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Design and Development of Mobile Application for Physical Fitness Monitoring and Tracking.

A.Chaitanya
Department of Computer Science and Engineering, Narayana Engineering College, Gudur
chaitanyaarakti508@gmail.com

G.Praveen Kumar
Asst.Professor, Department of Computer Science and Engineering, Narayana Engineering College, Gudur,
praveen.mom@gmail.com

B.Sai kumar
Department of Computer Science and Engineering, Narayana Engineering College, Gudur
saikumarbillu123@gmail.com

K.Pavan Kalyan
Department of Computer Science and Engineering, Narayana Engineering College, Gudur
Pavankommi0503@gmail.com

ABSTRACT:

The emerging popularity of so-called "Wellness Apps" (Mobile application that are designed to moniter the physical activities of its user and assists them to maintain a healthy life style). It has presented an interesting challenge to mobile application developers. Our application "Stay fit" incorporates step tracking and food calorie counting mechanisms. The step counter is received from the Accelerometer sensor in the mobile and food items list was received from the user it self In addition, the application tracks the user's physical activity throughout the day and using this data, the user can monitor the correlation between his or her exercise, and overall Diet. In this project the STAYFIT Application is based on the Android platform.

Keywords: Fitness, Accelerometer sensor, step counter, Diet monitor, Nutritional value.

1.INTRODUCTION

Since the emergence and popularization of smart phones, many mobile applications that track and record data about their users have been created. The classic example of this is the pedometer which utilizes the mobile device's built-in accelerometer to track the number of steps the user takes each day [1]. Applications in this category, that track and record health or activity data about their users, are typically called Fitness Apps. These fitness Apps are designed to assist the user in pursuing a healthy lifestyle by encouraging them to perform positive activities, and improve lifestyle choices. Factors that are typically targeted by such applications include exercise, and diet. Understanding the nature of this relationship is crucial when designing a Fitness App. Applications like this have the potential to motivate its users into maintaining a cycle of positive lifestyle decisions and/or breaking a cycle of negative lifestyle decisions. Diet and exercise can affect several physiological pathways associated with depression and a bidirectional relationship likely exists between depression and these lifestyle factors, thereby creating a potentially increasing cycle of healthy life.

The goal of this Application: The purpose of this Application was to create a fitness app for the Android platform capable of tracking, recording, and displaying data relevant to a user's physical activity like step count and calorie intake from daily diet. This application also enables individuals to become aware of deficiencies in their everyday habits and will hopefully encourage the user to self regulate towards improvement. The data can be visualized in a clear and simple manner. We can also add three videos to give extra motivation to our users and get some info regarding the training of Running. The addition of an pie chart diagram to represent the user's current step count, The overall goal is to show the user his or her daily steps count and the calories taken from food and help them to a healthier lifestyle, and therefore, a happier life. This document will comprehensively describe such an application's research, design, testing, and development.

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2. LITERATURE SURVEY

In the present modern Era, everyone are much more concentrated on their daily physical activity like walking and daily Diet. In our application we concentrated on these activities, so we start exploring various resources for our references.

Azumio Inc. (n.d.). Argus - your fitness and weight loss goals with the ultimate activity tracker by Azumio on the App Store on apple. Retrieved from https://itunes.apple.com/us/app/argus-pedometer-run-cycle/id624329444?mt=8; here, we take the information regrading the step counter and how to fet the information from the accalorometer to our application.

Lopresti, A. L., Hood, S. D., & Drummond in a review of lifestyle factors that contribute to important pathways associated with lack of physical activity and more depression.

Michaud, C.(n.d.) at al includes the accessing the sensors in mobile devices from http://nebomusic.net/androidlessons/Pedometer_Project.pdf. PELUSO MAM et al. Physical activity and mental health: the association between exercise and diet CLINICS 60(1): 61-70, 2005.

