

**MEDMINDER: A MEDICINE INTAKE SCHEDULER AND REMINDER**Akshay Pande¹, Rahul Kumar², Vinay Yadav³, Prof. V.N. Dhawas⁴^{1,2,3} Student, Department of Computer Engineering, S.I.T. Lonavala, India⁴ Asst. Professor, Department of Computer Engineering, S.I.T. Lonavala, India

Abstract-- Modern healthcare services can be considered as one of the most error prone services due to out-patient medication administration. The highest numbers of medication errors occur during the acquisition of prescribed drugs from the pharmacies. Another reason for medication errors occur when the people/patients buy drugs without prescriptions and/or prescribe the drugs to themselves without any proper guidance or due to somebody telling them that it helps. In this paper we present an alarm and healthcare management system, which is deployed on android devices. Now days almost everybody uses mobile devices which they carry with them everywhere they go. In this system we are also implementing reminders which use alarms. This alarm will be updated over the internet by the use of GCM. This in turn removes the need of manual input in the system's medication reminder thus preventing errors.

Keywords: Medication error, Google Cloud Messaging, Emergency alarm, healthcare, Android.

I. INTRODUCTION

With the change in times the lifestyle has changed drastically over last few years. This change in lifestyle has resulted in rise in medical problems in people. One such example can be seen as increase in the number of obese and diabetic people all over the world since last few decades. Due to these reasons it has become necessary to develop a system which can keep up with the current systems and trends. The mobile phones are the devices which have become increasingly common among the people with development of technology over time. They have started playing a crucial role in people's lives. Due to this it is best choice to deploy the health monitoring and reminder systems in these devices.

Another way is to use independent devices for these services. These devices may be linked using wires or may be wirelessly linked to other gateway. This gateway in turn can be connected to emergency centers and/or hospitals. However these systems have various disadvantages. Some of the disadvantages are : the coverage area of various devices is different. If a device goes out of coverage area then the system can stop working. Another problem is power consumption. When using extra hardware the power consumption needs to be monitored. The solution to above mentioned problems is using mobile phones and the communication is to be done using GCM. In GCM the messages are sent as push notifications. Using the smartphone as the carrier of the healthcare management system has various advantages. The best and biggest advantage is that smartphones are comfortable to carry and easy to use. People now a days have a habit of carrying their smartphones with them everywhere they go. This makes it easier for them to trigger the alarm anywhere. Secondly the operating systems used in smartphones like Android, iOS, Symbian, etc. have multiple applications which can be easily extended by developing more applications. Third, using the smartphones, the user can make phone calls to family and friends, also using GPS the location can be acquired.

II. RELATED WORKS**A. Android**

Android is the most popular OS in the market with the market share of around 66%. It is followed by iOS at 27%. Windows is third at around 5%. And remaining are other os. The statistics are of 1st April 2016. Android is a linux based os which is designed basically for touch screen smartphones and tablet computers which were developed by Google in conjunction with the Open Handset Alliance. Android was developed from ground to allow creation of various interesting smartphone applications by the developers allowing the users full possible use of their smartphones. The system described in our paper is specific to the android OS only due to the higher number of users. Android has an ADF – Application Development Framework. It provides an API for development of applications and also various services for accessing data and other components. The framework design simplifies the integration and reuse of the usable components. Android apps have to be built using XML manifest file which is mandatory. The essential information to the android platform for the life cycle management of an application is provided by this file. Android being an open source system unlike iOS, can be modified to suit our needs by rewriting the source code.

