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MEDI-CONNECT APP USING FLUTTER FRAMEWORK AND AI CHATBOT.

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ABSTRACT

Medi-Connect is a revolutionary healthcare application developed using Flutter and AI. It aims to bridge the gap between patients and healthcare providers by leveraging the power of technology. The app offers a wide range of features, including virtual consultations, personalized health recommendations, and intelligent symptom analysis. Using Flutter's cross-platform capabilities, Medi-Connect ensures a seamless user experience across different devices. The integration of AI enables advanced functionalities such as image recognition for diagnosing skin conditions, natural language processing for personalized health advice, and predictive analytics for early detection of diseases.

With Medi-Connect, users can easily connect with healthcare professionals through virtual consultations, eliminating the need for physical visits. The app also provides access to a comprehensive database of medical information, empowering users to make informed decisions about their health. By implementing e-prescriptions and digital prescriptions, Medi-Connect reduces medication errors and enhances convenience for both patients and healthcare providers. The app securely stores medical records and enables easy sharing of information between patients and doctors.

Overall, Medi-Connect revolutionizes the healthcare industry by leveraging the power of Flutter and AI, providing a user-friendly and intelligent platform for managing healthcare needs

KEYWORDS: Scheduling Algorithm, Machine Learning, Natural Language Processing (NLP), AI Chatbots.

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INTRODUCTION

Smart phones have become an integral part of modern human life, and many institutions and companies have rushed to use these portable devices to keep up with users' needs. Where this research deals with a study on Android operating systems that run on most smart phones, as well as in this research learning how to program and design smart phone applications that work on the Android system. The medicine is on time, which was called My treatment appointments, and the Dart Flutter language was used to program the application, which is part of the Flutter software platform, and this platform enables the programmer to program applications for all types of applications Phones Whether the phone works on the Android system in most smart phones or the IOS system in I-Phone devices, and the Flutter platform works using the Android studio program, which serves as a general platform that contains all Flutter tools.

1.1 Android Applications: An Android application is software designed to run on an Android device or emulator, and it is a software application that runs on the Android platform. Since the Android platform designed for mobile devices, the typical Android application is designed for a smartphone or tablet running on Android OS and is the primary software in which Android applications are programmed whether in java, Kotlin, or Dart Flutter, and the official development environment for programming Android applications is Android Studio For the development of Android applications, and at the end of programming any Android application, the application is stored in the Android package (.apk) via the Android Asset Packaging Tool (AAPT), as any Android application that is installed on the mobile phone has its extension on .apk format.

1.2 Flutter software platform: Flutter is a suite of application programming and development tools that provides a comprehensive framework in the Dart Flutter language dedicated to drawing destinations with high quality and at the same time gives the developer the tools that make him build complete applications in the least time. Tools is the mobile SDK. Flutter is a framework that was created from scratch and used to write and build it in the Dart language and the C++ language, as Google launched it in early 2017 and during this period it achieved a very great success. Flutter is based on the Dart language, a programming language that Google programmed in 2011. And the Android studio program is within the framework of the flutter filters that were used to program our application, and it supports more than java and dart languages. The Dart Flutter language was used in application programming.

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RELATED WORK

The objectives of this research lie in designing an Android application that works on smart phones that alerts the times of taking medical treatments at the appropriate times for the purpose of helping patients of all age groups, to reach a state of recovery by taking the treatment (medication) at the time specified by the treating physician?

The design of this application is characterized by simplicity of use and without complexity, its aim is to help patients of all age groups to use it, to reach the state of recovery by taking the treatment (medicine) at the time specified by the attending physician as it works to remind the patient to take treatment doses at the time specified by a notification, specified by device, as the reminder method supported by this application improves the patient's health and helps him to adhere to the specified dates for taking the medication, as many patients neglect to remember the dates of taking the medicines at the specified times, and certainly the failure to adhere to the specified dates.

To take medicine, especially in some diseases that cause many health problems, so the application of (MEDI-CONNECT) solves all these problems that the patient suffers from. Through this application, the user can specify and adjust the specific times of medications by the user, and he can add any number of medications and set notifications to remind the patient of the time of each type of medication that has been added. Our application has been programmed using the Dart Flutter language in the Android program studio, where a series of software engineering steps and stages were worked to develop the MT application, where the SDLC model was used, and the language that was used to model the steps on which the application was built is Star UML language.

