Fitness Tracking and Advisory Application

Rukhsar Haji[1], Sana Naik[2], Rohit Singh[3]

[1]Assistant Professor , Department of Computer Engineering, Rizvi College of Engineering, Mumbai, India

[2]Assistant Professor, Department of Computer Engineering, KC College of Engineering, Mumbai, India

[3]Student, Department of Computer Engineering, Thadomal Shahani College of Engineering, Mumbai, India

Abstract— In today's time, most of the people are health and fitness concern. People look for online tips or resources to stay healthy. Since mobile computing plays a very important role in our daily life and so mobile devices have become powerful and distributive. Android is the most popular mobile operating systems. This application enables a user to track his/her fitness and also get advices and fitness related information in the form of a report at the end. The proposed application will enable the users to calculate their heart rate, blood pressure, and other health related parameters.

Keywords— Fitness; Heart Rate; Calories; Blood pressure; Smartphone; Calculation ;Report .

I. INTRODUCTION

The fundamental nature of a project is that it is a temporary endeavor undertaken to create a unique product, service, or result. As far as the information age is concerned, it is commendable that with the enormous increase in the web, electronic information is also increasing in huge amount. As defined by the World Health Organization (WHO), health is a "state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity." Fitness is defined as "the ability to meet the demands of the environment."

Fitness Management is an interdisciplinary field that blends scientific knowledge of exercise physiology and fitness studies with practical business skills. The need of fitness is that a person who is fit is capable of living life to its fullest extent. Physical and mental fitness play very important roles in your lives and people who are both, physically and mentally fit are less prone to medical conditions as well. People who are physically fit are also healthier, are able to maintain their most optimum weight, and are also not prone to cardiac and other health problems. In order to maintain a relaxed state of mind, a person should be physically active.

Sports and fitness are increasingly getting attention of companies and researchers around the world. In particular, recent mobile devices with hardware GPS and accelerometers, has made possible variety of sports and fitness applications that were not possible earlier [1]. Hence, the system is an application that tracks the user's fitness by calculating their heart rate, blood pressure, respiration rate, oxygen saturation, body mass index, steps taken throughout the day and calories burnt and consumed, later generating a report about their health and fitness at the end.

II. BASIC CONCEPT

The main aim is to design and develop an application for tracking the fitness of a user and giving advice in the form of a final report at the end. The fitness of a user should be tracked and the details of the same should be given in such a way to the user so as to make the user more aware of his/her health and fitness and also daily improvements or degradation in one's health and fitness. Nowadays, most people spend good amount of time on their fitness and they do so online due to lack of time.

The main objective of the system is to make an application available to the users so that they can efficiently and easily manage their fitness while saving time. Since everything is online today and everybody has busy schedules, hence people do not want to spend time in going out of their homes for fitness but they do want a fit and healthy lifestyle, hence, people opt for online resources. This application is one of such online resources that will help people to know about their fitness on a daily basis and will also be easy for them to handle.

The system will calculate the heart rate, blood pressure, oxygen saturation and respiration rate of the user using the camera and flashlight of a smartphone [6]. Next, the system will be able to calculate the fitness parameters of the users for example calculating the steps a user has taken throughout the day. The system will also calculate other fitness parameters like the BMI and will enable the user to calculate the total calories consumed and burnt. The user can also scan the bar code of any item if they do not know the number of calories it contains. At the end, the system will generate a report about the health and fitness of the user based on the output of the modules of the system.

The components required are :

- Smartphone Camera (Back)
- Flashlight
- Internet Connectivity
- GPS System

III. FITNESS TRACKING MOBILE APPLICATION

Fitness Tracking and Advisory Application is the fully featured software application that will deliver various health care and fitness based services to meet all the health needs of target. The proposed system will help general people to understand the importance of fitness and having a healthy life style.

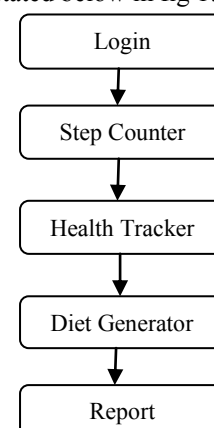The main specifications of our system can be divided into the following modules stated below in fig 1:

Fig 1 : Steps of fitness tracker

A. Registration and Login

New user has to register itself to the application and if the user is registered then user can directly login by entering the correct username and password.

