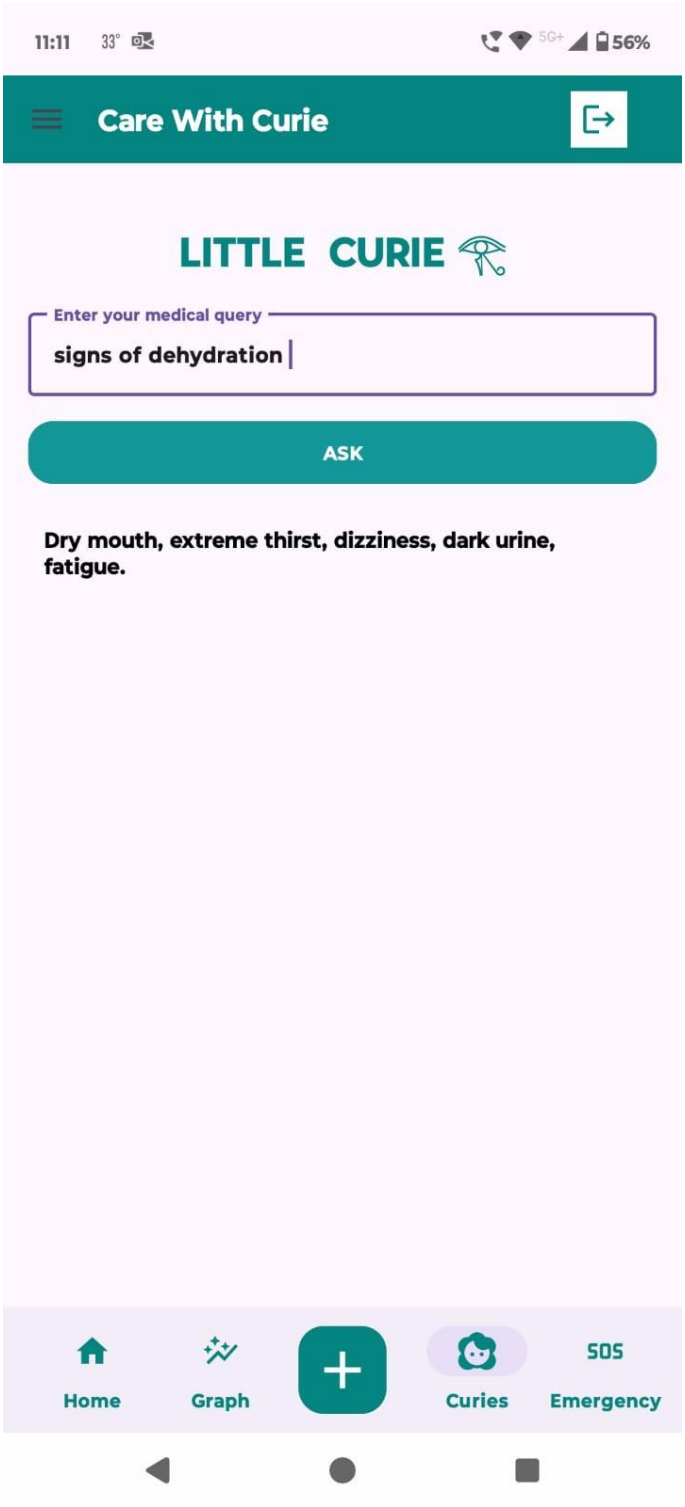

Figure 4.6: Little Curie AI

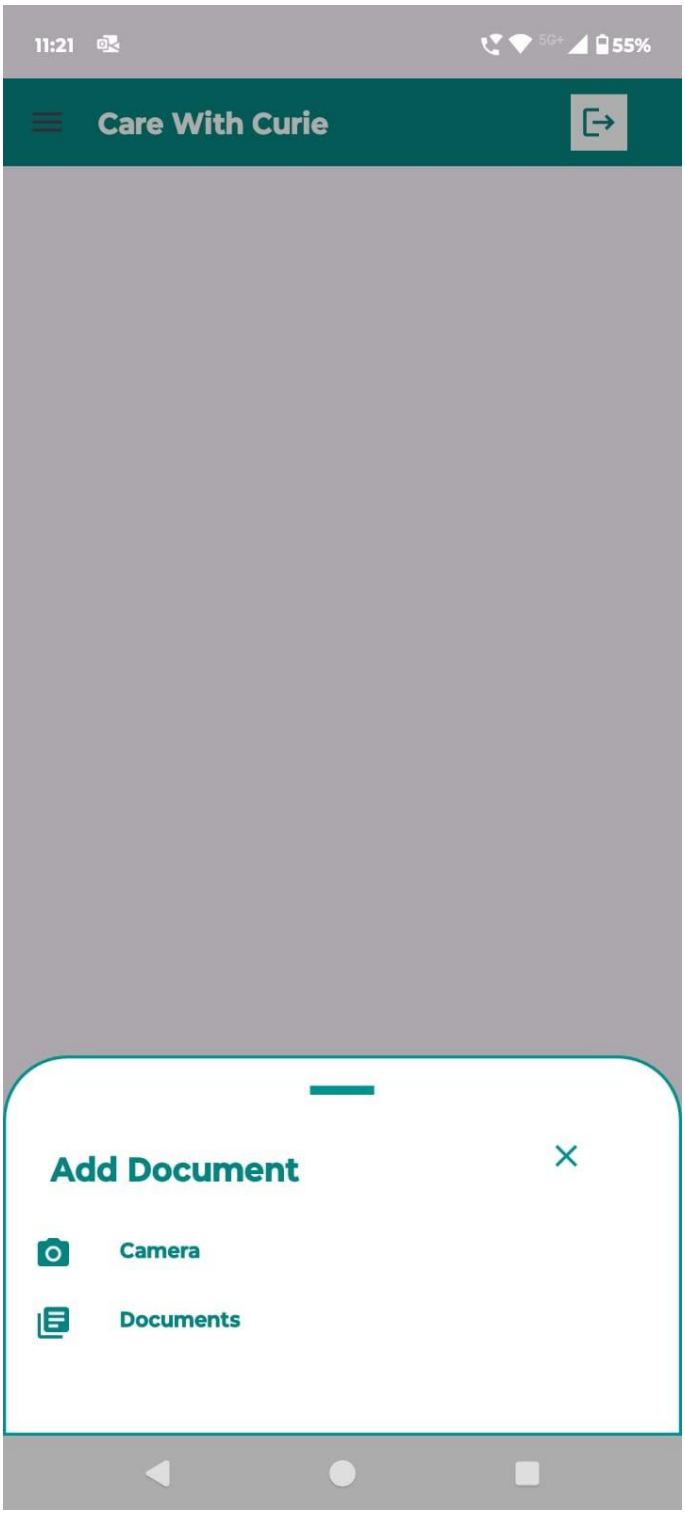

Figure 4.7: Document Upload Options

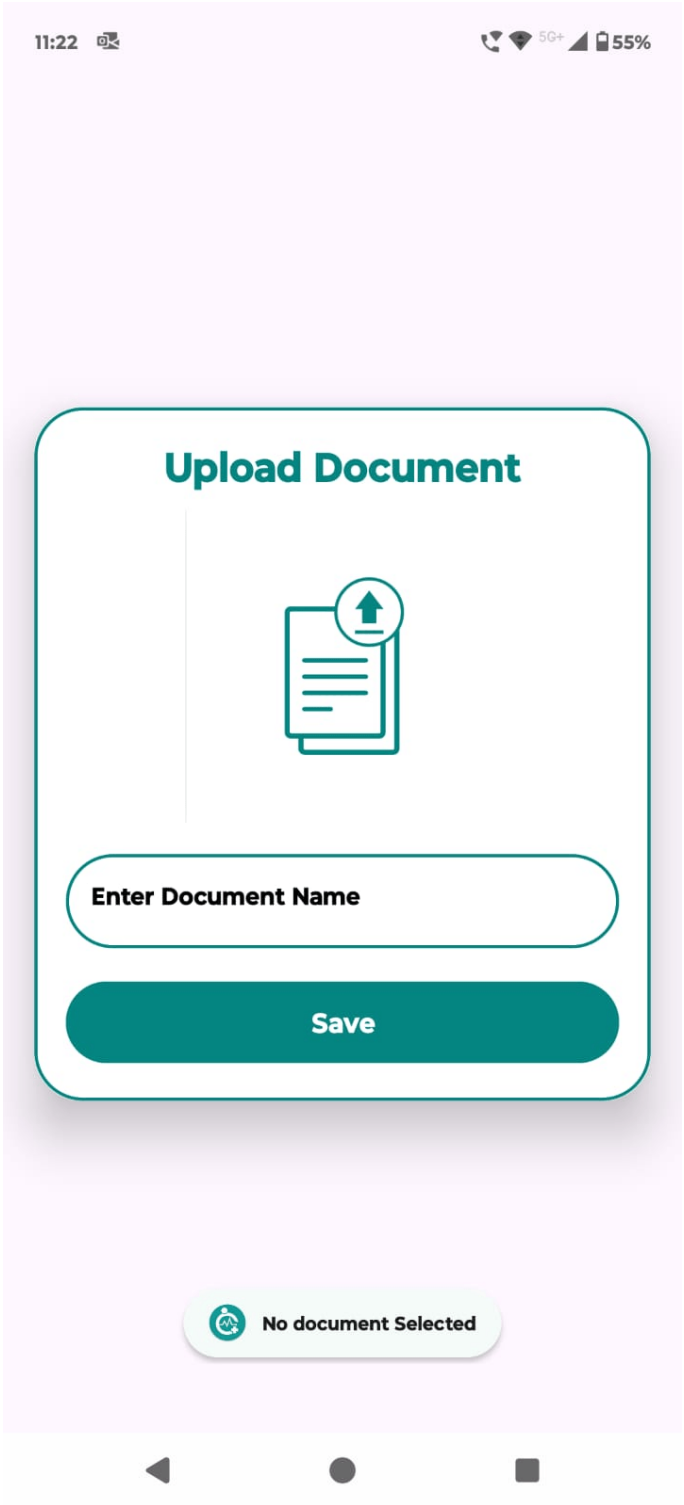

Figure 4.8: Document Upload Form

Testing

5.1 Testing Approach

Manual testing on Android devices and apps was performed to assess the applications.
Every feature and module, including dashboard navigation, maintaining health records, feedback submission, BP graphs, SOS features, and login/sign-in, were manually verified against functional requirements.[7]
Each component underwent independent testing to ensure that it functioned effectively on its own.

5.2 Device Compatibility Checks

To guarantee uninterrupted operation, the application has been evaluated on many Android devices and versions, given that it was developed specifically for Android platforms. Testing had been carried out on:
Android emulated systems (Android Studio AVD)

- Android 9 (Pie)
- Android 10
- Android 11

In order to ensure accurate functionality and UI adaptability, actual gadgets with different screen sizes are used.

5.3 Bug Fixing Process

Every problem and bug identified were carefully noted. Significant bugs that were required to be fixed promptly comprised database errors, application errors, AI late responses, and sometimes empty replies.

UI/UX contradictions were fixed based on usability feedback.

After correcting for bugs, regression analysis was performed to ensure that the functionality that was already there had not been impacted.

The final version was improved within beta testing with sample users, maintaining a seamless and obvious experience.

Challenges Faced

We overcome many challenges while working on CWC (Care With Curie) project's growth and development, and these put our skills for problem-solving and teamwork to the test.

6.1 Technical Issues

In the initial phases, we encountered a number of technical challenges associated with data security, API connectivity, and system integration. The problems of fixing and improving code across different systems requires thorough testing and cooperative troubleshooting.

