MEDiZee- Augmented Reality Medicine Tracking Application

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Abstract: Medication adherence is fundamental for effective health outcomes. One of the main reasons behind poor medication adherence is forgetfulness, and tracking systems are often used to address this problem. This paper presents MEDiZee, an innovative medication tracking system on mobile devices. Our approach helps patients to manage and understand their medicine. The app provides individuals with the digital tools they need to stay engaged in their health. This system is interactive and enriched with several useful features.

Index Terms - Medicine, Drugs, Clinical, Drug database, Medicine Tracker.

I. INTRODUCTION

Non adherence or poor medication leads to increase the risk of disease. Thus, we need effective solution to improve adherence. Health professionals suggest taking correct medicine at correct time and in accurate amount. Mostly, patients manage medication alone and doctor does not monitor them at home, office and in travelling. It is very often to forget schedule of medication routine. And it is also obvious for patients to take more pills that was recommend to them because -- the higher the dose, the better the effect! But important fact is that higher doses are associated with more frequent and more severe adverse effects. At very high doses, the benefit-harm balance changes and harmful effects may begin to outweigh beneficial ones.

In this paper, we introduce MEDiZee- augmented reality medicine tracker which focuses on tracking of patient's medication schedule to improve their health. MEDiZee is an iOS platform based application. It is user interactive, efficient and reliable application. It maintains the record of in-take schedule of medicine. It also has the information about the medication like number of pills remaining and the maximum amount of pills can a patient take at a time. The measure focus of this app is to keep track of pills and to avoid the high dose of medicine. This application is building in iphone operating system using Xcode. It is a software development kit that enables pioneer to build applications for iPhones. The application functions are implemented using the swift programming language and compiled on Xcode along with ARkit which is use to Build unparalleled augmented reality experiences for hundreds of millions of users on iOS. It also uses Google Vision API which enables developers to understand the content of an image by using powerful machine learning models in an easy-to-use REST API.

This application has several functionality like application is capable of operating in high dynamic environments, The user is gets information about medicine at any time, The user can see history of number of pills taken and the time when last pills were taken and This provide patient to take pills according to prescription and prevent him/her from high dosage.

We are expected to get some of the outcomes from patients those who will be going to use this application. As our expectations of outcomes from this app is that Greater Adherence to the prescribed medicine routine by patients. It will reduce the cases of hospitalization due to over dosage of a drug. Easy interface fully functional app that could be used by patients of any ages. Correct identification of the drug by app when the patient is unable to determine. Help patients to take medicines on time in case the original prescription is misplaced.

II. LITERATURE SURVEY

Review from Literature #1:

Wedjat is medication reminder mobile application which reminds and record the in-take schedules. The distinguished feature of Wedjat is its alert to the patient for drug-drug and drug-food ineraction.When dose was missed it updates the in-take schedule automatically. The application consists of user friendly interface for easy user interaction. It has Personal Health Record (PHR)system which maintain in-take records and synchronize them on host machine. Wedjat has been designed for Windows Mobile Platform. It provide medicine identification and in-take directions to user. This system uses electronic medical record (EMR) for patient prescription and in-take record. It uses one- medicine-at-time and one-dose-at-time scheduling algorithm for medication scheduling. It is built upon .NET framework and accesses calendar application through calendar API. The purpose of wedjat is to integrate healthcare support using mobile computing. It offers ubiquitous services.

Review from Literature #2:

"MedRem: An Interactive Medication Reminder and Tracking System on Wrist Devices", NSF Grant CNS1319302 and DGIST Research and Development Program (CPS Global Center) funded by the Ministry of Science, ICT & Future Planning. This paper presents MedRem which provides solution for a novel medication reminder and tracking system on wrist watches. This system is easy to use, user interactive and consists of various special features. This system created to overcome from the limitation of tiny display of wrist devices. This system has speech recognition and text-to-speech feature along with along with clever interface design. In this way, user can interact with device through voice