B. Step Counter

The user can see how many steps he/she has taken in the entire day and can view previous history. It also contains a feature by which a user can map the route from source to destination with calories burn and the time to reach the   destination .

C. Health Tracker

In this user heart rate, blood pressure, oxygen saturation and respiration rate is calculated. The user places his/her finger over the camera and the camera will capture the image frames of the finger tips. The algorithm written in to application will perform analysis of the taken frames and will compute the health parameter of the user with more than 98% accuracy.

D. Diet Generator

It provide the user with diet plan and will calculate the number of calories consumed by the user .User can scan the bar code of the food item consumed or can manually enter the calories in that food item

E. Advisory and Reports

Based on the responses of the above steps, the output will be shown in the form of reports and charts considering various health and fitness parameters of a user.

IV. STANDARD OPERATING PROCEDURE OF THE SYSTEM

The design considerations of the application are as follows.

- The application will run on a smartphone.
- The smartphone should have a back camera [6].
- The smartphone should have a flashlight.
- The smartphone should have GPS system.
- The application will need the GPS to function so that the user can use all modules efficiently.
- The GUI of the system shall be user friendly.
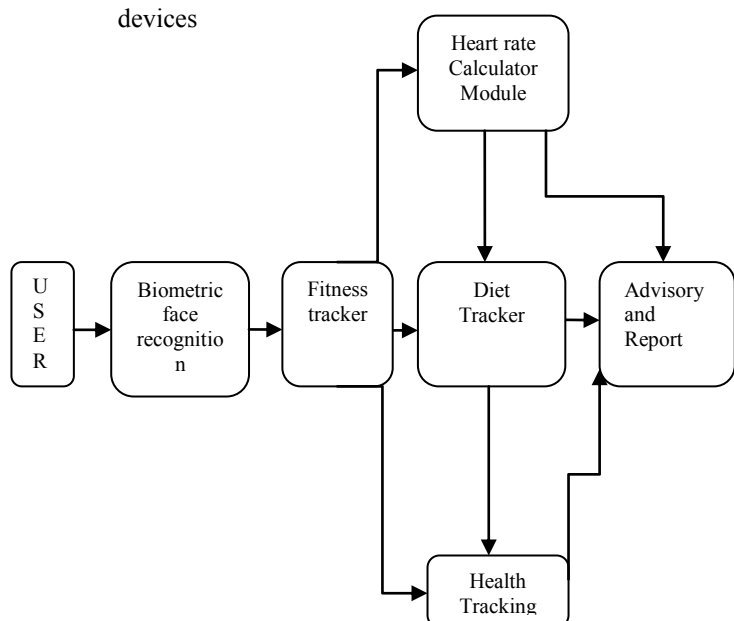- The application shall run efficiently on most android devices

Fig 2 : Fitness tracker and advisory application block diagram

A. Heart Rate Calculation Module

Fig 3 shows For Heart Rate calculation, we decode the images to Green and Red frames, keep a track of the counter, calculate the frequencies of Red and Green Pixels using Sampling Frequency and thus calculate the beats per minute using the frequencies calculated. We then calculate the heart rate using all the above values.
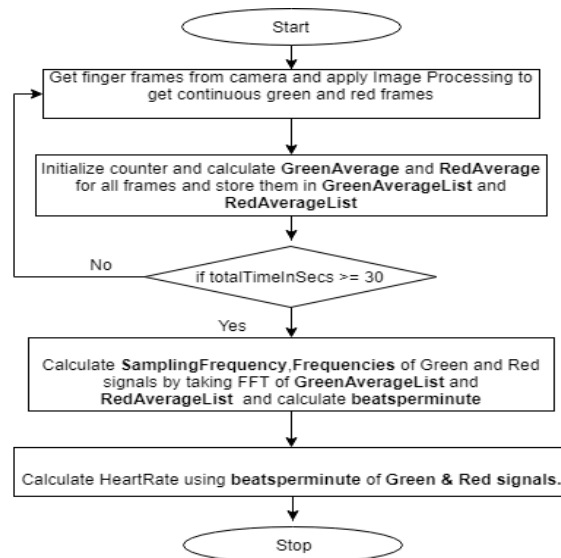
Fig 3 Flow chart For Heart Rate

