

SMARTPHONE BASED MEDICINE INTAKE REMINDER USING GCM

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ABSTRACT — *The most error-prone procedure in modern healthcare has been found out to be the out-patient medication administration. Most of the medication administration errors happened when patients acquired over-the-counter and prescribed medicines from several pharmacies and use them at their homes without proper guidance. This paper presents an emergency alarm and healthcare management system, which is deployed on android phones which are conveniently used and carried by most of the people. The alarm is updated and schedule is modified automatically over the internet using GCM resulting in no need of manual input to the application.*

Keywords — *Medication Error, Google Cloud Messaging, Emergency Alarm, Healthcare, Android.*

I. INTRODUCTION

With the changing way of living which has moved to a fast paced lifestyle, most people have started facing with health problems. This is why it is important to design a health monitoring and security system for people. As mobile phones are very common and play very important role in people's lives, it is the best choice to deploy the monitoring and security system on mobile phones. Usually, the emergency alarm and healthcare system is deployed on independent devices [9] [10] which are wired or wirelessly linked to a gateway and then are connected to hospitals or emergency centres. But such systems have disadvantages like: on getting out of the coverage of the gateway, the system stops working. To this problem the solution comes in the form of communication using GCM where messages are sent in the form of push notifications. As carrier of healthcare management system and emergency alarm, there are many advantages for using the cell phone. First, the cell phone is very easy and comfortable to carry around. People are always carrying a cell phone with them everywhere, so they can trigger an alarm everywhere and every time. Secondly, the operating systems on cell phones like Android, Symbian and iOS have multiple applications and are easy to extend by developing applications. Thirdly, using their cell phones, users can make phone calls to their friends and family, and with the help of GPS, we can acquire their location.

II. RELATED WORKS

A. ANDROID

In this paper, we have chosen Android as our platform. Today more than half of the smartphones run using Android OS. Android operating system is a Linux-based operating system which is designed basically for touch screen mobile handsets such as smart phones and tablet computers which was developed by Google in conjunction with the Open Handset Alliance. Android was basically built from ground-up to allow the developers to create various interesting mobile applications which make the full use of all a handset has to offer. The system is specific to the android operating system only because the users of Android are high in number. Android also has an application development framework (ADF), which provides an API for application development and also includes various services for building various applications, accessing data, and other types of components. The framework is designed so as to simplify the integration and reuse of the components. Android apps are built using mandatory XML manifest file. This file provides the essential information to the Android platform for the management of the life cycle of an application. Compared to iOS, Android is an open source system, so we can modify it to our specific needs by changing or rewriting the source code.

B. GOOGLE CLOUD MESSAGING

With the beginning of pervasive and mobile computing era, smartphones have become very common, and wearable devices are getting improvements and opportunities. A significant portion of the applications for these devices rely on remote servers on the cloud, and Google Cloud Messaging (GCM) is a very popular service for client/server communication for Android. GCM is a service which allows developers to send push notifications

to Android devices from the server. GCM handles the queuing of the messages and then delivers those messages to the destination applications on the devices. GCM is a free service provided by Google, and has no quotas. It is the automatic push messaging solution for the Android devices [4].