DEPLOYMENT DIAGRAM

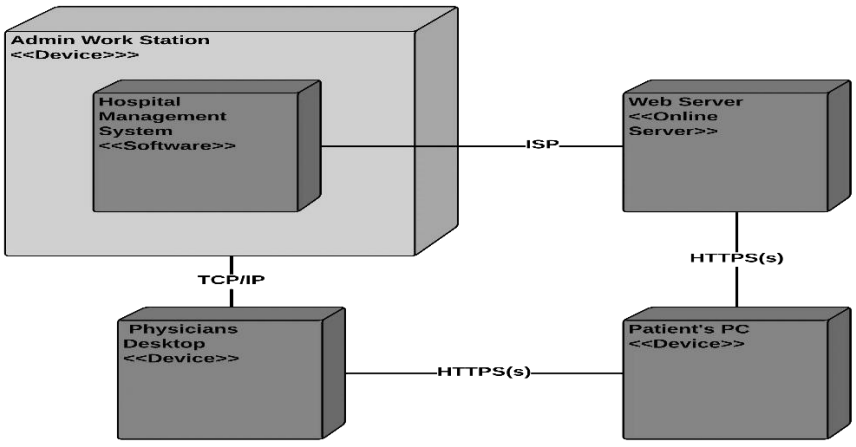

Figure 1: Deployment Diagram

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PROPOSED ALGORITHM

The main objective is to design a system with a range of features that will help people to cope with a variety of challenging scenarios during a health interruption while saving time. For example, nearby hospital suggestions, online consultants, scheduling a doctor's appointment, prescription displayer, medical history, disease prediction, AI Chabot, and other features would assist the user in making a quick decision and avoiding unexpected situations. This combination of components has never been seen before in any previous work.

1. **Notification Scheduling Algorithm**: **Interval-based Scheduling**: Use algorithms like the Timer or ScheduledExecutorService in Flutter to schedule notifications based on the calculated time intervals for medication reminders.
2. **Chatbot Algorithms**: **Natural Language Processing (NLP)**: Utilize NLP algorithms and libraries (e.g., TensorFlow, spaCy, NLTK) to process and understand user queries and provide appropriate responses.

User Data Variables:

1. *P*: Patient/user
2. *M*: Set of medicines prescribed to the patient
3. *D*: Doctor/healthcare provider
4. *TMi*: Time interval for each medicine

Notification System Variables:

5. *NP*: Number of notifications for the patient
6. *RMi*: Remainder message for medicine

Equations:

1. **Time Interval Calculation**:
    1. *TMi*=Frequency of taking medicine *Mi*
    2. *TD*=Frequency of doctor appointments
2. **Number of Notifications**:
    1. $NP=\sum i=1n\ TD/TMi$
    2. $ND=1/Td$
3. **Remainder Message**:

    RMi=Compose message for reminding to take medicine *Mi*

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SYSTEM ARCHITECTURE

The proposed system is made up of three main modules:

Admin Module: The administrator part is used to create and update information in hospital and doctor servers. admin, often known as the administrator, gives patients access to the system and keeps it running smoothly.

Doctors Module: Patients' appointments are managed by the physicians, who also give consultation to the patients. Doctors have access to a patient's prior medical records and can write prescriptions based on their symptoms.

Patients Module: The patient's module has several unique capabilities for general patient's, such as the ability to anticipate illnesses based on symptoms, maintain profiles and medical histories, access doctor data, and schedule visits.

