



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

HSS: Health Support System Using Smart Intelligence

Soundarya M*, Suraj K, Adarsh K and Ajay Prakash BV

Department of Computer Science and Engineering, SJB Institute of Technology, Bengaluru, Karnataka, India

E-mail: soundaryamangesh@gmail.com

Abstract: Ignorance of the concept of a balanced diet, lack of understanding of the importance of periodic medicinal intake and improper self-diagnosis has always been a seedy underbelly of the society, affecting large amount of people. The purpose of this paper strives to bridge the gap of individual's understanding of a healthy lifestyle and competent steps to be taken in order to acquire the same. It concurrently tries to educate the masses of proper diet, exercises and elderly healthcare aids. Thus, aims to quash any stigma attached to them.

Keywords: Android; Mobile health; Alert system; Mobile computing; Health care

I. INTRODUCTION

The objective of a healthcare system is to provide highest attainable standard of physical and mental health, which includes access to all medical services, sanitation, adequate food, healthy working conditions while also improving the environment. Healthcare must be accessible unequivocally. Allowing them to follow a healthier lifestyle-exercises, diet and medications. Healthcare sector of India has a major setback in terms of affordability and awareness thus leading to a stunted healthcare quality. With a review of the statistics, it can be noted that UNICEF as of 2016, Under nutrition contributes to nearly half of all deaths in children under 5 and is widespread in Asia and Africa [1]. According to WHO - In 2016, globally there were 155 million children under 5 years of age stunted, 52 million wasted and 41 million overweight [2]. In the ageing and sick population malnutrition is an important problem that has been seen in hospitals, residential care, and in the community. Prevalence rates have been estimated for the general hospital population to be between 11% to 44%, but this rises in elderly groups to 29%–61% [3]. The World Health Organization (WHO) reported that nutrition-related diseases account for about 60% of all deaths, and 43% of the global burden of disease and that by 2020, the impact of nutrition related non communicable diseases is expected to rise to 73% of all deaths and 60% of the global burden of disease [4]. In addition to these woes, the myths often surrounding dieting and exercise, where dieting is watered down to fasting because of which more often than not the anticipated results and goals are not met due to ill-informed decisions. Exercises are broadly categorized as a casual sprint or jog across the park, in the eyes of masses. Thus, promulgating the evils of ignorance and unawareness. Healthy and periodic administration of medicines especially in elderly is an essential ritual. Alarms and reminders for its administration can serve to help. According to WHO as of 2016-Available statistics show that over 44% of WHO Member States report to have less than 1 physician per 1000 population [5]. To tackle the ongoing issue technological prowess can be harnessed in the form of android applications. The overwhelming popularity of android and its ability to reach out for masses in friendly yet effective manner leading it to be a pervasive part of human life. Due to the close integration of mobile devices and health care settings, bolstered the rapid growth of health related monitoring applications. In recent times, medical application has already initiated the users to gain control over their medical decisions. Additionally android user believes that health apps help to promote better relationship between health care professionals and users. One best example to substantiate this, according to the Plano, Tex.-based Research Now Group, found out that 86% of healthcare professionals believe that health apps will increase their knowledge about patient's condition and 72% of them believe that health apps will encourage patients to be more responsible about their health. In addendum to this 96% of users think health apps help to improve the quality of their life all these results were obtained from survey which included 500 healthcare professionals and 1000 health apps user in US [6]. The high ground of using health related applications are they are cost-effective and can be used effectively irrespective of geographical conditions, age



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

group of individuals to name a few. By providing the tools to maintain, monitor and control to a person, improves the sense of responsibility. With the information at hand, the patient can have a healthier dialogue with the doctor rather than walking into the diagnosis blind. This paper is framed as follows: Section II discusses about related work. In section III, the key challenges are highlighted. In section IV, methodology proposed is represented and depicted. In section V implementation and tools and technologies used in the application is explained, results and snapshots obtained in this work is presented in section VI. Conclusion is presented in section VII.