3.SIMILAR APPLICATIONS

Applications that manage wellness have become some of the most popular downloads for smartphones today. These apps commonly track various types of user inputs such as exercise, sleep and other health habits. In theory, organizing this information in an easily interpretable way, motivates the user to continue a healthy lifestyle. Each of these apps has a unique way of expressing data to the user, and some methods have proven more effective than others.

Moves
Moves is a mobile application that automatically tracks a user's movement and location throughout the day and displays it in a timeline format. The app counts the number of steps taken per day, as well as the number of calories burned and the distance the user walked. Key places are recognized, and unrecognized places can be given a name by the user that will be remembered by the app. These travels are tracked and displayed on a map and timeline over[4]. To continue motivating a healthy lifestyle, the user is able to set goals for the number of steps he or she wishes to take throughout the day. In addition, a record can be kept of various exercises or activities that were performed that are unable to be automatically tracked by the app (such as gym workouts or various sports where the user may not carry their device). All of the information gathered about the user is easily sharable with other apps.

Argus
Argus is a another wellness app with a number of motion and life tracking features. Unlike Moves, which can only monitor movement, Argus features the ability for the user to create and track custom step and workout goals. It has a somewhat customizable main screen, where the user can display a pedometer and distance walked, reminders, as well as information about friends also using Argus. This app allows the user to set reminders to drink a glass of water or walk more throughout the day. Users are urged to connect with their friends on the app in order to gain motivation to strive towards a healthy lifestyle[5]. This app can be linked to other "sister" apps that are able to track sleep and create more in-depth workout plans. All of these activities can be viewed in a graph format over days, weeks, months, or years. Although Argus has more features and trackers than many other wellness apps, the overall app seems less polished.

Some disadvantages in previous applications

- These applications are only concentrate on physical activity of its users, they doesn't add the feature of calories taken by its users.
- They continuously collecting the user information and doesn't follow the user rules of User privacy, some of it are sell the user data to Third party peoples also.
- Accessing the unwanted permission like camera, messages, voice recording, etc may lead to cyber attack on user devices. All of the previous problems are overcome in our application.

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4.FEATURES OF OUR APPLICATION

After researching the many existing wellness apps, we were able to identify some basic required features that we considered for our own design. We now list and expand on these features:

Step Counter: One of the most common is the step counter. The implementation of which would require a subroutine that uses the device's accelerometer to record the number of steps that the user has taken. Moves takes this a step further with GPS tracking and records distance traveled differently, depending on whether the user is walking or Running [5]. It was represented in Fig1. This presents us with an important design decision, as we have the choice between tracking activity with the accelerometer.

Goal Setting: Another common feature is goal setting. This is a relatively simple way to encourage habitual use of the app. Including this is an important design consideration, not just because it can be implemented for any data that is recorded or provided by the user (such as with a calorie counter and step counter), but also because we could integrate game elements in order to further encourage habitual use of the app. It was represented in fig2. It is also common for wellness apps.