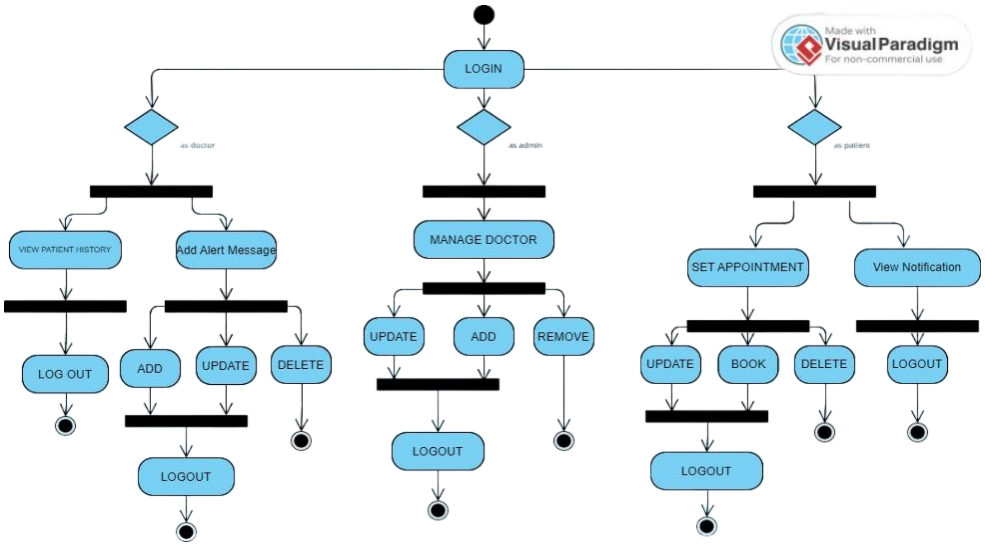

Figure 2: Activity Diagram

Mobile Application: This application is proposed for all Android-based smartphones. It makes use of the Flutter SDE, as well as the Dart programming language, which is a cross-platform application User Interface kit. To keep all of the details for patients and clinicians, it employs Firebase Cloud servers and a database. Users can choose from a variety of features in the proposed system. It comprises an appointment area where physicians and patients may monitor and organize their appointments with specialized doctors, a symptom checker that can forecast diseases based on reported symptoms, and a user can look up information on nearby hospitals and test facilities.

- Appointment: The appointment booking feature is one of the novel features of this application. Any user can search for a suitable doctor, specialist, or consulate and schedule an appointment online. If it is available, the user can reserve it in advance by selecting a time slot. Individual authority uses this application to update the list of doctors available.
- Predict Disease: When the user just wants a quick idea of what the problem (disease) might be, this module is used. To get a more accurate result, the user must select a minimum.

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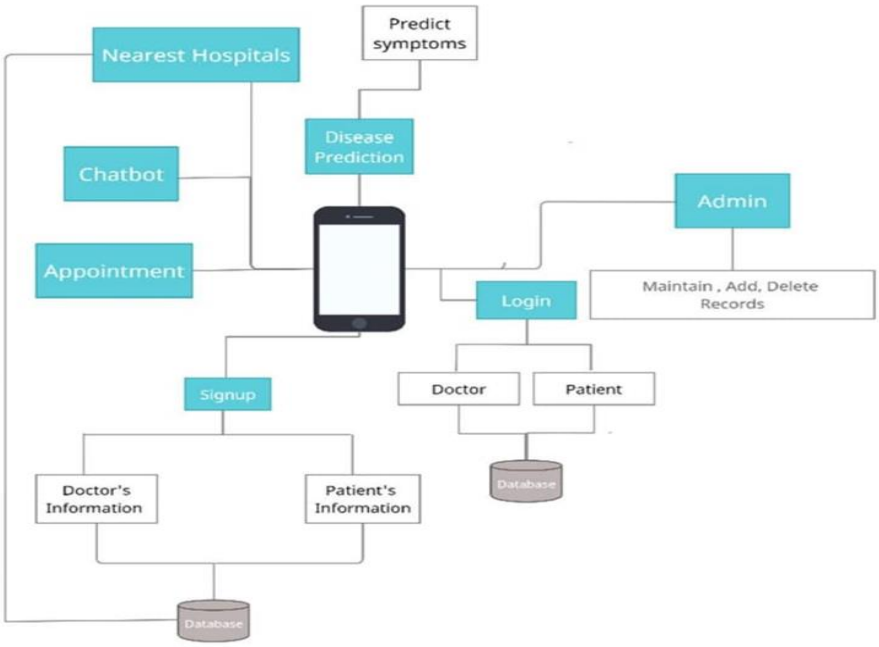

