Android Based Application to Ensure Medical Adherence: CareWise

Anushka Prashant Amte[1], Bryan Francis[2], Elisha Halona Edwin Gras[3] and Sini Anna Reji[4]

[1]Student, Department of Computer Engineering, Fr. C Rodrigues Insitute of Technology,Vashi, Vashi, Maharashtra, INDIA

[2]Student, Department of Computer Engineering, Fr. C Rodrigues Insitute of Technology,Vashi, Vashi, Maharashtra, INDIA

[3]Student, Department of Computer Engineering, Fr. C Rodrigues Insitute of Technology,Vashi, Vashi, Maharashtra, INDIA

[4]Student, Department of Computer Engineering, Fr. C Rodrigues Insitute of Technology,Vashi, Vashi, Maharashtra, INDIA

[1]Corresponding Author: anushkaamte@gmail.com

ABSTRACT

In this fast-paced world, it is difficult to balance one's domestic and professional life. Often, we have seen our grandparents forget things that are a part of their routine for like their medication. Many of them need to take their medicines at a fixed time, due to their age they often forget their scheduled medicines which can sometimes have consequences on their health. Therefore, we feel that there is need for an application to help our fellow senior citizens with their medication by the usage of image and a general description. By doing so we feel that this application can act as a helping hand to better monitor their health. This application will have features which will help them sort out medicines based on their name, image and description. A scheduled calendar will help them plan their medicine more efficiently. Reminders ensure that they don't forget the medications. This application will provide a very easy to use interface that the elderly can easily navigate through without any qualms.

Keywords— Android Application, Elderly Care, Medical Adherence, Medicine Tracker

I. INTRODUCTION

The fast pace of today's world makes it difficult for working professionals to keep track of their health. The broad category of patients includes people from all walks of life; teachers, artists, businessmen, students etc. Without constant reminders usually provided by our family members or caretakers, it is difficult to remember our medications. The elderly who live far away from their family members find it difficult to keep track of their often-extensive medications which they need to stay healthy. Due to rapid globalization and modernization, a large part of our population has found access to cheap and sturdy smartphones and internet connections. This gift of technology can certainly help the people in need to keep a better record of their health.

Medication adherence usually refers to whether patients take their medications as prescribed (eg, twice daily), as well as whether they continue to take a prescribed medication. Medication adherence is a growing concern to clinicians, healthcare systems, and other stakeholders (eg, payers) because of mounting evidence that non-adherence is prevalent and associated with adverse outcomes and higher costs of care. [1]

Thus, in order to avoid higher medical risks, we present CareWise, your personal medicine reminder. This Android application sets reminders for the patient's daily medicine dosage so that they never miss their medications. For our elderly users to make this process simpler we provide images of the medicine, along with its name, use and prescribed dosage.

CareWise allows the user to set alarms & disable them according to their convenience. A notification is sent to the user reminding of their alarm. This application adheres to the needs of the elderly and people who forget their medication or have a hard time keeping track of their medicines. Thus, ensuring that their health is never compromised even in their busy lives. The image and description of the medicines reduces the errors made during consumption of medications.

II. LITERATURE SURVEY

This section elaborates on the related work about mobile applications focused on medication self-management.

In [2]the authors presented a smart phone application Wedjat. It reminds its users to take the correct medicines on time and keep an in-take record for later review by healthcare professionals. Wedjat works with the calendar application available on most smart phones to issue medicine and meal reminders. As a telemonitoring device, it can maintain medicine in-take records on board, synchronize them with a database on a host machine or upload them onto an electronic medical records (EMR) system. However, the one sector in which this application falls short is providing that the user must always insert manually a new medicine and respective schedule for intake can become a burden to the user.

In [3] the authors presented SapoMed, a mobile health (m-Health) application for medication administration management. Through visual, audio, and vibrating alerts, SapoMed keeps users aware of their medication schedule. The application allows users to

register medications through the mobile phone camera to capture the barcode available at the medication boxes. It makes use of Web services to consequently retrieve all the medication information and posology. While SapoMed allows user to register medication by scanning the barcode, it does not provide real-life images of the medicine nor the instructions as to how the medicine is to consumed.

In [4]the authors presented a design of a friendly user interface for the elderly with Parkinson's Disease. This design provides an interactive interface, large font, a big button, an intuitive graphical interface and some simplified functions. This design also includes an improved main menu, a selective reply message together with a voice button function, a scrollable full-screen graphical buttons, a medication calendar with both a list of return appointments and medication reminders. Despite the various merits of this application, this is primarily focused on patients diagnosed with Parkinson's disease, and thus limits the scope of users.

In [5]the authors presented the smart pillbox for enhancing medication adherence. The pillbox is a new variant of the typical dosette, instrumented with light-emitting diode backlights to notify the patient at the scheduled times when the medication needs to be taken and with sensors to record whether the patient has done so and when. The associated mobile application serves as a reminder in parallel with the pillbox and can be available to both the patient and family members who may be able to influence the patient's behavior and motivate adherence. The smart pillbox provides an effective system to ensure medical adherence, it is not a versatile solution. Also the mobile application needs to be configured from an external website making it tedious to change schedules .

