Multipurpose Health Application

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Abstract - *In this paper our aim is developing an Android application for finding closest hospital, calculating calories burned and administration of medication. GPS system locates hospitals in the user's vicinity. Path from place of emergency to nearest hospital is found using two attributes: Latitude and Longitude. Calorie counting will be done by detecting human activities using Android accelerometer. ACSM equations are used to find burnt calories. The medication management module intend to notify the user about medication schedule to avoid unsteady intakes or over doses. Notifications can be in form of audio, visual, vibrating alerts.*

*Key Words***: Android, Emergency, GPS, Accelerometer, Calorie counting, Medication.**

1.INTRODUCTION

In this paper, we are representing how health care model is implemented using recent tools available in the market. It uses the Android system for purpose of monitoring medication and health. The application is user friendly and has multiple uses. It combines advantages of three modules which can serve people of various interests.

Mobile technology can be useful to resolve major issues related to health care, since mobile devices provide instant assistance to users by their functionalities. Due to its broad applicability Android platform is capable of providing different services.

In this project we have implemented the following functionalities: A user in need during emergency such as an accident will get access to nearest hospital based on their current location [1]. Details and timing of the dosage can be notified to the users [2]. Also monitoring of health and weight can be done [3].

1.1 Problem statement

To create an application on android platform which comprises of overall health benefits for all kinds of users. The application will target the health conscious people, people on medication, people in need of medical assistance specially people in emergency. Also to provide an inexpensive and easily accessible application for overall health benefits.

2. LITERATURE SURVEY

2.1 Hospital Locator

This paper presents development of an Android application for helping people to getting nearest hospitals list in emergency situation. It helps in contacting the nearest hospital with minimum number of clicks, thus saving time.

2.2 Medication Management

It presents an android application design for resolving dosage monitoring. Medication errors in outpatient administration were identified as the most error-prone procedure in modern healthcare. Most medication errors are performed when patients use them without proper guidance.

2.3 Calorimeter

This research intends to present a mobile calorie counting application which utilizes An-droid accelerometer to perform human movement recognition. The acceleration generated by users movement will be converted into speed and further be used in ACSM metabolic equations in order to nd the number of calories burned. The proposed application also shows the statistics of calories burned per day and suggests the appropriate number of calories burned for each user which can help people to control their weight anytime and anywhere.

3. PROPOSED SYSTEM
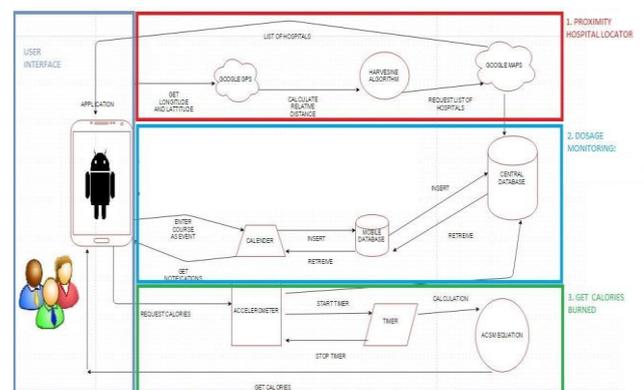
Fig -1: System Architecture

The project will cover features such as:

3.1 Hospital Locator[1]

The purpose of this module is to assist the user to locate the nearest hospital in his vicinity.
Harvesine Formula:
R = earths radius (mean radius = 6,371km)

$$\Delta lt = lt2 - lt1$$
$$\Delta ln = ln2 - ln1$$
$$a = sin^2(\Delta lt/2) + cos(lt1).cos(lt2).sin^2(\Delta ln/2)$$
$$c = 2.a.tan2\left(\sqrt{a}, \sqrt{(1-a)}\right)$$
$$dist = R.c$$

3.2 Medication Management [2]

Majority of the issues faced by outpatients are due to erratic and inconsistent dosages of prescribed medication.
Input to the system is the details of medicines, time and interval of their dosages. The output is in form of vibrating notification for reminder of the time of dosage.

3.3 Calorimeter [3]

This module is useful for users that wish to maintain or reduce their weight. The inbuilt android sensor has been used to recognise the physical action being performed by the user. Acceleration is generated which will be used in metabolic equations by converting it into speed. The ACSM metabolic equations are used to calculate the calories that are burned during the physical activity.

The ACSM metabolic equations are discussed below:

Maximal Oxygen consumption equation :

$$VO_2 Max = H + V + R$$
$$VO_2 Max(W) = (0.1 * Speed) + (1.8 * Speed * Gradient) + 3.5$$
$$VO_2 Max(R) = (0.2 * Speed) + (0.9 * Speed * Gradient) + 3.5$$

where, V, H and R are amounts of oxygen consumed in the vertical, horizontal motions and resting.
0.1 and 0.2 are oxygen cost/meter for moving each kilo of body weight while walking and running respectively.
1.8 and 0.9 are oxygen cost/meter of moving total body mass against gravity (i.e. vertically).

Calorie Expenditure:

$$caloric\ expenditure = (VO_2 Max * Weight/1000) * 5$$

Unit of Calorie Expenditure is Kilocalorie (i.e. kcal).
BMR (Basal Metabolic Rate) :
$$Male\ BMR = 66 + (13.7 * Weight) + (5 * Height) - (6.8 * Age)$$
$$Female\ BMR = 665 + (9.6 * Weight) + (1.8 * Height) - (4.7 * Age)$$

3.4 Firebase[4]

Firebase is a web platform that assists developers for building high quality applications. The users can combine and use the complementary features provided by firebase as per their needs. Firebase's main feature is real time database which provides an API that allows developers to load and sync data across number of clients. Secure file downloads and uploads for the clients' storage is provided by the Firebase Storage, notwithstanding the quality of network.