Figure 3: System Architecture

CHATBOT

Healthcare Chabot provide each user with a personalised experience in ways that are more convenient and efficient than human capabilities. Google API is an artificial intelligence powered symptom database. It advertises itself as a self-diagnosis tool or pre-primary care guidance, and it contains actionable health information that has been verified by professionals. For example, if you list nausea and a headache as symptoms, the app will ask you whether you also have light sensitivity, fatigue, dizziness, or other symptoms. Finally, it may determine that you have a margin. For example, if you list nausea and a headache as symptoms, the app will ask you whether you also have light sensitivity, fatigue, dizziness, or other symptoms. Finally, it may determine that you have a migraine.

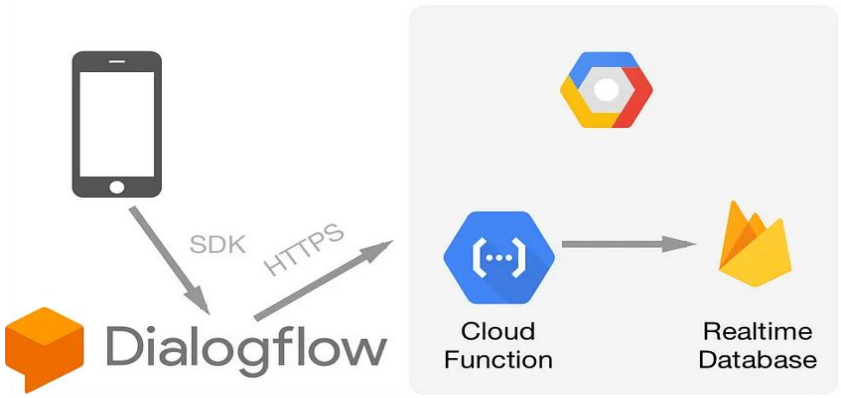

Figure 4: Chatbot Architecture

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IMPLEMENTATION APPROACH:

The implementation approach adopted for this study is Spiral Development Model.

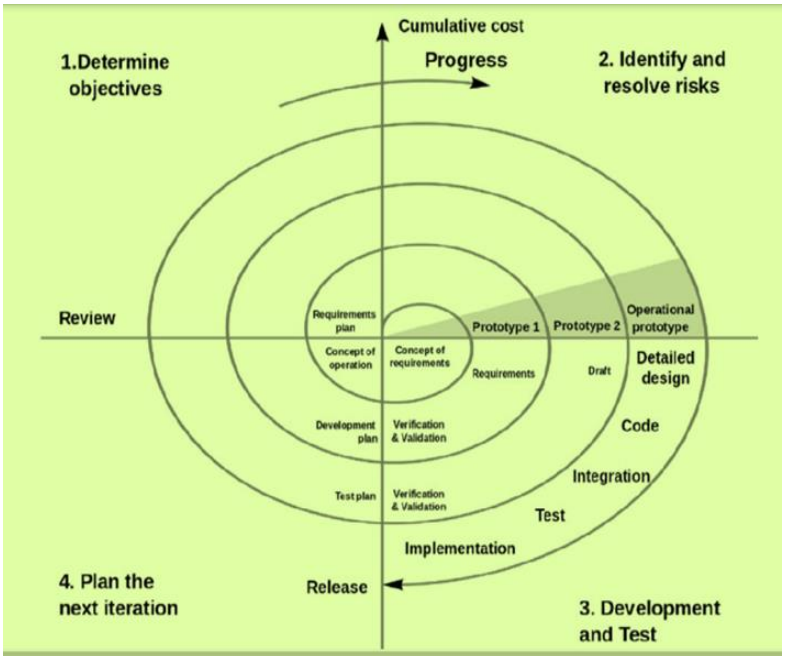

Figure 5: SDLC Model

The spiral model is a cyclical model with four phases: identification, goal determination, alternative evaluation, and restrictions.

Objective determination- Customers' requirements are gathered at the start of each step, and the objectives are specified, elaborated, and analyzed.