6.2 Time Management

Managing deadlines for projects with curricular obligations is a major challenge. Teamwork along with effective scheduling was necessary to set achievable targets and keep up steady growth and get the result.

6.3 Design Dilemmas

It was difficult to strike a balance between usability and design. Based on the ongoing feedback and usability testing, we continually examined our UI/UX plans to ensure that the application maintained its understanding while advancing every requirement.

In along with improving the project, resolving these challenges upgraded our knowledge of technology, management of projects skills, and our ability for pressure-filled adaptation to it.

Results

7.1 Final Output

Care with Curie (CWC) is a fully functional application aimed at enhancing patient care and accessibility to medical services.

All of the supposed features—secure registration for users and logins, customized care plans, access to all healthcare documents, access to a carefully curated library of health resources, and a feedback/support system—are successfully integrated into the software. With an easily understood flexible user interface optimized for mobile and desktop platforms, the application provides a seamless and straightforward experience for users[8].

A strong database framework encourages all applications' flexible components, promising secure personal information handling, and real-time data updates. Extensive testing was conducted to ensure the software's efficiency, safety, and balance across multiple devices and individuals.

The goal of providing users with a trustworthy, user-friendly, and effective digital medical assistant has been accomplished by Care With Curie (CWC). It builds a solid basis for future development, including the inclusion of cutting-edge features like video consultations, AI-based health recommendations, and integration with outside healthcare providers.

7.2 Performance / Feedback

Feedback Received

- **Satyam Sharma, satyams2812@gmail.com, Software Engineering Intelligent Planner**:- I think the application is very innovative, and I like the work students have put in here, and specifically how they used Retrofit and API. I would also like to state that it

is better to see that the children are actually working on projects that solve real-world problems. The way they integrated all the small elements and then made the perfect user-friendly application impressive. Their work with Firebase is really good, and I think there are many improvements and potential in their work.

- **Avni Singhal, e22cseu1571@bennett.edu.in, E22CSEU1571**:- I believe that there has not been a single app dedicated solely to storing medical documents like this one. This will be helpful in minimizing the need to always carry medical records to hospitals. The way it analyzes our reports and then plots graphs, it is very easy to track our health and changes in health. I also think the chatbot's little curie is great, and it can answer the basic doubts that the user has. In the future, if this work is done, we might not need to go to doctors for every small problem.

- **Mehak Gupta, E22biou0033@bennett.edu.in, E22BIOU0033**:- The UI is great. I like that, it is simple and easy to use, great for elderly people and patients. The story behind choosing the name of this application is interesting. As a biotech student myself, I feel we see the medical field pretty closely; this application is a great start to something much better and bigger. However, there are still many improvements to be made. However, at the college level, this is a significant application. The idea is very new, and I am glad that it can be implemented. I think it is a good overall application.

Conclusion

8.1 Learning

We ended up being able to put our theoretical understanding into real-world problem-solving through the development of CWC, which proved to be an excellent learning opportunity. The understanding of application growth and development, design that prioritizes users, and practical healthcare problems have increased as a result of this project. Additionally, we enhanced our technical, critical, and teamwork abilities, all of which are crucial for the advancement of our careers.

The project's main objective was to establish an easily accessible medical assistance platform for navigation and production. We were excellent at developing and using crucial features such as Little Curie, our mini AI in application itself, and record of health documents. Frequent testing and feedback sessions made sure that the finished app satisfied its technical specifications as well as the needs of users.

8.2 Future Improvements

We identified fields that may have changed in later iterations because the project achieved its objectives. Expanding assistance to multiple languages, incorporating more sophisticated AI-driven health recommendations, enhancing information analysis capabilities, and fortifying safety measures are important recommendations for the next stage. Increasing the platform's user base and connecting it with healthcare facilities are two achievable improvement to increase its usefulness.

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Appendix

https://github.com/Sara-Chaudhary/CWC-Healthcare-Documentation-Android-App

This figure explains how user data is migrated to cloud security.