II. LITERATURE SURVEY

This section elaborates on related work about mobile applications focused on dietary intake, physical activity, and elder care-giving and medical alert system. Although there is an increase in number of mobile health applications, these tend to focus on addressing only specific concerns thus leading to devoid of more holistic approach towards an efficient mobile health application. Ahmed Imteaj et al. [7], provides a system which comprises features like BMI calculator, alert system to take medicines at fixed time, but it fails to notify the person on the emergency call list. Nevertheless, the author does concentrate on improving the healthcare. Medication Remainder and healthcare application implemented by Deepti Ameta et al. [8] deals with sending timely alert notifications via email or messages. The Medication Remainder application further provides an opportunity to search doctor based on disease and also provides contact details of the doctors. The paper developed by authors Fabio Ferreira et al. [9], serves as safety critical application which is concerned with elder caregiver communication whose aim is to provide effective monitoring of elders activity and status using a mobile device. Design and development of personal health monitoring using android platform by authors Robert Sowah et al. [10], assists and emphasizes the user to maintain healthy lifestyle. The pith of safety critical application comprises Food calorie intake, Calculator Module- which calculates the calorie values for breakfast, lunch, dinner from the user interactive menu choice, BMI Calculator module, Disease Risk Determinator Module which determines the disease risk and while considering factors like meal time Planner to get back into shape and avoid unnecessary hospital visits due too poor healthy lifestyle and lastly Mealtime Planner Module which offers various meal plans for breakfast, lunch, and dinner based on the amount of calories needed by the person taking into consideration, age, type and nature of work. BeWell application designed and implemented by authors Nicholas D. Lane et al. [11] is a smartphone application designed to monitor and promote mental and social dimensions of well-being. The BeWell application has the ability to continuously monitor multiple dimensions of behaviour and incorporates user feedback mechanisms that provide awareness of various aspects of lifestyle. The paper developed by authors Vuda Sreenivasa Rao et al. [12] was intended to design an application that provides exercise advice based on BMI and BMR in addition to this the application also provides suitable time expense with each sport, for normal users as well as patients with health issues. The application developed by Bruno M Silva et.al [13], emphasize about how the user can maintain healthy a lifestyle through his diet and physical activity, which can shared through social media, the application provides constant alerts regarding the next meal. Kurdi HA et al. [14] developed a Personal Diet Assisting (PDA) application in Arabic because of the fact that there are very few Arabic based diet application for android; the application allows the user to maintain diet and track the location of nearest gym.

III. KEY CHALLENGES

1. Security

Seemingly is the eminent apprehension of the user since they feature all the personal information about themselves and they would like keep this in close to ones chest particularly between them and the application. The health application should provide the user with such assurance that the personal details entered will be completely confidential.

2. Centralized Data

Most of the applications use centralized data where the users/patient's information is stored in a secured location; the following circumstance might be a concern to the user. The user feels the necessity to have the confidence in knowing how secure the data is. If this trust isn't banked on then the user might shy away from the using this application.

3. Professionalism

The user does not directly deal or meet the physical doctors and they interact with an e-application, its fashioned that the user usually don't weight to everything that an application states considering the source of the information provided. The information provided by the application must be able to bridge the gap between and physical doctor and an E-application. The discipline provided to the application must be from an honourable source.

4. User-Friendly

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

Health becomes an decisive factor for elderly people and they might be in need of continuous monitoring, since not all can afford physical counsel they might use E-application and so the patients literacy might be low or new to this platform and so the application must provide an easy to use platform which makes the user comfortable to use the application, Arduous application is usually restricted away.

5. Alerting

Elderly people usually tend to forget things and they must be reminded constantly in a non-Bother some manner and also the people concerned about the patient must be notified, bridging this gap is the key. There are applications which remind the user/patient about the medicines to be taken but no application provides notification to the well-wisher. Providing this might be a relief to the well-wisher.

6. Motivation

Providing inspiration is really important and providing them in a non-irritating manner is the top priority. The patient must be inspired in the right way.

IV. PROPOSED METHODOLOGY

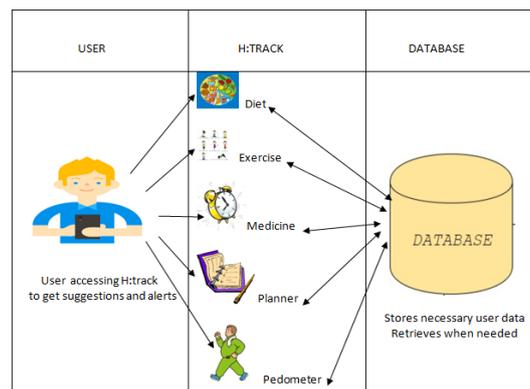


Figure 1: Proposed methodology.