commands and also with display available on the device. In order to reduce the number of errors for recognizing commands from user, MedRem uses a dictionary training approach for the state of the art speech recognition system. This system is crated for native as well as non-native English speaker. It is highly flexible, customizes and automated system. In this system wrist watches automatically connected with cloud platform. Moreover, configurations and updations are automatically downloaded. The caregivers, physician and other legitimate user can use this updated data for different purposes. It takes inputs from microphones and speakers along with touch screen of wrist devices and provide output to user. It uses very few symbols and words for user interaction through touch screen. For different types of reminder, it uses different types of symbols. Along with reminder, it also tracks medication intakes. This system provides medication racking with minimum intervention. The reminder system of MedRem runs for very short period of time and when it ends, system schedules the next reminder. The system energy consumption depends upon how many times reminder session schedules and how long it runs. To minimize the energy consumption of system, it automatically save or download data from cloud. The limitation of MedRem is lack of real world deployment.

Review from Literature #3:

eMedication provides overview of medication of patients during their hospitalization. The purpose of eMedication is to reduce medication error as well as medication management. It is a smart phone based application implemented on android platform. This system provides details related to the drugs that are involved with the patients. This system is user friendly and adaptable for different age groups. It uses real data for processing of application. The implementation of the application based on iterative and incremental approach. It display detail information about drugs in simple and understandable way. The user interface of application consists of login and logout page. To help patient, it provide a tool which give brief information about medication during hospitalization. It also authenticate user. User can also access old medication files from hospital database. It provides security by authenticating user anytime. It is also reliable as it is available at any time. It is designed using Android UI Design Kit. The limitation associated with eMedication are, firstly it is not appropriate for large number of medication list and user experienced crash and freeze of application while using it.

Although there are many medication reminder apps are readily available to the public and have the potential to improve the effectiveness and reduce the costs of traditional interventions to improve medication adherence, there is no published evidence that such apps are effective in improving medication adherence.

A. *Existing solutions:*

Medisafe Meds & Pill Reminder allows you to schedule different types of medications with their description, dosage, regime type and frequency. With this app you can track drug intake and lots of health measurements, such as blood pressure, pulse, weight and temperature.

MyMeds The app shows not only which medication you should take, but also the reasoning for it. It tracks your medication, saves and analyzes your usage history. The app will notify you to refill your prescriptions and suggest the best price for each prescription nearby.

Care4today The app is designed to keep track of your medication schedule and provides reports for every type of medication you use. You can share these records with your doctor directly from the screen of your mobile device. You can also be connected to your healthcare provider and your loved ones to support one another to take medication on time.

Dosecast has a wide range of sounds and options for their notifications: repeating signals after a certain time, continuous signal lasting as long as you do not hear and do not come running to turn it off, and even a postpone option.

B. Drawbacks of existing systems:

- They don't facilitate storing the original prescription.
- The possibility exists for the existing systems to hang down due to the manual work involved.
- Trust and Quality Issues
- The Problem of Data Overload Security and Privacy Issues Reimbursement Issues
- EHR Issues

III. PROPOSED SOLUTION

We came up with a concept which makes a patient free from keep tracking or making a note on their medicines. We are providing a software solution to resolve this issue in simple and accurate manner. For solution we need a camera supported by IOS device, a data set consisting of images of medicines and system that recognizes and processes the things recorded by camera.

We are creating an iOS app in Swift using ARKit. We collect data on the pill bottles from the iphone camera and passed it to the Google Vision API. From there we receive the name of drug, which our app then forwards to a Python web scraping backend that we built. This web scraper collects usage and information for the medicines. We then use this information in the app to keep track of pill usage and build a robust functionality of our app.

