GPS BASED MEDI –SAFE APPLICATION USING ANDROID DEVICES

M.Kirushalini and HMM. Naleer

Department of Mathematical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka
Shalu.mahendra@gmail.com, hmmnaleer@gmail.com

Abstract

The purpose of this paper is to explore the possibility of creating an android application which provides its users with a more efficient way of managing their medical needs than existing application. The project looks at existing applications and sees what they are lacking on and how this project could improve on their mistakes. The project tries to provide a more efficient platform for doctors to communicate with patients and also implement other features which are not very common to give the application an edge over existing applications.

The application developed in this project was developed in Eclipse. The application uses a Sub Query Language database to store user information such as their personal information, medications and appointments. It allows users to find doctors and add them as contacts or make an appointment and allows the user to search for doctors by their name or by location. Finding doctors by location is a very efficient way of finding doctors as the user can find doctors in their area. Unlike most medical applications this application allows patients to book appointment without having to talk to the doctor. The doctors can fill out appointment slots they want to be available and then the user can come along and book one of those appointment slots. This application also provides the users with scheduling tools which allow the users to plan out their week relatively easy, they can enter in their medications and when they want to take them and application will be send them a notification.The result of this thesis is a fully functioning Android application which provides users with an efficient way to find and communicate with doctors, book medical events, and be reminded of medical events.

Key word: Eclipse , Android ,Medical application

Introduction

Technology has really changed the world we live in. It has helped make our lives easier in so many ways. It has made it much easier for us to be more organized and communicate with each other. There are many growing trends in technology these days that have helped us to be more organized and communicate with each other. No one trend has helped us accomplish this more than mobile applications. Mobile applications have provided us with all different types of services such as calendars, alarms and instant messaging.

These services have become very helpful for people in many different scenarios but have not been taken advantage of in others. These days many medical practices do not use technology as well as they could to communicate with their patients. Many medical practices have not been very efficient with the way they assign appointments to patients. Several patients are often given the same appointment times. This can cause appointment rooms to be overcrowded. This can be a health risk to vulnerable patients. It also can be a big inconvenience for others who may be waiting long periods of time. Also many patients do not use technology as well as they could to help them with their illnesses. Many patients could benefit with using an application to remind them when to take their

medicine. There have been many attempts to develop an application which helps people manage their medical needs. Most of which provide a good service but have their shortcoming. One of the applications I discovered was "Book Dr Appointment" [1]. This application allows new users to join and find a Doctor. They can then book a doctor appointment with the Doctor of their chose. This application has been quite successful amongst android users. It's has a 4.5/5 on the Google play store. It has been installed by 5,000 – 10,000 android users.

There are many other applications on the Google play store just like "Book Dr Appointment" that all pretty much do the same thing. Most of them do not implement any additional features which could be beneficial to the doctor or to the patient. Instead of just recreating the wheel, this project will explore the possibility of developing an android application to help users manage their medical needs in a different and more efficient way than the ways that are already available. Some of these additional features will include a scheduling system which will allow doctors and patients to manage their schedules in an efficient way.

The aims and objectives for this project are as follows:
1.   Research mobiles applications in relation to medicine and learn the best approach to take.
2.   Develop a complete operational Android application that allows doctors and patients to communicate, manage appointments and medications in an efficient way. The application should implement the following features:
    1.   Allow patients to book appointments.
    2.   Allow patients to communicate with their doctor through phone.
    3.   Allow patients to fill out their medication schedule.
    4.   Remind patients when they have an upcoming appointment.

Android application for medical management purposes
Mobile medical applications have really changed the health care system for the better over the last few years. These advancements are really needed in this day and age because of the increasing aging population of the world. They are providing doctors and their patients a number tools and resources to help them manage their health [17]. A survey at a Canadian medical school found that 85% of students owned smartphones and often used medical apps to reference disease diagnoses and medications [18]. A review on academic literature by [19] found most apps targeted at patients focused on certain health conditions, health diaries and medical calculators.