B. GCM (Google Cloud Messaging)

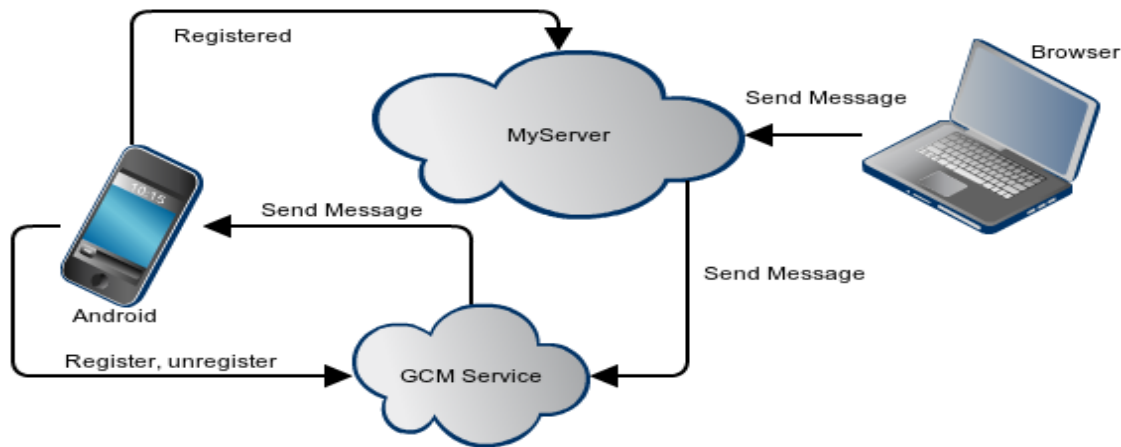


Fig 1: GCM Implementation

Smartphones have become very common since the beginning of of pervasive computing and mobile computing era. This in turn has resulted in various opportunities improvements in wearable devices. A significantly large portion of applications for these wearable devices rely on remote servers which are on cloud. Google Cloud Messaging (GCM) is a very popular client/server communication service for Android. The GCM service sends push notifications from the server to the Android devices. The queuing of messages and the delivery to the destination application is handled by the GCM service. GCM is a free service which is provided by Google and has no quotas. It is an automatic push messaging solution for Android Smartphones.

III. Proposed System:

Many times people buy over the counter (OTC) drugs from different medical stores. They then consume these drugs with little or no guidance. This is one of the biggest causes of out-patient medication. Common causes of these errors are: (1) complicated intake schedules due to multiple prescribed medicines, (2) irregular medicine in-takes due to erratic lifestyles, (3) lack of knowledge of proper application of medicine, (4) adverse drug reactions due to inconsistent prescriptions that are obtained from multiple sources, (5) lack of monitoring functions to keep track of the medicine intake schedules for monitoring the patient's health, (6) irregular or lack of consultation with healthcare providers due to various reasons.

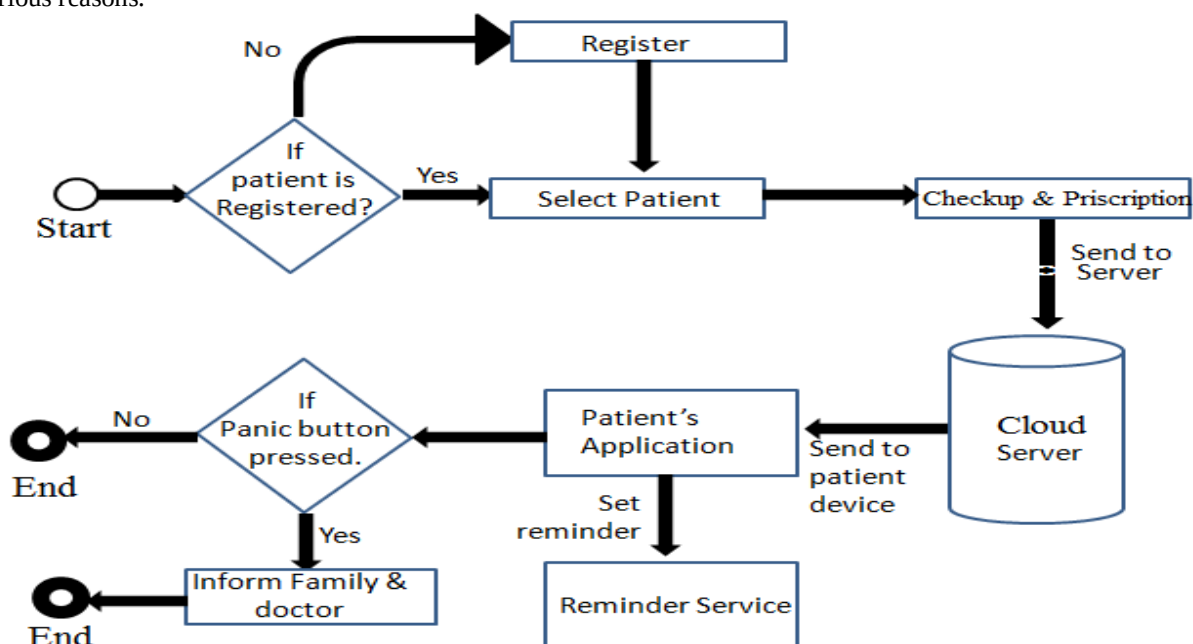


Fig 2. Medminder Activity Diagram

In recent years, investigations have revealed telemonitoring as a cost-effective approach for managing control of the out-patient medication administration. With the use of remote control devices for in-take reminder, proper medications can be dispensed with the ability to store records. Health Maintenance Organizations (HMO) have been hoping to reduce the cost medical services while also improving quality of care to elderly and/or chronically ill patients. Even though when such remote controlled devices are installed is taking a step in right direction, the devices like medicine dispensers are costly, bulky and are liable to mechanical dispensing errors. The easy alternative is installing the medication intake scheduler and reminder on smartphones. This suggested solution is highly cost effective and may result in having a deeper effect in the market.