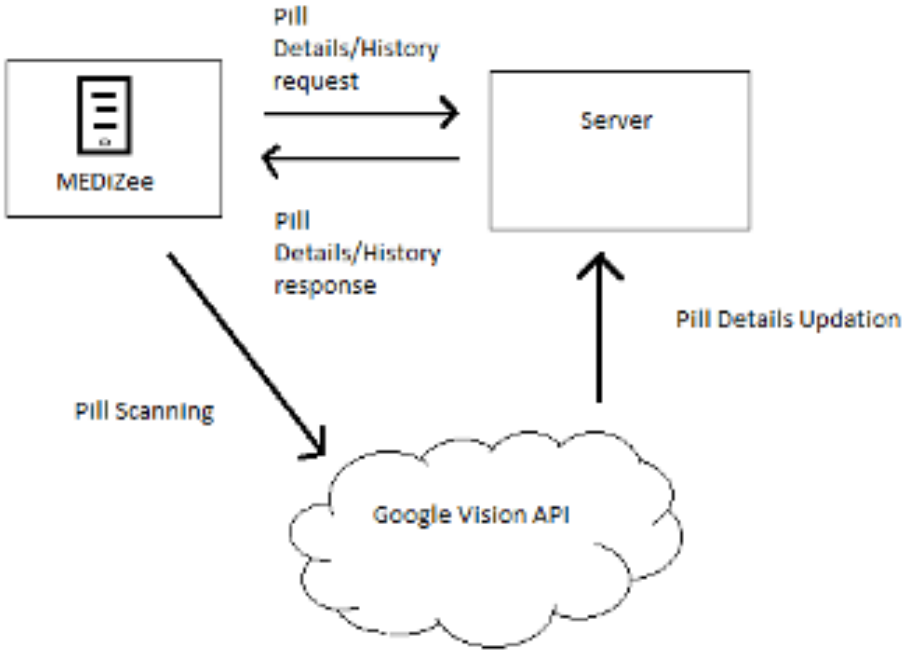

Fig1: System Overview

A. *Scan Activity:*

MEDiZee registers all the medicines that the patient wants to keep track. The patient can add medicines by scanning the medicine labels. After this process of label scanning is done, it will show the description of the medicine scanned in the form of an augmented card over the medicine bottle. The card displays name of the drug, the time of last medication, remaining dosage and the maximum limit of that medicine. And then, the information about the medicine is updated to the database.

B. *Scraping:*

It is a technique employed to extract large amounts of data from websites whereby the data is extracted and saved to a local file in your computer or to a database in table format. It decreases the time required to extract large amount of data from a source .It increases the accuracy of data extraction. It is faster than manually copying & pasting the data.

C. AR BASED CARD:

The result or output of scan process of medication is represented in the form of an augmented card. The virtual card appears above the medicine bottle. The card has the Name of the Medication; number of medications taken, maximum number of medication patient can take at a time. The card has a button to mark a medicine as taken.

IV. FUTURE WORK

The rapid integration of mobile devices into clinical practice has, in part, been driven by the rising availability and quality of medical software applications, or "apps." Apps are software programs that have been developed to run on a computer or mobile device to accomplish a specific purpose. Faster processors, improved memory, smaller batteries, and highly efficient open-source operating systems that perform complex functions have paved the way for the development of a flood of medical mobile device apps for both professional and personal use. The ability to download medical apps on mobile devices has made a wealth of mobile clinical resources available. Medical apps for many purposes are available, including ones for electronic prescribing, diagnosis and treatment, practice management, coding and billing, or e-learning. A broad choice of apps that assist with answering clinical practice and other questions at the point of care exist, such as: drug reference guides, medical calculators, clinical guidelines and other decision support aids, textbooks, and literature search portals. There are even mobile apps that simulate surgical procedures or that can conduct simple medical exams, such as hearing or vision tests. Many mobile apps are not intended to replace desktop applications, but are meant to complement them in order to provide a resource that has the potential to improve outcomes at the point of care.

This mobile application is very promising approach to be used in a future while addressing issues in healthcare. We can add on some more helpful features to our application for even more usefulness. We hope to be able to get more accurate medication information for each specific bottle, such as pill size, number of pills in one bottle. We would like to improve the bottle recognition capabilities, by maybe writing our own classifiers or training a data set. We would also like to add features like notifications to remind you of good times to take pills to keep you even healthier.

V. CONCLUSION

The implementation of this android application may be beneficial in helping patients to take their medications in prescribed manner. It has the Ability to record the time of last pill taken and number of pills left. Since it uses QR Code scanning, it will also help the patients to recognize the pill even if the name of pill has been erased. It will help in reducing many human cases of hospitalization due to over dosage.

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