There are many different approaches to medical applications out there, one research paper [20], discussed an application to monitor a patients vitals. [20] allows doctors to view up to date information of the patients' vital health parameters such as, heart rate and blood pressure. The doctors can monitor these results and make notes on them. If the patients vital levels go below a critical limit their doctor will be notified that their patient is in danger.

Another medical application approach was discussed in the research paper [21]. [21] is a mobile application which aims to stop the common problem of misinterpreted drug prescriptions. This has been a serious problem in the medical field which has led to the deaths of thousands of people [22]. It can be caused by the doctor's sloppy handwriting or inability of the pharmacist to correctly interpret the drug name on the prescription. This

application allows users to take a picture of the prescription with their phone camera. The picture is then processed by the handwriting recognition algorithm and returns the matching result from the database.

Methodology

Technology required

1.Eclipse
The Eclipse was downloaded from the android website [ref]. It is the official integrated development environment for android. It was improved visual editor and better code completion. The application was built completely in eclipse using the Android software development tools.

2.Android SDK Tools
The Android SDK was downloaded to develop the application. The Android SDK provides many different packages such as the SDK Tools. This package provides tools for debugging and testing, and other utilities that are needed to develop applications. The application was build, tested and debugged using the Android SDK tools.

3.Google Play Services SDK
The Google play services was downloaded so that the application could take advantage of the latest Google powered APIs such as Google Maps. The application used Google Maps to allow patients to search for doctors by location using a map.

4.MySQL
MySQL is a relational database management system. The application used a MySQL database to store data such as the doctors and patients personal information, appointments time and medications.

5.PHP
PHP is a server-side scripting language. The application used PHP scripts to communicate with the database. Through PHP scripts the application is able to request data from the database and can also send data to the database.

6.JSON
JSON is a lightweight, human readable format for structuring data. JSON was chosen over XML mainly because of its ability to generally parse data faster than XML. The application used JSON to read in data from the database

Requirements Specification and Feasibility
The application was developed with Android 4.0 (Ice Cream Sandwich) which means it will run on 94% of all android devices. The application has a minimum SDK version of 14 and a target SDK version of 19. The application was tested on the following devices:

1.   Sony Xperia E – Running on Android 4.0 (Ice Cream Sandwich)
2.   Samsung S5 – Running on Android 5.0 (Lollipop)
3.   Nexus 10 – Running on Android 6.0 (Marshmallow)

Software development life cycle

The Software Development Life Cycle which was chosen for the project is the Spiral model. This model was chosen as it involves a lot of testing which will help the final application to be better.The spiral model is similar to the waterfall model but it is an upgraded version. The spiral model consists of four phases. They are Planning, Risk Analysis, Engineering and Evaluation. The project goes through these phases in iteration. This approach assumes that no one gets it right the first time, each iteration refines the previous result.

- Planning Phase: In this phase requirements and objectives are gathered.
- Risk Analysis Phase: In this phase risks are identified and are analysed. Alternative solutions are also evaluated.
- Engineering Phase: In this phase the software is developed and testing is carried out.
- Evaluation Phase: In this phase the project output is evaluated before its takes its next spiral.

The main advantage of the spiral model is that it reduces the chances of project failure. This is achieved through extensive risk analysis. By carrying out risk analysis it can help avoid risks which could cause the project to fail.
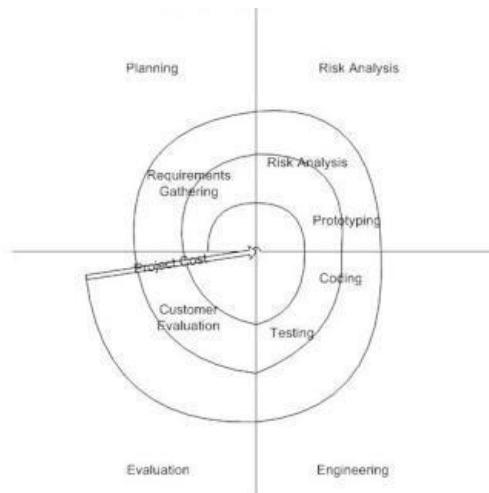
Figure 2. Spiral Model [29]

System design
1.Application Design
Navigation
- One of the most important consideration when designing the application was navigation. The users should know where they are at all times and how to get to the places they want easily.