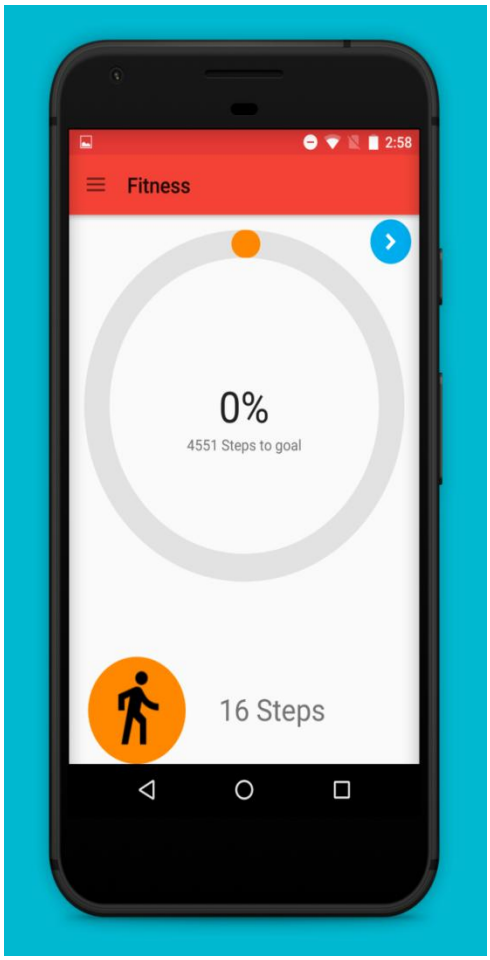

Fig1: Step Counter

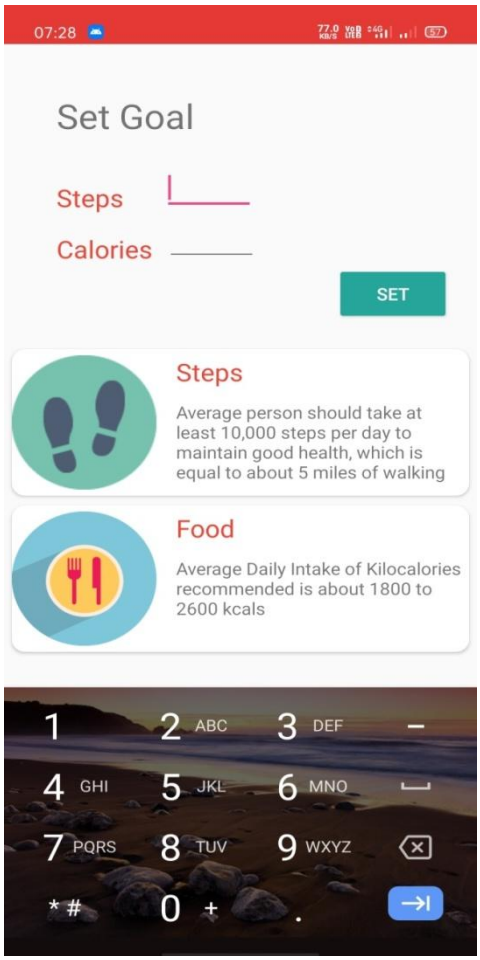

Fig2: Goal Setting

User Accounts: Perhaps the most common feature is the use of user accounts. Here, we use the Google Firebase cloud servies as our hosting server, with this we can manage the user login information and takes the personal information only during the initial registration and no need to give every time. we provide multiple ways to signup for our application they are Google, facebook, phone(mobile number) and Gmail. For better security and privacy issues the user can login every time by entering the mobile number/email, but no need to fill the details again. We were now faced with the interesting design decision between binding user data to user accounts, or binding user data to individual devices.

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Calorie counter: In this module we can collect the information from the user like Rice, dal curry, Idly, etc. whatever he eats Throughout the Day. We have some predefined Data set that contains huge amount of food list along with their nutritious values like fats, proteins, carbo-hydrates and also its calorific values. After entering all the food items list user can able to see the nutritional values in the food and total calories taken through out the day. It was one of the major feature in our application.

5.WORKING OF APPLICATION

This application is mainly working on the accelerometer sensor with this we can count steps of the user and count the nutrition values from the user diet, these information is collected from the user itself.

Login: we can login to our accounts by using email/ phone number, once you login to your account the user can see the step count status. User also set the goal of the day.

Basic information about the user:

We collect the basic information like name, sex, age, height, weight and mobile number during the signup process no need to enter it again and again.

Goal Setting:

If the user wanted to set a particular step count goal and amount of calories intake, we allow them to create their targets and check the amount of completing their targets [7].

Step Counting:

When a user has their phone in their pocket or attached to their body in some form, and they take a step, the phone will move in a distinct manner. By using the sensors in the phone, we hoped to develop an algorithm to track this movement, and, in turn, track a user's steps [4].After some research, we found a simple step counting algorithm that tested the change in the phone's position on the circle, and if this change in distance was greater than some user defined threshold, the algorithm would add a step (Michaud). After testing this algorithm for some time, we found that it was not as accurate as we had anticipated. Unfortunately, this was not much more accurate in counting steps than our previous implementation so we began researching alternative methods for tracking exercise. We eventually came across the Google Fit API, which utilizes a phone's various sensors to implement algorithms that record and store different sets of fitness data, including step counting [2]. That data is sent to the Google Fit Service and is then available to the developer to use as he or she needs. The developer can then access the stored data to use in their own application. In our implementation, we read the step counting data every time the user opens the app or activity tab and use it to update the graph, the number of steps displayed to the user, and check for newly earned achievements [3].