Each Mobile application requires specific requirements that must be abided by the user for correct and complete functioning of an application. The application HSS requires user to enter personal details such as height, weight, emergency contact number, age to name a few during registration (Figure 1). In addendum to this HSS requires several frequent inputs such as food consumed, details about medication and events to be alerted in planner. All these information is stored in local database of the smartphone for quick and effective access. The user profile is designed based on the information provided by the user. Each user can access diet, medicine, exercise, planner and pedometer module which are intended to provide suggestions, notifications to the user needs accordingly. Another important requirement is regular update of health details of user such as height, weight to provide effective health plan. The user must to motivate enough to follow the suggestions even though the application tries to goad user to a healthier lifestyle.

V. IMPLEMENTATION

5.1 Tools and Technology

Android applications are fabricated across discrete platforms and the most extensively used among them is Android studio, for development of any android based applications it's imperative to cognize the front end and back end design. The HSS application is exclusively developed for android users, which can also be re-created in any of the desired platform such as IOS, Symbian etc.

The major software used to develop HSS health applications are:

1. IDE- Android Studio
2. Database- SQLite
3. Frontend- JDK Programming Language

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

Entire application is developed using android studio with the support tech of Android SDK (Android Software development Kit). Since the application uses local database lion's share of data is stored in phone's storage and consequently the application is built using the support of SQLite database. The application's desgin and background is built using Java and XML language.

4. Web Application

HSS is a web application where the app uses web to search the location of neighbouring hospitals, gym, yoga centres etc. For better experience the application requires to access the remote location of the device.

5.2 Functionality

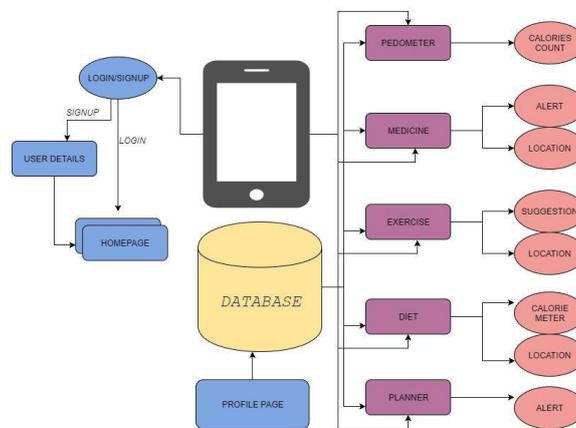


Figure 2: System architecture.

The proposed android application consists of following modules namely:

5.2.1 Medicine cabinet:

It is a customized virtual medicine calculator where the user feeds vital information like the medicine name, timings of the medicine consumed, total count along with the course of the medicine. The User sets the reminder for medicine consumption. The notification pops up providing three choices - "SendSms", "Share" and "okay". Each of the choices have different functionality, "SendSms" button will notify the person of interest by sending an SMS to his/her phone. (it provides a perfect transmission of the periodical routine and medicinal trends of an unmonitored elderly person by allowing the information to be shared Via email, messages, whatsapp etc. The following operation is carried out in tandem with "share" and "sendsms" buttons.) "Okay" button will simply turn off / stop the alert tone. In all of the above three choices the medicine count decreases accordingly, the application also provides a low count alert if the medicine count is below a threshold. Options are also provided to show the nearby medical stores by the click of a button (Figure 2).

5.2.2 Pedometer:

It is an additional feature in this application it calculates the number of steps physically taken by the user. It serves as a motivational factor to the users. Pedometer is turned on when the application is opened and runs continuously until reset. The intent is to monitor, control and mediate the calories burnt in terms of steps taken for an entire day.

5.2.3 Planner:

It is an assistant to the user, the user feeds in his future plans which include the date and time of the event and the application will remind the user by sending an alert message three hours prior to the event. The planner will not allow the user to miss any important event hence it will remind the user way early just in case. After the event is over the application will discard the event.

5.2.4 Login/signup module:

It is a basic authentication function. On providing a proper username and password communication, an entry is granted to the personal details-height, weight, emergency contact number etc.

5.2.5 Home screen:

Home screen is the centre page of the application, which is unique for each individual user. The pivotal aspect of the home screen is that it depicts all essential information of the medicine cabinet. Presence of an adapter class extends the



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

ability to update the medicinal information periodically. This screen also suggests common health and fitness tips in addendum also contain emoticons. The purpose behind designing the emoticons was to provide user interaction and to alleviate user's mood. The home screen includes a drag screen which will allow the users to navigate to the different parts of the application.

5.2.6 Profile page:

Certain physicals traits of the users are subject to constant change. Thus, an edit function is provided to update the profile on a regular basis.