Scaling
- The application has been designed with scaling in mind. In order for the application to run effectively on different types of Android devices of all different sizes the layouts must be as flexible as possible

2. User Interface and Functional Design

1. Welcome Activity- The "Welcome" activity is the first activity to open when the application is launched.
2. Login Activity- allows users to sign into the application.
3. Register Activity - allows users to choose to register as a patient or as a doctor.
4. Patient Register Activity- allows users to register as patients.
5. Doctor Register Activity - allows users to register asdoctors.
6. Home Activity - allows the users to manage their accounts.
7. Search Activity- patients to select a search method to search for doctors.
8. Search by Name Activity - allows the patients to search for doctors based on their names.
9. Search by Location Activity- allows the patients to search for doctors based on location.
10. Calendar Fragment - contain a CalendarView which allows users to select the dates.
11. Diary Entry Activity- allows users to see events for a certain date.
12. Contacts Fragment - allows users to see their contacts.
13. Planner Fragment - allows users to add schedules.
14. Add Medication Activity - allows patients to add a medication schedule.
15. Add Appointments Activity - allows doctors to add an appointment schedule.
16. Profile Activity - allows patients to see doctors' profiles.
17. Available Appointments Activity - activity allows patients to see available appointments for doctors.

Results

Figure .3 shows the Main menu of the medi-safe app
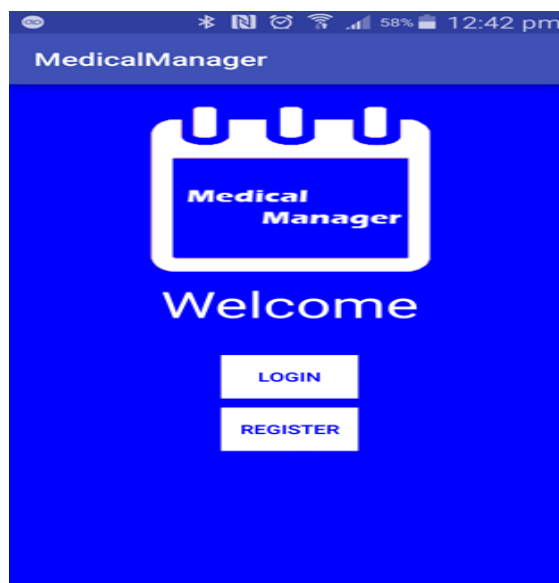
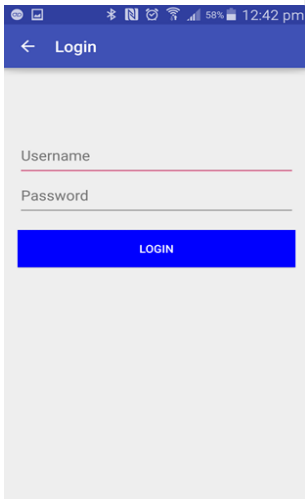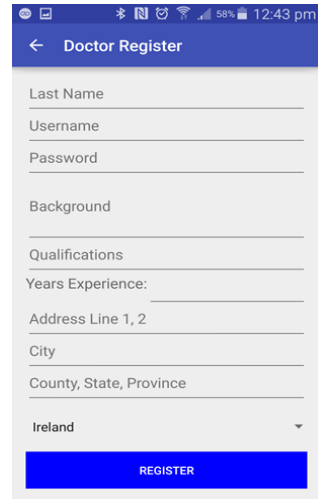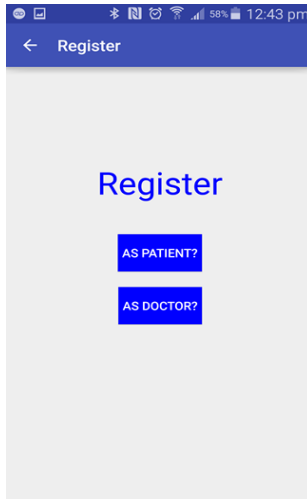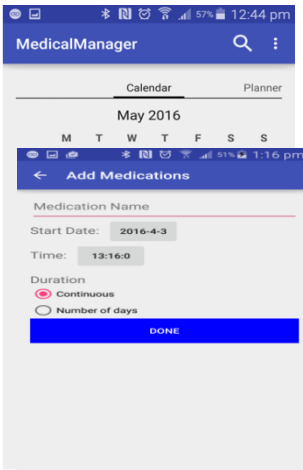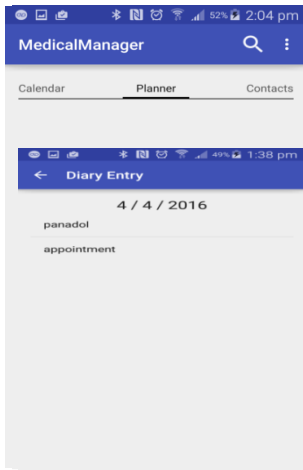**Fig 3: Welcome activity implementation**