Identify and Resolve Risks- In order to choose the optimal solution, all viable solutions are analyzed, and the risks associated with each solution are identified and resolved using the best available method.

Development and Testing- Identified features are produced and tested, and the software's next version is released.

Review and plan- The client reviews the program as it is currently produced, and planning for the next step begins.

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HARDWARE REQUIREMENTS

Parameter	Values
Processor	Intel Core i5+ or higher
System Memory	4 gigabytes or higher RAM
Disk Requirement	256GB of SSD for storing application
Database	A cloud-base (SQLite, MySQL) database that can be scaled depending upon requirements
Hardware application	Android Mobile Phones, USB debugger corda

SOFTWARE REQUIREMENTS

- WINDOWS OS (WIN10/ WIN7/ VISTA/ XP / 2000 / 200 Server / 2003 Server)
- Visual Studio. Net 2008 or Latest Enterprise Edition
- Internet Information Server (IIS)
- Visual Studio. Net Framework
- Operating system- Latest version of Android

DEVELOPMENT ENVIRONMENT:

Visual Studio Code is a conventional Microsoft product license distribution of the Code - OSS repository with Microsoft specific changes. Visual Studio Code blends the ease of use of a code editor with the features required by developers for their edit-build debug cycle. It has lightweight debugging, a robust extension model, and lightweight interface with existing tools, in addition to extensive code editing, navigation, and understanding assistance.

LANGUAGE OF CHOICE:

Flutter is a cross-platform framework created by Google for developing mobile, desktop, and web apps. Flutter combines the benefits of native development with the ability to reuse the majority of the code across platforms, potentially saving money. Flutter is a Google-developed free and open-

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source user interface framework for building native mobile apps. Flutter enables developers to create mobile apps for both iOS and Android using a single codebase and programming language.

TECHNOLOGY USED:

- Flutter SDE
- Dart Programming
- Google APIs
- Firebase Cloud Server

FUNDAMENTALS OF TESTING:

Any Android application that is designed by the programmer must be tested either by the programmer himself, that is, while writing each programming code that is tested before downloading it to the mobile phone, or by users after installing the application on their mobile phone. Testing any Android app is an integral part of the app development process. By constantly running tests on the application, the validity, functionality and usability of the application can be verified before it is released publicly, i.e. before it is published on Google platforms The app has been tested twice: The first: testing by the programmer Second: testing by users of the application.

TEST BY THE PROGRAM:

The application of my treatment appointments was tested manually while writing the program in flutter Dart language by installing the virtual simulator (Emulator) inside Flutter through the AVD Manager tool, which is the tool for the simulators in the program. Every line of code in the app was tested, and later the app was run with compatible devices. But running the application directly on the physical device is not practical because it will be very slow and expensive, i.e. the application is not checked on the physical device after writing each code because this will require time and effort in downloading the application to the mobile phone, instead it can be after completing the Writing the code The application is downloaded to the mobile phone and the program is tested. In this way, a good test strategy will find the appropriate balance between test accuracy and both its speed and reliability. The similarity of the test environment to a real device determines the accuracy of the test. Therefore, higher accuracy tests are performed on the simulated devices or on the physical device itself. High-accuracy tests are often slower and require more resources, so not every test should be a high-accuracy test. The test by the programmer consists of different types of tests done on our application Mobile applications in general are complex and should work well in many environments. As such, there are many types of tests and are as follows:

- **Functional testing:** Our app is tested for what it does and what the app is supposed to do.
- **Performance testing:** The application was tested in terms of the performance of the operations it performs, for example, the transition between one interface to another, and whether this was done quickly and efficiently.

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- **Accessibility testing:** Does the app work well with accessibility services?
-

DIMENSIONS OF THESE TESTS:

Tests also vary by size or degree of isolation:

- Unit testing or small tests check only a very small part of an application, for example testing a small program statement, a specific instruction, or a specific class within our program.
- End to End testing or big tests check larger parts of the application at the same time, i.e. the whole program is tested.
- Medium tests: This type of test is between the two types above and checks the integration between two or more units, that is, between two or more parts of the program. These ranges of tests are illustrated in the following figure:

INSTRUMENTED TESTS AND LOCAL TESTS:

Instrumented tests: These types of tests are carried out on Android devices, whether they are physical, that is, on a real mobile phone or on a virtual device that is included in the program that has been installed within Android studio. Automated tests are usually user interface tests i.e. testing application interfaces from the point of view of the user of the application, its operation and how these interfaces are interacted with by the user.

