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# Fitness Application for Health and Well-Being

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**Abstract:** ***Recent studies indicate that people are not inclined to maintain a healthy lifestyle and exercising on a daily basis. Statistics also show that there is a rise in obesity in the younger generation. Taking advantage of the rise in the use of Android Devices, applications can be developed to motivate people and to promote exercises which lead to a healthy life. The proposed application develops a feeling of competitiveness between friends and family members by comparing their respective scores which have been calculated based on the amount of exercise. This propels users to exercise more and beat their own as well as others records. This application can be used by people to connect globally and set new fitness goals. Google Android has integrated various sensors which can be used to sense the activities performed by the user.***

**Keywords:** Fitness app, Health care, Android, Activity Tracker, Pedometer

## 1. Introduction

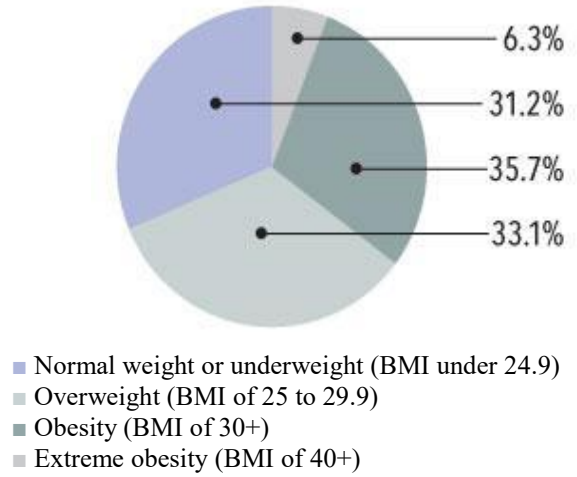
Android operating system is the mobile Operating System that is enhancing its use in different areas of today's life. Android operating system is developed by Google on the basis of the Linux kernel and firstly designed and used for smart phones and tablets. [1] It also supports the working of a variety of in-built sensors such as gyroscope, accelerometer, GPS, proximity sensor etc. which can be used by the developer to develop applications as per the requirements.

The proposed Android based application is using the variety of sensors available to the common user using his/her smartphone sensors to measure the amount of activity being performed by the user which can then be used to set new fitness goals and compete with other people using the system. The previous records of the activities performed by the user are stored in a database using SQLite and can then be viewed by the user as statistical data to map their improvements and progress. Also, the application supports a feature which can be used by the user to create a running event which can then be participated in by other users who are in a different geographical location. The application logs the distance and time taken by the users who have participated in the event for the run and then the winner is declared taking into account the user having finished the run in the least amount of time. This feature helps connect the people who are in different geographical location.

## 2. Literature Survey

Data from the National Health and Nutrition Examination Survey, 2009–2010:

More than 2 in 3 adults are considered to be overweight or obese. More than 1 in 3 adults are considered to be obese. More than 1 in 20 adults are considered to have extreme obesity. About one-third of children and adolescents ages 6 to 19 are considered to be overweight or obese. More than 1 in 6 children and adolescents ages 6 to 19 are considered to be obese.[2]




The existing fitness based applications available to Android users have certain downfalls. For instance, these applications tend stop working when the screen of the Android device is turned off. This inability to work when the screen is turned off leads to serious problems as the user needs to keep the Android Device Screen on in order for the application to track the activities being performed whenever using the application which in turn results in a degraded battery life.

## 3. Proposed System

### 3.1 Disadvantages of Existing Systems:

- Applications stop sensing the activity being performed when the smartphone screen is locked.
- Does not give accurate readings while using treadmill as the user is stationary.
- Drains battery life drastically while the application is in use as the screen needs to be unlocked for the application to work.
- No support for marathon mode when multiple users participating from different geographical locations.