III. APPLICATION DEVELOPMENT

A. Requirement Analysis

The user interface is easy and intuitive to use, with minimal input from the user. Screen size and orientation minimization dictate an interface with large buttons and appropriate font size to enable the application use on the move. Furthermore, the application allows users to remember to take medication on time by using the phone's notification system. The application requires the user to provide access to their phone's camera in order to take images of the medicines. An email-based authentication asks the user to sign-up with their email and verifies them via an OTP.

B. System Architecture

This application helps users to manage and keep a medication intake schedule, providing a better control and a greater supervision. All medications and their images along with the time of them to be taken are stored and a registered in a database. Through the mobile phone camera, the application can click photos of each medication to help the users to differentiate between different medication by its shape or color. Data is store on

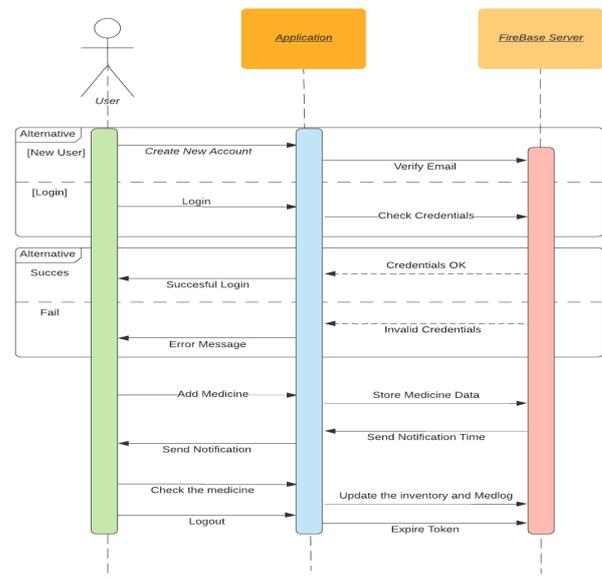a Firebase server furnishes all the required information anytime and anywhere.

Figure 1: Sequence Diagram

C. Used Technologies

CareWise works best on mobile devices running Android platform. The software stack used for application development was the Flutter SDK and the Dart programming language. For the backend, Firebase and its services such as Realtime Database, Storage and Authentication are used.

IV. SYSTEM EVALUATION AND VALIDATION

A. Application Evaluation

The user interface is well organized in order to keep it easy to use. The application monitors the user medications, even running in background and sends alerts whenever scheduled to take their medication. The user can login with their registered email id and password. A new user can create an account with their email id, for verification of email the user is sent an OTP which needs is validated by the application.

The homepage presents a neatly organized grid of all their medicines with precise information. The inventory provides a neatly organized lists of medicines with their quantities. The Medicine Log shows a list of all the medicines taken by the user throughout the day, the latest is displayed at the top. The user can edit or delete medicines by clicking in the image of the medicine on the homepage. The user can add a medicine by clicking on the add button on the homepage. A notification is scheduled for all the medicines at their respective times. The user can click on the notification pop up and will be redirected to the homepage, wherein they can click on the check button to log their daily dose. The inventory automatically

decrements the medicine quantity, thus automating the process of keeping track of the user's medicine stock.

V. CONCLUSION

This paper proposed CareWise a mobile health application for medication management and monitoring. This application is very intuitive and easy to use. Its main goal is to prevent medication errors by tracking and managing all prescribed medication. CareWise allows users to register and save their medicine manually and consequently, all the medication information. This application uses a Firebase data system to retrieve and save all the medication data. Furthermore, it saves past intake medication and their intake records. It was demonstrated and validated, and it is ready for use. To the best of authors' knowledge, no other applications have ever used such approach. Future improvements include support for devices which run on IOS operating software, application being able to work efficiently on a tablet and the ability for more users to be able to see a single users medication list as well as the ability to share data between users. Furthermore, collaboration and cooperation among users, socializing and helping each other to reach pre-defined thresholds, belongs to further application improvements.

REFERENCES

[1] P.M. Ho, Chris L Bryson, & JS Rumsfeld. (2009). Medication adherence: Its importance in cardiovascular outcomes. Available at:
https://pubmed.ncbi.nlm.nih.gov/19528344/.
[2] JK Zao, MY Wang, P Tsai, & JWS Liu. (2010). Smart phone based medicine in-take scheduler, reminder and monitor In: *12th IEEE International Conference on e-Health Networking, Application and Services, Healthcom*, pp. 162-168.
[3] BM Silva, Ivo M. Lopes, Mickael B. Marques, Joel J. P. C. Rodrigues, & Mario L. Proença. (2013). A mobile health application for outpatients medication management. In: *IEEE International Conference on Communications (ICC), Budapest,* pp. 4389-4393
[4] Ying-Wen Bai; Chun-Cheng Chan; Chia-Hao Yu. (2015). Design and implementation of a user interface of a smartphone for the Parkinson's disease patients. In: *IEEE International Conference on Consumer Electronics (ICCE), Las Vegas,* pp. 257-258.
[5] B. Abbey et al. (2012). A remotely programmable smart pillbox for enhancing medication adherence. In: *25th IEEE International Symposium on Computer-Based Medical Systems (CBMS), Rome,* pp. 1-4.