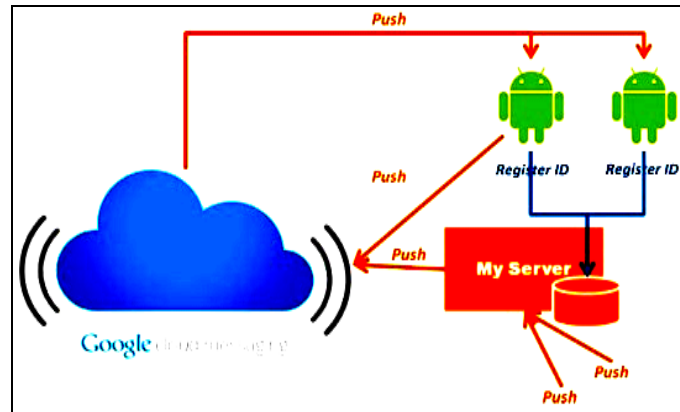


Fig 1. GCM Implementation

C. LITERATURE REVIEW

In the paper “A mobile Health Application for Outpatients Medication Management”, the authors Bruno M. Silva, Ivo M. Lopes, Mickael B. Marques, Joel J.P.C. Rodrigues, Mario L. Proenca Jr., have proposed a mobile health application called SapoMed primarily for medication administration management. The advantage of this proposed system is that it is easy to use, allows user to register drugs manually, and saves past intake medication and records. But in this system the complete list of medication identification is not present.

In the paper “Implementation of Cloud Messaging Service”, the authors Yan Chen, Penghui Li, Renyuan Wang Taoying Li, and Junxiong Sun have analyzed the working of the Google Cloud Messaging (GCM) service. Their analysis has shown that the fully real time up- dates, customization and personalization, security and reasonable scalability, less battery consumption, high productivity, get most benefits of cloud computing. Using GCM also avoids wastage of the network traffic and consumes less battery power.

In the paper “An android based emergency alarm and healthcare management system”, the authors Yuanyuan Du, Yu Chen, Dan Wang, Jinzhao Liu and Yongqiang Lu propose a system for management of user’s health record and reminder for medication, emergency alarm system. The advantage of their system is that emergency help is available anywhere and anytime, reminder of medication based on prescription. But the disadvantages of their system are that absence of cloud Synchronization causes loss of network traffic and data, and there is a lack of medication database.

III. PROPOSED SYSTEM

Most out-patient medication errors happen when patients have bought prescribed and over the counter (OTC) drugs from different medical stores and consume them with little or no guidance. Common causes of these errors are: (1) irregular medicine in-takes due to busy or erratic lifestyle of the patient, (2) complicated in-take schedules due to the multiple medicines prescribed to the patient, (3) adverse drug reactions due to inconsistent prescriptions that are obtained from multiple sources, (4) lack of knowledge about proper application of medicine, (5) irregular or lack of consultation with the healthcare providers due to any reasons and (6) lack of monitoring functions to keep track of the medicine in-take schedules of the patient and monitor his/her health.

In recent years, telemonitoring has been investigated as cost-effective approach to manage control in quality of the out-patient medication administration. Using remote control devices for issuing the medicine in-take reminders we can dispense proper medication and also keep a record of the medication in-take schedules of the patient. Health Maintenance Organizations (HMO) hope to reduce the cost of service while at the same time improving the quality of care offered to the elderly and/or chronically ill patients. Though the installation of such remote controlled devices represents a step in the right direction, the medical dispensers are mostly bulky, costly and liable to mechanical dispensing errors. An alternative solution to this is to install a medication intake scheduler and reminder on a mobile phone and using that mobile application to take medication on proper time and in proper quantity. This solution is cost effective and can also result in deeper effect into the market.

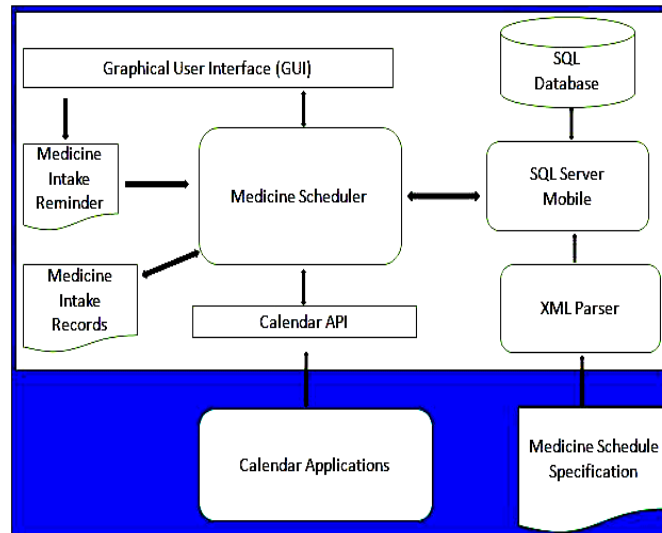


Fig 2. System Functional Module

Features like medicine intake records are used to store the patient's old medicine prescriptions for the reference to the doctor. The calendar API will remind the patient to either meet the doctor again on finishing the current dose or to buy next dose as suggested by doctor. All the interaction will be done via the GUI of the application. Our system has two main functions: emergency alarm and medication reminder.