### 3.2 Proposed System Introduction

#### 3.2.1 Modules

- **Time Limit Module** - This module enables the user to set a particular time limit for his workout after which the application will give a reminder to the user that the allotted time is over.
- **Distance Limit Module** - The Distance Limit Module is used to set a distance goal by the user. The application will track the user's progress and at the end of the set distance, it will end the workout.
- **Exercise Training Module** - This module includes predefined exercise routines which the user simply needs to follow to exercise. This module includes pushups, squats etc.
- **Treadmill Module** - The Treadmill module calculates the distance the user has run, the amount of calories he has burnt based on formulas and data gathered from the accelerometer and the motion sensor.
- **Calories Calculator Module** - The calorie calculator module is used to calculate the amount of calories burnt by the user by taking into account the distance, speed and time of the user.
- **Step Calculator Module** - The step calculator module calculates the distance covered by a user, taking into account the height and weight of the user, it approximates a step measurement of the user and hence, using this and the total distance covered, the number of steps taken by the user is calculated.
- **Display Module** - This module is used to display the results obtained by the application. e.g. The amount of calories burnt.
- **Marathon Module** - This module enables users to communicate with users located at different geographical locations to communicate with each other and initiate various activities like marathons and compete with each other.

#### 3.2.2 System Architecture

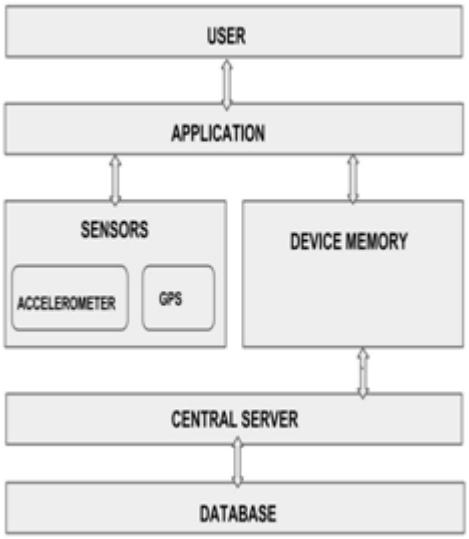



**Figure 1:** Proposed Architecture

#### 3.2.3 Algorithm

1. Start.
2. Select predefined workout or running exercise or exit.

if(predefined workout selected)
goto 3;
else if(running exercise selected)
goto 9;
else
goto 30;

3. Show the list of predefined workouts or back option to be selected.
4. if(predefined workout selected)
goto 5;
else
goto 2;
5. Required workout is selected and n<- number of repetitions are entered.
6. The selected workout is started and the user is instructed to perform accordingly.
7. n<- n-1;
8. if (n=0) goto 3;
else
goto 5;
9. Ask whether the user want's to run with or without time or distance limit ;
10. if(with time limit selected)
goto 11;
else if(with distance limit selected)
goto 14
else
goto 19
11. T_limit <- time limit entered by user.
12. limit<-T_limit;
13. goto 16
14. D_limit <- distance limit entered by user.
15. limit<-D_limit;
16. Display Start Button.
17. Reduce limit by elapsed amount of limit.
18. if(limit = (25%of original limit))
Play motivation message audio and goto 17;
else if(limit = 0)
goto 26;
else
goto 17;
19. Display Start Button.
20. When user selects start, start timer.
21. Record time elapsed and record the distance travelled. Display time, distance, stop and pause button.
22. if(Stop selected)
goto 25;
else if(pause selected)
goto 23;
else
goto 21
23. Display start button. Pause Timer
24. goto 20;
25. Stop Timer.
26. Display exercise end message.
27. Calculate calories burnt.

**1. Know your speed, grade, weight and time spent exercising**

Eg: Speed 2.5 mph, Grade 2 percent, Weight 130 lbs., Time 30 minutes
Convert units
Speed - meters per minute
Percentage Grade - as Decimal

Weight - kg
Time - minutes

**2. Complete the equation**
(i) Speed <= 6 kmph :
Walking formula: (0.1 x speed) + (1.8 x speed x grade) + 3.5
(ii) Speed > 6 kmph :
Running formula: (0.2 x speed) + (0.9 x speed x grade) + 3.5

**3. Calculate the results**.
The result of the above equation gives amount of oxygen used.

**4. Calculate calories per minute.**
Multiply result of step 4 with body weight in kg. Dividing the above result by 200 gives the caloric expenditure/min.

