

# **(Mobile Exercise Game)**

**Computer Engineering - Senior Project Report**

**Advisor:** Tuğba SÜZEK

**Group Members:** Esra Ay, Burak Eken

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Esra Ay, Burak Eken

Computer Engineer

Muğla Sıtkı Koçman University

12/01/2020

## Summary

According to World Health Organization (WHO) data, there are over 400 million obese people and more than 1.6 billion overweight individuals in the world and it is estimated that this number will reach 700 million and 2.3 billion in 2015, respectively. [1]

Insufficient physical activity, a sedentary lifestyle, is one of the most important causes of many chronic diseases including obesity. Since the human genome is based on high activity, it is seen that lifestyle with low physical activity, which is the most effective among environmental effects, leads to disease phenotypes. The fact that there are few areas where both exercise and socialization can lead people to a more inactive lifestyle. The most appropriate way to increase physical activity is to incorporate physical activity into the lifestyle. [1]

There are many chronic diseases caused by inadequate physical activity as well as obesity. Metabolic syndrome, another of these diseases, is seen in 60% of males and 75% of females between 60-70 years of age. The incidence of the disease increases with age. While this situation shows a parallel result with the data of Europe and the USA, the incidence of metabolic syndrome in our country is increasing day by day as in the whole world. The average population over the age of 20 in Turkey are known to have struggled with this disease 1 of 3. [2]

This project aims to apply the concept of “serious play, which has recently been used, to entertain people, play games and socialize to increase the healthy individuals in our society. Serious play or hands-on play is a general definition given to games designed for a primary purpose, such as health, education, and pure entertainment. In this project, it is aimed to provide more accessible and more encouraging “serious games ere to the individuals in need of exercise by considering the time that people devote to games and the inadequacy of social spaces where activities can be performed.

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# 1. Introduction

Inadequate knowledge of the society about physical activity, insufficient understanding of the importance of physical activity for health, and the adoption of an increasingly sedentary lifestyle had been one of the most important factors increasing the incidence of chronic diseases such as obesity, cardiovascular diseases, hypertension, and diabetes. The negative effects of technology on the individual have triggered inactivity and as a result of urbanization, people cannot find suitable places for their activities.

In this project designed to solve this problem and to encourage people to exercise, people will be able to enjoy sports and prevent the search for space.

In practice, which aims to raise awareness of people, fight against diseases and create a healthy society, the individual can follow his / her daily movements and increase his / her activity according to the suggestions to be given. In doing all this, the hard-earned habit can be made by having fun, not by force, as opposed to other practices, and can develop socially by communicating with other people through play.

## 2. Methods

The application, which will be developed within the scope of the project, is considered as an environment where people can have fun while doing sports. In this environment where they will not feel lonely, they will encourage users with a sense of competition.

As a result of the prerequisite analysis made for the application, the required features in the application were determined as follows:

- The application can receive data from the accelerometer and gyroscope.
- Multi-user support is available.
- Multi-media (iPhone and Android) to work.

## **i. Determine of Sensor Libraries**

Game requirements are taken into account when determining sensor libraries. These requirements are:

- GPS for outdoor play
- Accelerometer for a constant platform (such as spacewalk and treadmill)
- Pedometer for a defined area (such as a field or garden)
- Gyroscope to be used in all
- Gravity sensor

We've done a few experiments in determining these sensors. We determined the most suitable sensor by using scenarios according to the environment where the application will be used. In this scenario, multiple users have different locations. As a result, the `LocationService` [3] in Unity was determined for the Outdoor scenario. Thanks to this class, location functionality can be used. `Input.acceleration` [4] in Unity will be used for the fixed environment scenario. Thanks to this class, the 3D data calculated by the accelerometer will be read. Pedometer plugin (version 1.5) [5], where pedometer data can be obtained, will be used to make the game more efficient in defined field-like areas. Gyroscope class in `UnityEngine` will be used in common for all scenarios and Gyroscope for Gravity.

## **ii. Development of RUNON Application**

In this application, it starts with the user registering to the game or logging in from their social media accounts. On the home screen, the user can match a random person for one time if he wishes. Or instead, a game request can be sent to someone on their friend list. Before the game stage, the user is asked to select the environment. The speed data of the player is processed and reflected in the animation according to the places and the game continues in this way. The player earns points as he overcomes obstacles within the game and defeats his opponents. With these points, the player can buy materials that can be used in the game. Finally, as the user exceeds his / her records and the first of the week in the friend list will earn quite a lot of points. The player will be able to view these statistics weekly in his / her profile. The design of the game, data processing, and software will be done through Unity. Existing and purchased libraries will be processed and reflected in real-time data. The software that will be used for the Android environment SDK will be made entirely in C #

## **3. Results**

In the first half of the year, we determined the concept for our game and searched the libraries to be used. Although mobile development platforms such as Qt and Android Studio have been tried. We have the game engine and hardware problems. Unity has been decided because Unity has a multiplayer supported game engine. Following this decision, various tutorials were taken to gain basic knowledge about Unity. The performance of the game in three different places as outdoors, constant platforms, and defined areas was found to be beneficial for success and it was determined which sensors would be used for these three places. As a result of these developments, the process of reading data was started using Unity libraries.

Secondly, the Tübitak proposal was completed. We designed a figure for the system. This proposal gave us to better understand the building blocks of our project and to determine the game concept and to plan the time.

Finally, the data reading study was carried out by running the libraries we implemented in Unity through Android. We had some problems at this point. Therefore, this reading takes some time.

In the second semester, we will complete the rest of our project. The sensor data that will undergo data processing will be classified and directed to the game. The interfaces of the game will be completed and the animations will be loaded. When all these processes are finished, the test process will be started to understand the proper operation of the game. Finally, the game will be available on the mobile game store.

## 4. Conclusion

We believe that our project will minimize the insufficiency of physical activity that has become a major problem in the world. While doing this, our primary goal is to enable our users to exercise in the environment they want and thus encourage them. Our game will be easily available to every device and by any age audience. In this way, it is planned to become a part of our daily life and increase physical activity.

## 5. References

- [1][http://www.journalagent.com/turkhijyen/pdfs/THDBD\\_70\\_4\\_205\\_214.pdf](http://www.journalagent.com/turkhijyen/pdfs/THDBD_70_4_205_214.pdf)
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