B. Blood Pressure Calculation Module

Fig 4 shows calculation of blood pressure after calculating counter, frequencies of Green & Red frames by using Fast Fourier Transform and Image Processing, we then calculate the beats per minute by multiplying the frequencies calculated by 60 (60 seconds make a minute). Using all these values, we then calculate the blood pressure in systolic and diastolic units.
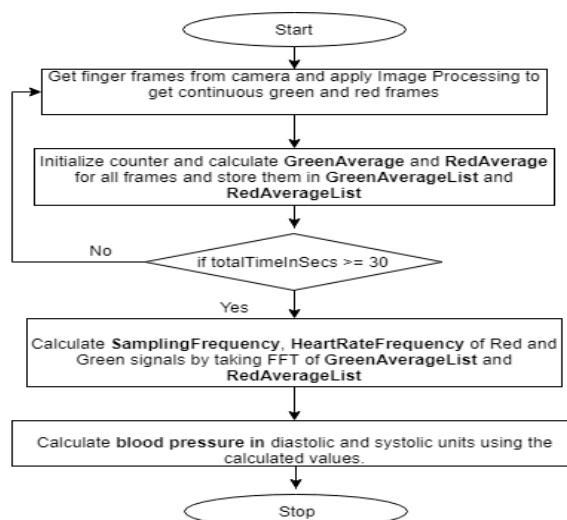
Fig 4 Flow chart for blood pressure

C. Oxygen Saturations calculation Module

In fig 5, for image processing, we use the red and blue frames of the finger as an input. The counter, here, keeps a track of the total number of frames taken as input. This counter will thus be used for further calculations and calculating the mean

and standard deviation of the red and blue frames which will then be used for calculating the oxygen saturation.
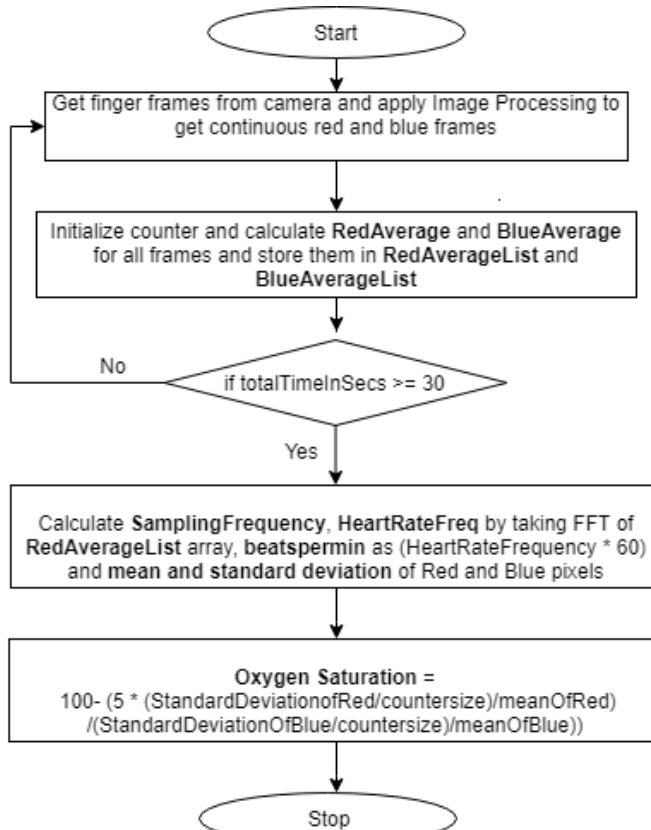