**5. Calculate total calories used.**
Multiply the calories per minutes with the total time of exercised.

28. Display Calories burnt, Time elapsed and Distance travelled.
29. goto 2;
30. Stop.

**3.2.4 Feasibility Study**
**P type problem -**
If the running time is some polynomial function of the size of the input, for instance if the algorithm runs in the linear time or cubic time, then we say the algorithm runs in polynomial time and the problem it solves is in class P[3] The P(polynomial time) class problems can be solved using inputs that are traceable and are easy to solve.

**NP type problem -**
A problem is assigned to the NP (nondeterministic polynomial time) class if it is solvable in polynomial time by a nondeterministic Turing machine. A is always also NP.[4]

Taking into consideration the above mentioned points and after analysis of our project algorithm it can be inferred that the problem is a P-type problem.

**3.2.5 Mathematical Model**
1. Let S be a system that describes the execution of the application.
   S = {…..}
2. Identify the modules as M
   S={M,...}
   where,
M = {E,R }
E = selection of predefined workouts module.
R = selection of running exercises module.
3. Identify input to E as Ie.
Ie= {W, n}
where,
W= Particular workout selected from list.
n= Number of repetitions of that selected workout.
4. Identify the modules of R as Mr
Mr = {Tl, Dl,Nl }
where,
Tl= Time limit module.
Dl= Distance limit module.
Nl=No limit module.

[A] Input to Tl is T_limit
where,
T_limit = Time limit specified for the module.

[B] Input to Dl is DT_limit
where,
D_limit = Distance limit specified for the module.

5. Identify the Processes as P
S = {M,P ,...}

P = {Pt,Pd,Pc,P_disp,Ps,Pw}
where,
Pt = Process of evaluating time.
Pd = Process of evaluating distance.
Pc = Process of evaluating calories.
P_disp = Process of displaying the calculated time, distance and calories.
P_set = Process of evaluating sets for predefined workouts.
Pw = Process of displaying selected predefined workout.

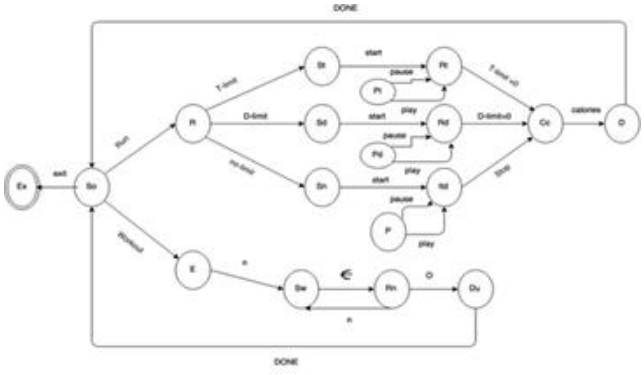
6. Identify the output as O.
S = {M,P, O,...}

O = {Or, Ow}
where,
Or = Output for Running module which displays
(i)Time elapsed.
(ii)Distance travelled.
(iii)Calories Burnt.
Ow = Output for Predefined workout module which displays the number of repetitions done

7. Identify the success as Su.
S = {M,P,O,Su,...}
where,
Su =Success is when the accurate calculations and results are obtained regarding the time elapsed, calories burnt and distance travelled.

8. Identify the failure as F.
S = {M,P,O,Su,F,...}
where,
F= When improper operations are done.

**The system can be described as**
**S={M,P,O,Su,F}**



### 3.2.5 Advantages of the Proposed System

- The proposed system will be much more battery efficient as compared to the existing system.
- The user will be able to connect and synchronize devices like smart watches and fitness bands to be used as activity tracker. Hence the user may not carry his smartphone every time he desires to use the application.
- The application will be able to track the activities even when the user is using a treadmill.
- Users located at different geographical locations will be able to compete and communicate with each other.
- Motivates users to complete their goals using a system of pep-talks when the user is about to reach his target which has been predefined by the user at the start of his workout.