Figure 4: login activity   **Figure 5:Register activity**   **Figure 6:DoctorRegister activity**
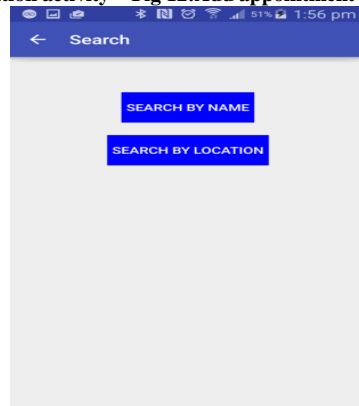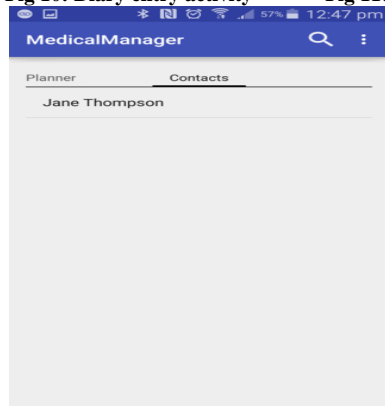
**Figure 7:Patient Register activity
Figure 8: Diary entry activity   Fig
9: Diary entry activity**

Fig 10: Diary entry activity   Fig 11: Add medication activity   Fig 12:Add appointment activity

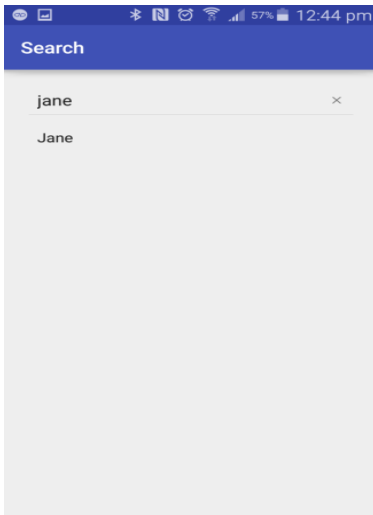**Fig 13:Add appointment activity   fig 14: Search activity**