Local tests: These tests are performed on the programmer's development machine or server, so they are also called host side tests. They are usually small and quick tests, which isolate the subject under test from the rest of the application.

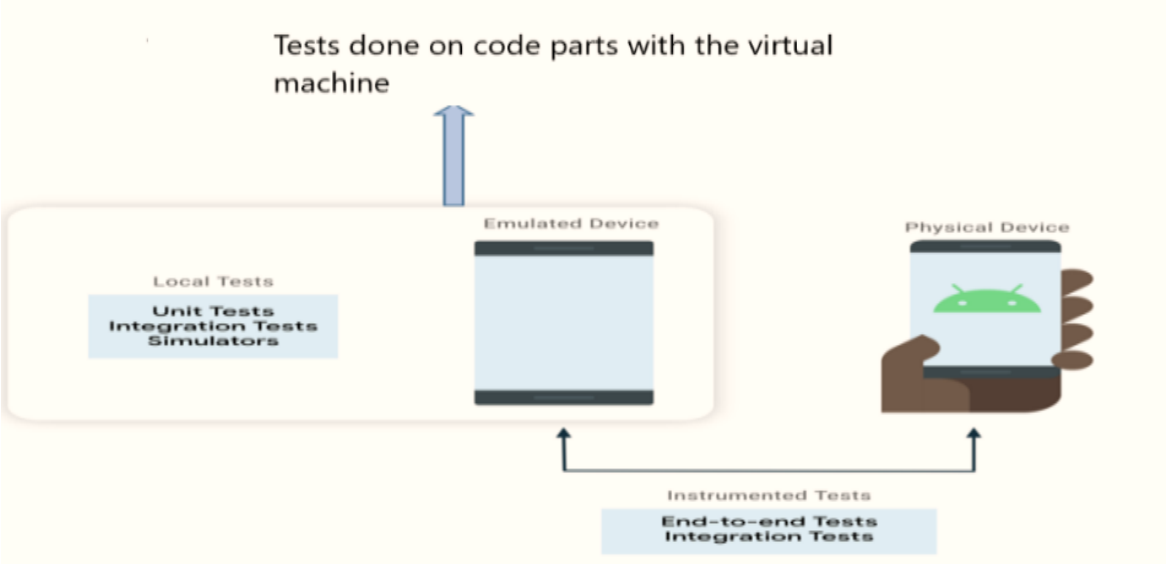

Figure 6: Testing Architecture

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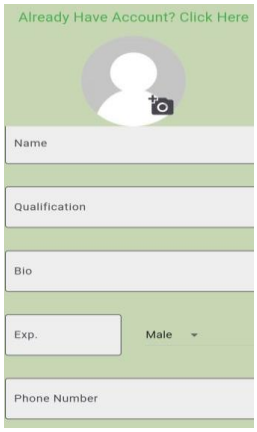
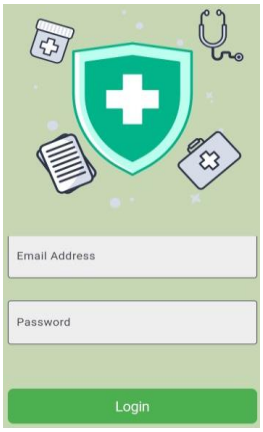
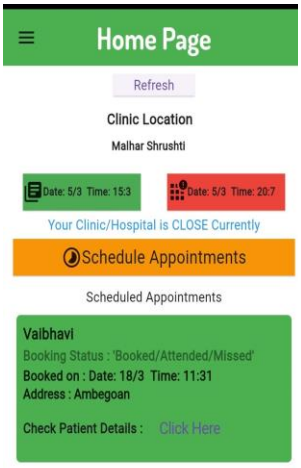
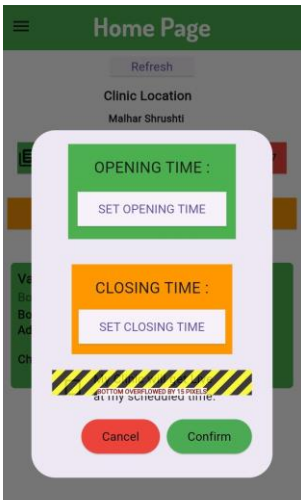
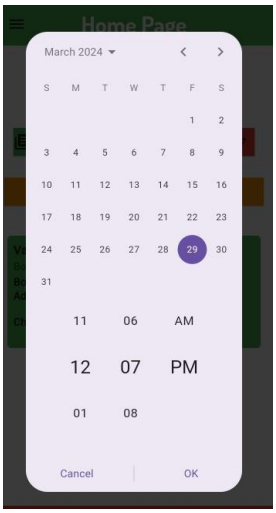
RESULTS