Fig 5 Flow chart for oxygen saturation

D. Respiration Rate Calculation Module

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Fig 6 shows , we use Green and Red frames as an input to ImageProcessing from the finger frames taken from the smartphone's camera and thus use these values to calculate values such as counter, RedAverage, GreenAverage. After 30 seconds of processing, we then calculate the RespirationRateFrequencies of Green and Red pixels.
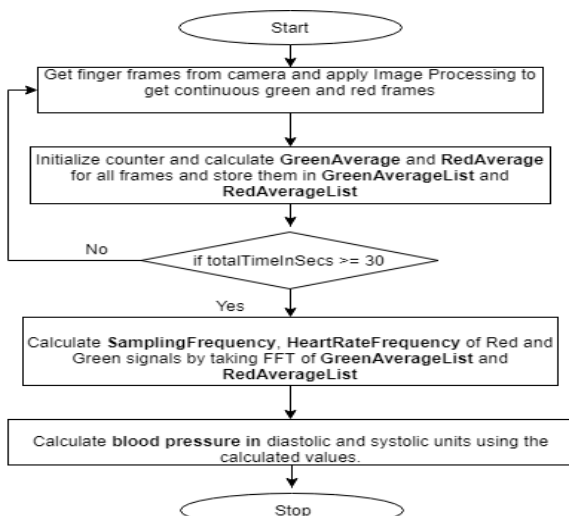

Fig 6 Flow chart For blood pressure

V   WORKING OF PROPOSED SYSTEM

Fig 7 shows along with showing the route to the destination, time taken and the distance in miles, we also calculate and show the calories that the user will burn on reaching the destination. This will thus be valuable for reaching daily

goals like burning x amount of calories per day.the user has entered current location as agripada and destination location as Mumbai central station. The maps feature shows the user the route to its destination. It also says that 80 calories are estimated to burn while the user walks to the destination, the time taken will be 16 minutes and the distance to the destination is 0.8 miles.
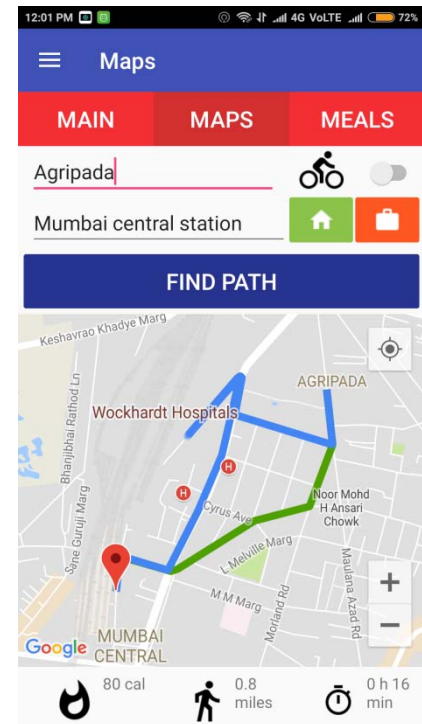

Fig 7 : Map Feature

The list of items that the user searches for, to calculate the total calories consumed, is shown in figure 6. It says that on the fourth day of fifth month, the user consumed a burger of 1200 calories and a cake of 261 calories. The total calories amounted to 1461 which is shown at the end of the screen.

The user wants to calculate any of their health parameter ie heart rate, blood pressure, respiration rate or oxygen saturation, then he/she will place their index finger on the camera of the phone. The screen that appears once the calculation starts.
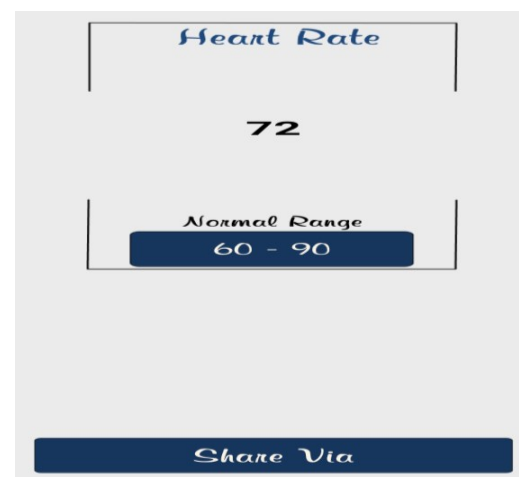