5.2.7 Exercise:

The Exercise portion recommends a collection of exercises to the users based on their profile information.

5.2.8 Diet:

The diet portion of the application calculates the individual's BMI (Body Mass Index). It establishes a "yardstick" for calorie consumption which serves as a guideline for the user's daily diet. Name of the food consumed can be entered into the application which calculates calorie. It also furnishes with the locations of restaurants nearby.

VI. VALIDATION AND DEMONSTRATION

The HSS application's user interface is simple and is suitable for people belonging to any age group. The application continuously runs in the background to provide continuous alerts regarding medicines and planner even if user is performing other actions. The application monitors users diet, suggests exercises, provides varied features like reminder and pedometer. Initially user is required to sign up and provide username and password, using these credentials user can login any time further after registration. Firstly the user is directed into a registration page as shown in Figure 3a where information about the user is obtained and is stored in local database, which is retrieved when necessary. Now the user is redirected into home screen which is unique for each user as shown in Figure 3b provides general health tips, depicts all essential information of the medicine cabinet and also contain few emoticons on clicking on those user can call friends or listen to music. The drag screen mainly consists of diet, exercise, medicine, planner, pedometer and edit information which is used to traverse to different parts of application. Upon choosing exercise option the application provides suggestions to and it consists of gymnasium, jogging track and meditation center buttons that provides locations to the same as shown in Figure 3c. On clicking on diet option, the application appraises if the user is overweight, underweight or normal and substantially provides a calorimeter which tells the number of calories to be consumed by user per day to lie on healthy range shown in Figure 3d. Whenever the user types the name of the food consumed the corresponding amount of calories is deducted from the total calories to be consumed per day and reset button is used to set the total number of calories is again. Calorie chart has the names and calories of popular dishes. On choosing medicine option, it needs information like name, number of times medicines should be consumed per day, total medicines available and interval of the medicine should be set. Obtaining this information from database, timely notifications is sent (Figure 3e) now the user can dismiss the alert by clicking either ok or by sharing information via apps, or by sending message to the emergency contact number. Further on low count of medicine i.e. lesser than five, low medicine count alert pops up (Figure 3f). Planner (Figure 3g) requires input such as event name and time and notifies the user three hours before the event. Pedometer comprises of calories and reset button. On clicking calories button it provides information about the number of calories burnt and on clicking reset the value to reset as shown in Figure 3h. On any time the user can edit or change the primary information such as height, weight, emergency contact number on clicking on edit information as shown in Figure 3i. The above sentences provides comprehensive working of the application HSS.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

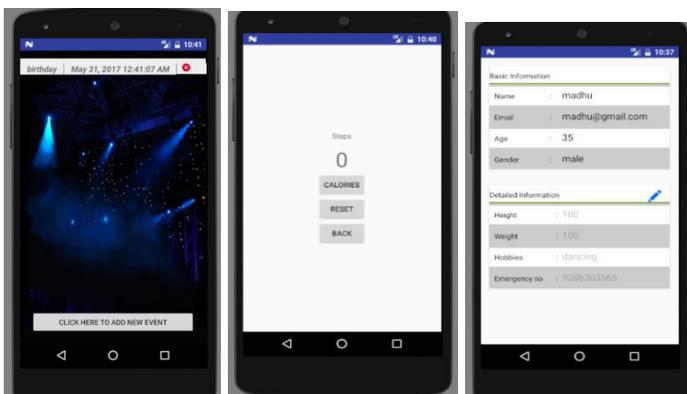
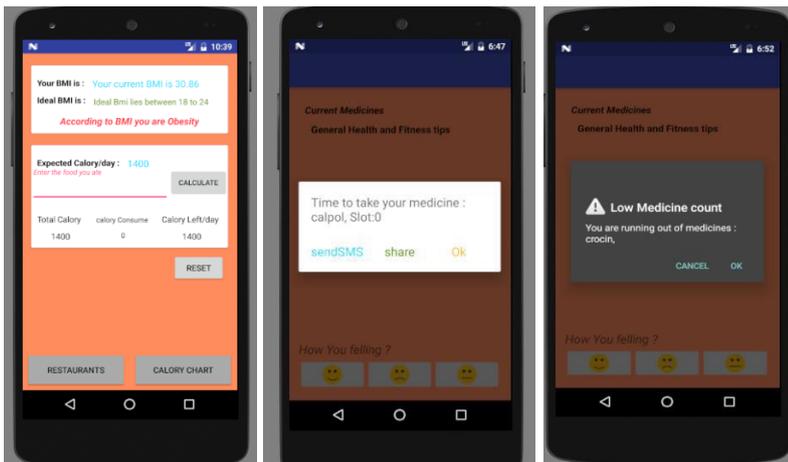
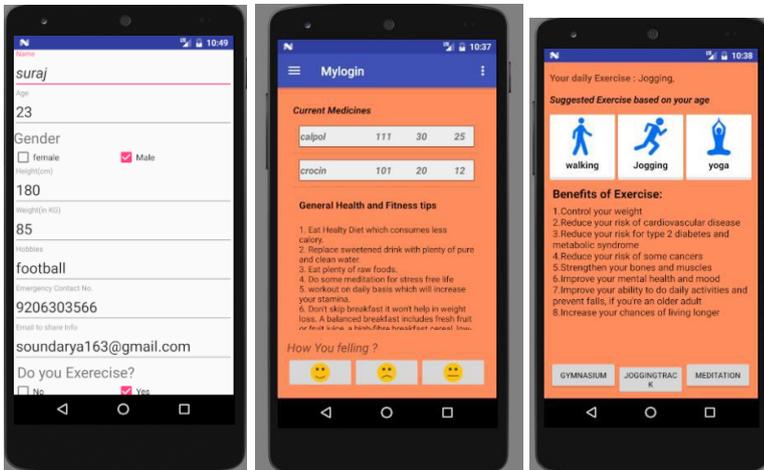