## 4. Features

- Application runs even when phone is locked as it can work in the background mode which a huge boost to the battery life.
- Predefined workouts are a set of workouts which have already been included in the application which the user can simply follow to finish a workout.
- Treadmill mode is an important feature as other applications don't have an effective treadmill mode which can calculate the distance covered by the user and the amount of calories that have been burnt.
- The proposed application can be configured to be synced for use with third party fitness gears such as fitness bands, activity trackers, etc.
- A simple graphical representation of collected statistics helps the user monitor his improvement and overall workout stats.
- Complete analysis of user's workout taking into consideration the data of the user activities is available.

## 5. Conclusion

As reported by a variety of surveys, there is a marked rise in the obesity among the youth all around the world. Following an unhealthy lifestyle is becoming commonplace and is hence giving rise to a variety of health problems. There is a huge demand of fitness application as seen in the recent download trends. Awareness about the health risks is ameliorating day by day. The fitness app connects and encourages users to stay fit and keep exercising. It has a huge scope in the future as people are tending to become more dependent on mobile phones.

## 6. Future Scope

The awareness about health related diseases is increasing day by day consequently increasing the interest of people in exercises and health related applications. The proposed system can be connected to wearable devices further enhancing the use and ease of using the application resulting in more accurate results. As the android devices are becoming cheaper, the reach of the devices will further increase and increase the scope of the application. There is a possibility of the application being connected to health monitoring devices in and for dynamically reporting a patient's health statistics inside or outside the hospitals. The fitness application will become a part of the lives of the people using smartphones, tablets and similar devices.

## References

[1] Android Operating System [Online] available: http://en.wikipedia.org/wiki/Android_%28operating_system%.
[2] Obesity Statistics: http://www.niddk.nih.gov/health-information/health-statistics/Pages/overweight-obesity-statistics.aspx
[3] Feasibility Study - P type problems: https://www.quora.com/What-are-P-NP-NP-complete-and-NP-hard
[4] Feasibility Study - NP type problems: http://mathworld.wolfram.com/NP-Problem.html
[5] P. James, R. Leach, E. Kalamara, and M. Shayeghi, The worldwide obesity epidemic, Obesity Research, vol. 9, pp. 228S-233S, 2012
[6] A. M. Khan, Y. K. Lee, S. Y. Lee, "Accelerometer's position free human activity recognition using a hierarchical recognition model," IEEE International Conference on e-Health Networking Applications and Services, pp.296-301, 2010.
[7] Shlomo Berkovsky, Mac Coombe, Jill Freyne, Dipak Bhandari, and Nilufar Baghaei. Physical activity motivating games: virtual rewards for real activity. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pages 243-252. ACM, 2010.
[8] T. Zhang, J. Wang, P. Liu, J. Hou, "Fall detection by embedding an accelerometer in cellphone and using KFD algorithm," IJCSNS International Journal of Computer Science and Network Security, vol. 6, no. 10,2006.
[9] Fabio Buttussi, Luca Chittaro, and Daniele Nadalutti. Bringing mobile guides and fitness activities together: a solution based on an embodied virtual trainer. In Proceedings of the 8th conference on Human-computer interaction with mobile devices and services, pages 29-36. ACM, 2006.
[10] J. Mantyjarvi, J. Himberg, T. Seppanen, "Recognizing human motion with multiple acceleration sensors," IEEE Transactions on Systems. Man. Cybernetics, pp.747-752, 2001.
[11] F. Lu and K. Turner, Improving adolescent fitness attitudes with a mobile fitness game to combat obesity in youth, 2013 IEEE Games Innovation Conference, pp. 148-151, 2013
[12] F. Lu, K. Turner, and B. Murphy, Reducing adolescent obesity with a mobile fitness application: Study results of youth age 15 to 17, IEEE Healthcom 2013, pp. 518-522, 2013

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