1. Emergency alarm system is triggered manually. The alarm action will send emergency message to the user's family and the doctor. And the emergency message can include the location information, in order to locate the user for the rescue.
2. The medication reminder function helps user to remind when to have medicine and some other things like injections according to the doctor prescriptions. It is useful to everybody but more effective for the elderly and the chronic patients.

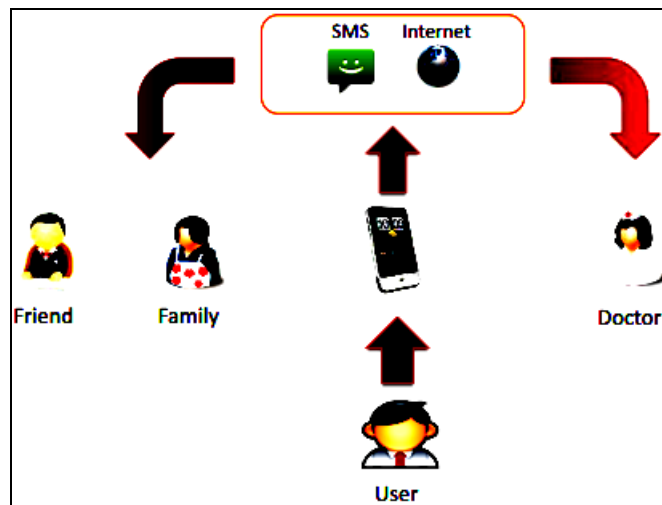


Fig 3. Emergency Alarm

Now-a-days most mobile phones support Internet access thus allowing the doctor to send the prescription to the user's mobile phone in order to update and/or modify the user's schedule. After the prescription is received on the user's mobile phone, the application alerts the user to take medicine on the time and quantity as per the updated schedule. These updates are sent to the patient's phone using Google's service known as the Google Cloud Messaging (GCM). Google Cloud Messaging (GCM) is a popular service as a client/server communication solution for Android.

IV. ADVANTAGES

This system will provide the information about the medicine timings and quantity. The appointments which are scheduled with the doctor including the contact details including visiting time. This system focuses on improving the number of visits or revisits at healthcare appointments. The personal phone notifications and reminders are very strong support tool for improving medication adherence strategies.

The New England Healthcare Institute estimates that healthcare expenditures worth \$290 billion could be avoided if medication prescription were to be followed as suggested [10]. It supports an easy implementation as it is more cost effective, reliable, scalable, accessible to anyone and everyone possessing smartphones, and does not require separate external devices/hardware and packaging. Also the service of reminding the doctor's next appointment is available.

The emergency/panic button provides the details of the patient to his/her family and/or emergency contact and to his/her doctor.

V. CONCLUSION

There are many medication reminder systems in the market. They have been made on different platforms. Most of these systems require special hardware devices for the job of reminder of medication timings and intake. Purchasing new hardware is not only costly but also consumes time. So in our project we have made attempts to create a system which is economical and easily accessible to everyone and which provides timely reminders. Not following the medication intake schedule provided by the doctor can result in reduced effectiveness of the treatment resulting in either prolonging the treatment or changing the treatment which in turn results in increase in financial burden.

The patients will receive the schedule of medication in-take time and quantity with medicine description, starting and ending date of medicine. The scheduled reminder will not be suggesting any different kind of medicine which is not prescribed by the doctor that will assure the protection of the patient from ill-effects and also will avoid wrong dosages. Doctors can view all the appointments along with their date and time, which he fix and using this he can make new appointment schedules.

VI. REFERENCES

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