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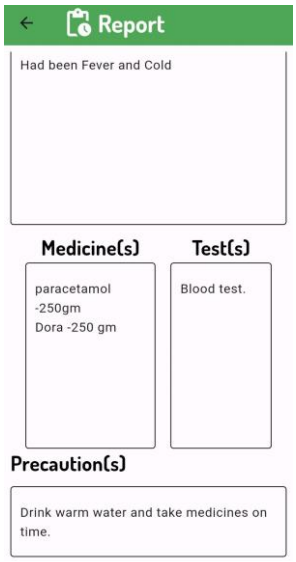

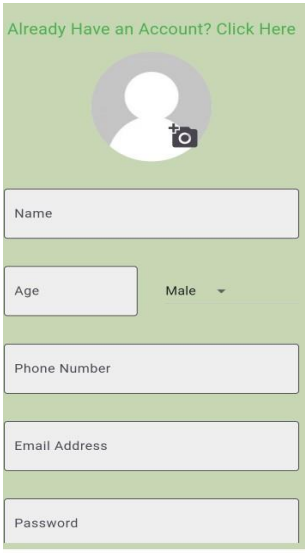

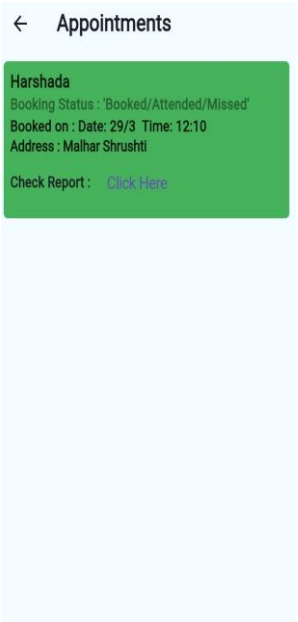

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FUTURE SCOPE

We hope to work on this extensively in the future to bring it to a new level for the benefit of people, particularly the poor. We're also excited to put our own artificial intelligence to work in assisting people in detecting disease based on symptoms. The proposed system "DOC.TIME APP" could be developed further into a standalone, automated system: A system that can include a variety of training elements that can be used to teach system users how to use it. The training module can be an HTML file that explains how to use various commands as well as how the system works as a whole. In this way, it is hoped that a mobile-based health-care system will become an integral part of daily life. Also, other features like Prescription, Finding donor and Emergency contact for nearest hospital. In this way, it is hoped that a mobile-based healthcare system will become an integral part of daily life.

CONCLUSION

Using this application, we can retrieve patient's history with a single click. Thus, processing information will be faster. It guarantees accurate maintenance of patient details and thus reduces the human effort and increases accuracy speed.

It aims to address the problem of limited healthcare access, improve communication between patients and healthcare providers, and deliver personalized care. The app has the potential to have a significant social impact by improving healthcare access, enhancing communication, empowering users, and saving time and costs. It is important for Medi-connect to prioritize user privacy, data security, and inclusivity to ensure its benefits are accessible to all individuals.

The software takes care of all the requirements of an average hospital and is capable to provide easy and effective storage of information related to patients.

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