Figure 3: a) User entering data. b) Homepage. c) Exercise suggestions. d) Diet suggestions. e) Medicine alert notification. f) Low medicine count alert. g) Planner h) Calorimeter i) Edit information.



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 6, Issue 2, February 2018

VII. CONCLUSION

The above application HSS presents health recommendations and guidelines for mobile users who have installed the android applications. Its main goal is to motivate user to lead healthier lifestyle by maintaining optimum weight, increasing physical activity, aiding to consume medicines regularly and having a good and balanced nutritional diet. Further enhancements include improving our application by freeing storage space from the mobile device (local database) to design a web service that will connect to server database and bolsters to promote a Web interface for better user experience. Further additional features can be added such as booking cab, understanding user allergies and providing constant feedback from healthcare professionals to name a few to provide complete and pervasive application that acts as personal assistant to the user.

VIII. REFERENCES

1. World Health Organization. Undernutrition contributes to nearly half of all deaths in children under 5 and is widespread in Asia and Africa. UNICEF Data: Monitoring the Situation of Children and Women. 2017.
2. World Health Organization Child Malnutrition. Global health observatory data 2017.
3. M Hickson, Malnutrition and ageing. Postgraduate Medical Journal 2006; 8: 2-8.
4. NM Eze, FO Maduabum, et al. Awareness of food nutritive value and eating practices among Nigerian bank workers: Implications for nutritional counseling and education. Medicine, 2017; 96.
5. World Health Organization Density of physicians. Global health observatory data 2017.
6. P Krebs, DT Duncan, Health app use among US mobile phone owners: a national survey. JMIR Mhealth Uhealth 2015; 3.
7. A Imteaj, MK Hossain, A smartphone based application to improve the health care system of Bangladesh. IEEE Medical Engineering Health Informatics and Technology 2016; 1-6.
8. A Deepti, M Kalpana, et al. Medication Reminder and Healthcare-An Android Application. International Journal of Managing Public Sector Information and Communication Technologies 2015; 6: 39-48.
9. F Fábio, F Dias, et al. Protege: a mobile health application for the elder-caregiver monitoring paradigm. Procedia Technology 2013; 9: 1361-1371.
10. S Robert, NB Joana, et al. Design and Development of a Personal Health Monitoring System on Android Mobile Platform. International Journal of Engineering Science and Technology 2013; 5: 1313-1320.
11. DL Nicholas, R Mashfiqui, et al. BeWell: A smartphone application to monitor, model and promote wellbeing. Conference on pervasive computing technologies for healthcare 2011; 23-26.
12. SR Vuda, K TM Krishna, A Design of Mobile Health for Android Applications. American J Engineering Research 2014; 3: 20-29.
13. SM Bruno, ML Ivo, et al. SapoFitness: A mobile health application for dietary evaluation. IEEE In e-Health Networking Applications and Services (Healthcom) 2011: 375-380.
14. KA Heba, A Arwa, et al. myPDA: a mobile healthcare application for personal diet assisting. In Advanced Computer Science Applications and Technologies 2012; 491-496.