Training videos for running:

In this application we add some training videos to give some motivation and way of training the daily exercises. It was light weight and very simple.

Nutritional values:

When the user enter the food items taken through the day and quantity of those food items. The application itself shows the related items ask for choosing its quantity. The application itself counts the nutritional values in the given food item and finally shows the nutritional values in it, like proteins, fats and carbohydrates.

Most relevant is the under-reporting of calorie consumption documented in many scientific studies. For food intake, as with many self-reported behaviours, there is likely to be both conscious and unconscious under-reporting. There will be items of food that people genuinely have no recollection of eating, and there will be accidental under estimates of portion sizes. This is not a new problem. For example an academic paper from 1993 states 'our current techniques often do not obtain valid measures of habitual intake [6].This problem has been suspected, but because of lack of evidence, often conveniently ignored'. However, there is at least one simple check for under-reporting. We can calculate the minimum level of calorie consumption that would be needed to maintain our current weight (i.e. our minimum energy requirement). We can use well-established

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equations to estimate this minimum level. Since the data show that our weight is not declining (atleast at a population level), if the survey estimates are below this minimum level then they cannot be correct as shown in Fig 3

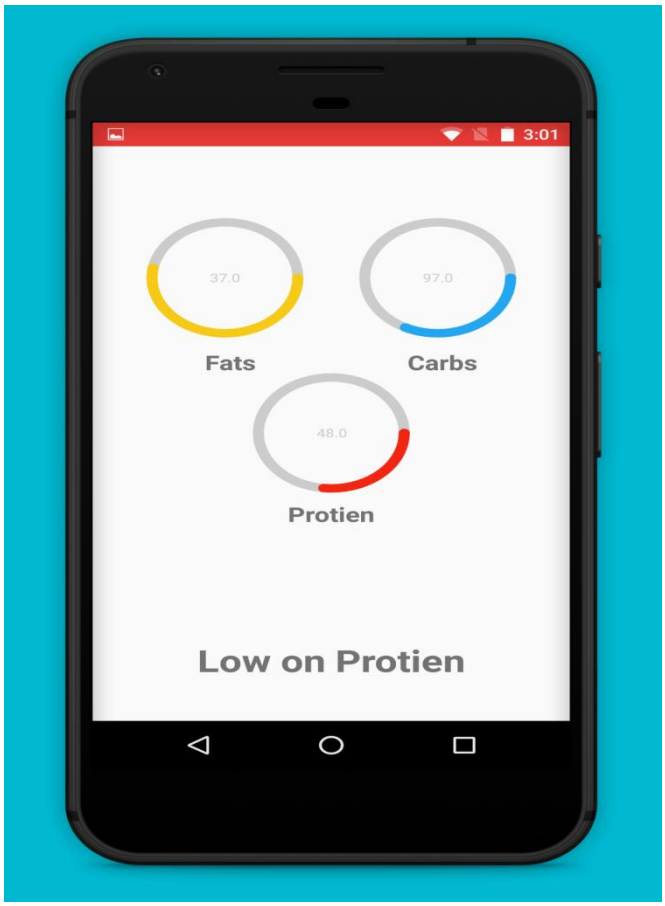

Fig3:Nutritional values

6.CONCLUSION

While it was a challenge to develop, our Application team successfully created a prototype wellness application for the Android platform capable of tracking, recording, and displaying data relevant to a user's steps activity and Nutritional values in the food. While the full scope of the initial app design was not realized, all of the core data tracking functionality has been successfully implemented.

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