Fig 15: Search by name activity
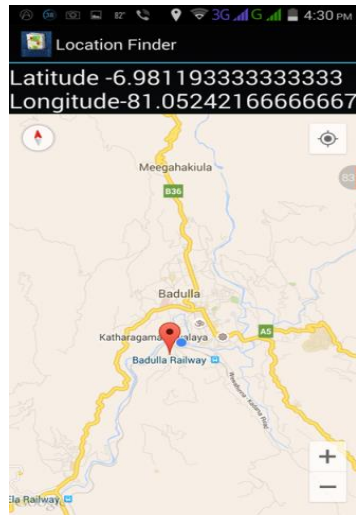

Fig 16: Search by name activity

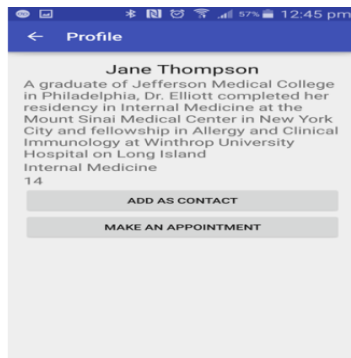**Fig 17:Available appointment activity**

fig 18: Profile activity

Conclusion

There is no application on the market which provides all of the features that this application does. This application has made improvements on existing application by adding in additional features and improving on existing ones. We can happily say that there is a demand for an application like this in medical practices after conducting the survey at a medical practice which received very positive feedback. The main purpose of this project was to explore the possibility of creating an android application that allows users to manage their medical needs in a different and more efficient way.This application will be very helpful for everyone who uses it. It will help doctors and their patients to have better relationships by helping them to communicate with each other better , provide patients with a more efficient way of booking appointments with their doctors, increase patients chances of them being seen at their scheduled time by preventing problems such as double booking , prevent patients from missing their appointments by sending them a reminder, prevent overcrowding in medical practices as doctors and patients will be more

likely to meet at their scheduled time and remind patients to take their medications by sending them a notifications.

References

[1] Book Doctor Appointment, Google Play, Retrieved 4/4/2016, 2016, from https://play.google.com/store/apps/details?id=com.bda.patientapp

[2] Shao Guo-Hong, "Application development research based on android platform," in Intelligent Computation Technology and Automation (ICICTA), 2014 7th International Conference on, 2014, pp. 579-582.

[3] Developers A. What is Android[J]. 2011

[4] ZHANG S C. Development and Research of Application Based on Google Android [J][J]. Computer Knowledge and Technology, 2009, 28.

[5] Brahler S. Analysis of the android architecture[J]. Karlsruhe institute for technology, 2010.

[6] DanylBosomworth, Mobile marketing statistics 2015

[7] Nielsen, Who's Winning the U.S. Smartphone Market, *2013*

[8] T. Bradshaw, "Apple's app advantage wanes as developers warm to Android," The Financial Times, pp. 1, 12/28; 2015/11, 2012.

[9] A. Stevenson, "Top 10 Android benefits over Apple iPhone," V3.Co.Uk, 03/28; 2015/11, 2014.

[10] M. Rowan and J. Dehlinger, "A Privacy Policy Comparison of Health and Fitness Related Mobile Applications," Procedia Computer Science, vol. 37, pp. 348-355, 2014.

[11] Rowan, M. and Dehlinger, J. Privacy incongruity: an analysis of a survey of mobile end-users. 13th International Conference on Security and Management. 2014.

[12] Steinberg, J. (2013, December 6). This flashlight android app has been secretly and illegally sharing your personal data with advertisers. Retrieved from: http://www.forbes.com/sites/josephsteinberg/2013/12/06/this-flashlight-android-app-has-been-secretly-and-illegally-sharing-your-personal-data-with-advertisers/.

[13] Slabodkin, G. (2014, May 8). FTC concerned with health data sharing apps. Retrieved June 10, 2014 from: http://www.healthdatamanagement.com/news/FTC-Concerned-with-Health-Data-Sharing-Apps-48017-1.html.

[14] Dubay, W. (2004, August 25). Principles of readability. Retrieved June 12, 2014 from: http://www.impactinformation.com.

[15] Phandroid Forums. (2012, October 31). Confused over app permissions. Retrieved June 11, 2014 from: http://androidforums.com/android-applications/641501-confused-over-app-permissions.html.