The feature of medication records will keep track of the patient's old medication data as a future reference. The feature of calendar API will serve as the reminder for the refilling of prescriptions and/or a meeting with the doctor for a follow-up. All the described interaction will happen via the simple GUI of the smartphone application.

There are two major functionalities in our application:

1. The emergency alarm system which is triggered manually. This alarm action sends an emergency message to the user's emergency contact which is registered and family and doctor. To locate the user this message can contain the location information of the user.

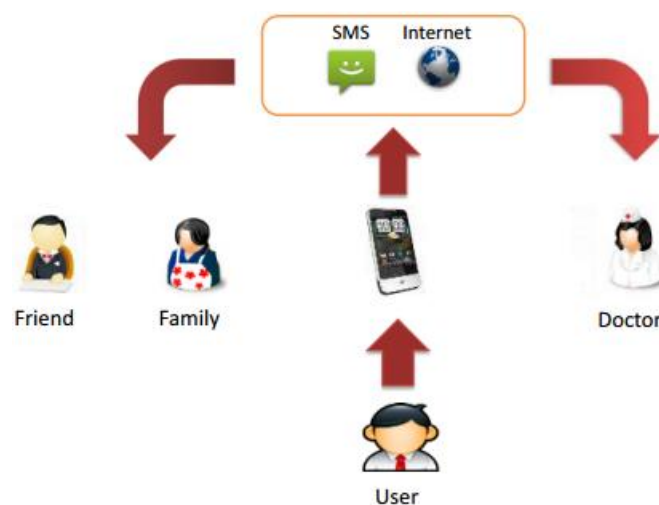


Fig 3. Emergency Alarm

2. The medication reminder functionality provides the user with regular, timely and helpful reminders as to which medicine is to be taken at what time and in what quantity exactly as described in the prescriptions assigned the consulting doctor. It will also make reminders of injections. This functionalities are especially useful the elderly and chronic patients.

The smartphones now-a-days provide the internet services. This allows the doctor to send the new/modified prescriptions on the patient's smartphone. This in turn updates the user's reminder schedules automatically. These updated prescriptions will be sent over the internet using Google's service known as Google Cloud Messaging (GCM).

IV. Advantages:

This system will provide the accurate information of medication timing and the quantity to be ingested. The details of follow-up schedules and doctor contact information will also be provided by the application. One of the focuses of this system is to improve the number of visits and/or revisits at healthcare appointments. The service of personal reminders on the user's smartphones is a great support tool for the 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. This system supports an easy implementation as it is cost effective and avoids the use of any external packaging hardware. The service of reminding the user regarding their next appointment with doctor is very useful in today's hectic lifestyle. The emergency alarm/panic button sends the details regarding the user i.e. patient to his/her emergency contact, family and doctor.

V. Conclusion & Future Scope:

In today's market there are many medication intake reminder systems are available. These systems have been made on various different platforms. Many of these systems require special hardware devices to perform the services of medication intake reminder. The purchase of such new hardware is not only costly but also consumes time. Thus in our project we have attempted creating a system which is easily accessible and is also economical for providing timely

reminders. If the medication intake schedule provided by doctor is not followed, it results in reduced effectiveness of drugs and/or prolonging of the treatment or complete change in the treatment. This in turn will increase the financial burden.

In our system all the patients will receive the schedule of medication details, intake time, quantity, start and end time of current medication. Our application will not provide any other substitute medication to the medication prescribed by the doctor. This will assure the patient does not suffer any ill effects or do not partake wrong dosages. The doctor side of the system allows the doctor to view all the appointments along with the details like date, time, etc. This will also allow the doctor to make new appointment schedules.

We plan to make overall improvements over other applications which in turn will result in better performance and easier access for the users. Also alternative medication suggestions which are best suitable to the user will be suggested to the user. OCR will be introduced to scan the details of medication. It will also focus on more ways for achieving medication adherence.

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