Some main features of Firebase are as follows:
• Notification of Firebase
• Real-time Database
• Authentication Feature
• Crash Reporting
• Storage

Firebase helps the user to develop the application, grow the client's user base.

4. EXPERIMENTAL RESULTS

4.1 Hospital Locator

We do not need to login into the application to use this functionality. The Google Maps facility returns an unsorted list of hospitals in the locality. Since we need the list in ascending order according to their distance from the users currents location, we need to sort it. For sorting we have used a sorting algorithm. Java provides hashmap sorting for java collections, the same has been used to sort the list of hospitals returned.
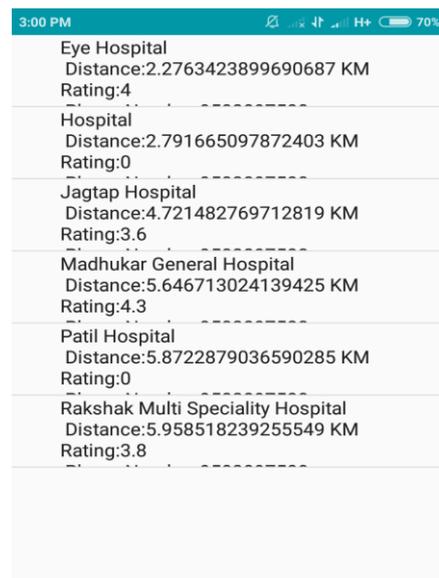
Fig 1. List of Hospitals

4.2 Medication Management [2]

The output is in form of vibrating notification for reminder of the time of dosage. The inbuilt alarm activity is used for the purpose of generating the notification feature. SQLite has been used as database for storing the details of medicine and dosage entered by the user. This feature has been provided to users only upon successful login.
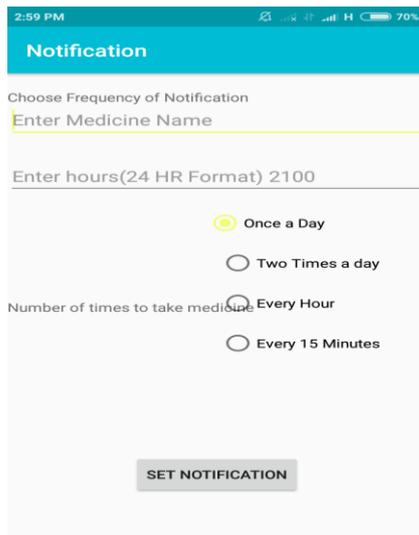
Fig 2. Taking input of medication details

4.3 Calorimeter [3]

The ACSM metabolic equations have been used to find calculate calories burned. This module helps in maintaining weight and thus in return ensures user's health.
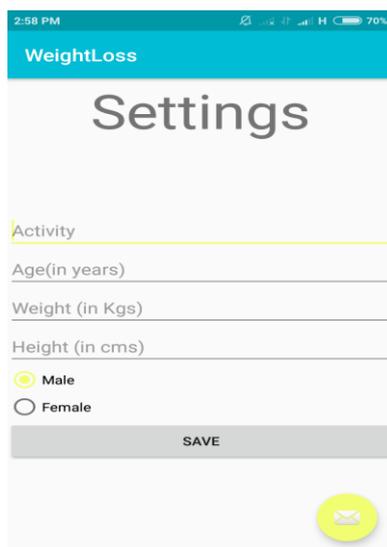
Fig 3. Taking input about user's details

Some screenshots of the login pages are as follows:
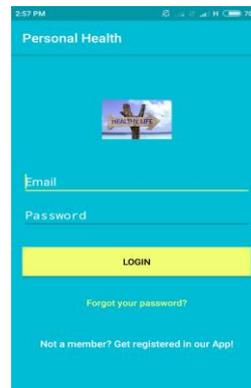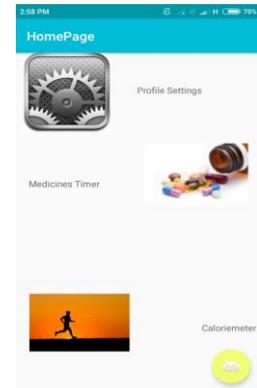
Fig 4. Login Page   Fig 5. Option Selection
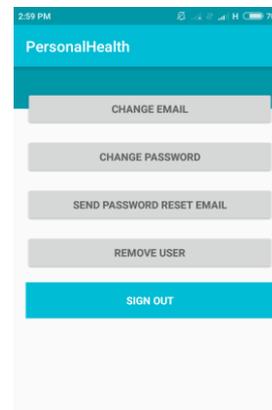
Fig 6. Change Settings

5. CONCLUSION

In this report we have successfully presented our project which is an Multi Purpose Android Health application. As presented our application has three functions which are Proximity hospital locator, Dosage monitoring and a calorimeter to calculate the calorie expenditure.

6. FUTURE SCOPE

There are various directions of future work. In future, analysis of the different aspects and variations of emergency services in different context is necessary. We also would like to work on other various emergency services. We would also like to introduce the variety of applications of offline maps, so that the client's job is much easier.

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