Fig 9: Screen for calculation of heart rate

The screen that appears after the calculation of heart rate finishes is shown in figure 8It says that the heart rate of the user is calculated to be 72 while giving the normal range below. The normal range of heart rate of a person is between 60-90.
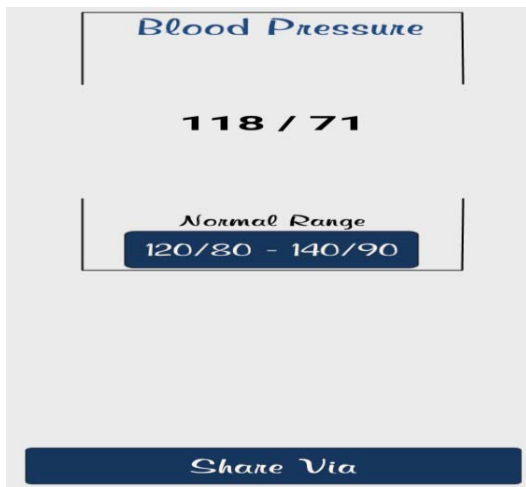

Fig 10 : Screen for calculation of blood pressure

The screen that appears after the calculation of blood pressure finishes is shown in fig 10. It says that the blood pressure of the user is calculated to be 118/71 while giving the normal range below. The normal range of blood pressure of a person is between 120/80-140/90.
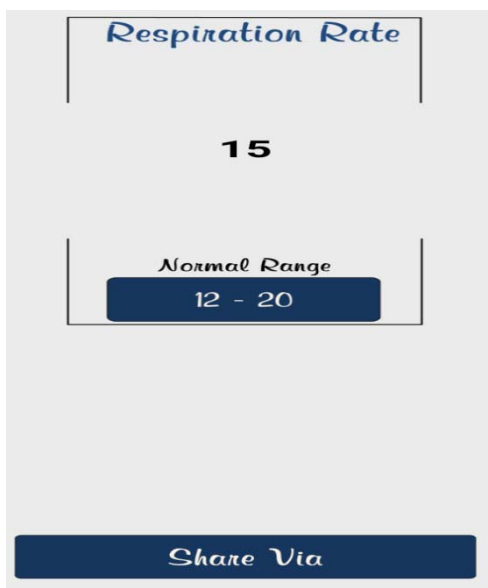

Fig 11: Screen for calculation of respiration rate

The screen that appears after the calculation of respiration rate finishes is shown in fig 11. It says that the respiration rate of the user is calculated to be 15 while giving the normal range below. The normal range of respiration rate of a person is between 12-20.
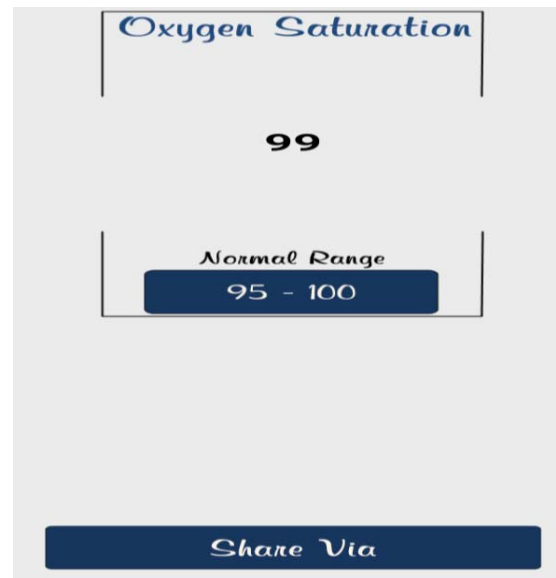

Fig 12: Screen for calculation of oxygen saturation

The screen that appears after the calculation of oxygen saturation finishes is shown in figure 12. It says that the oxygen saturation of the user is calculated to be 99 while giving the normal range below. The normal range of oxygen saturation of a person is between 95-100.

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