Lab 1 Final - SuperU Overview

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CS 410/411

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12/07/2020

Version 1
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1. Introduction

a. Background

Sometimes training can be very difficult when you do not have the right instructions and training. Nearly half of individuals training regularly face plateaus from under/overtraining, preventing them from reaching their goals.[5] A study with 20 men weightlifters separated into a supervised group and unsupervised group for a period of 12 weeks. The results showed that the supervised group’s squat and bench press one rep max were greater than the unsupervised group. [1] There are also factor that plays huge roles in training that individuals take for granted. The CDC found that 1 in 3 people do not get enough sleep on a day to day basis, something vital to weight training effectively.[2] According to the US National Library of Medicine, there is mounting evidence showing that, due to a variety of reasons, such as a demanding often experience sleep deprivation that in turn hinders their performances. A research conducted on sleep says that, “lack of sleep .. appears to be associated with increased injury risk in an adolescent athletic population”. [16] We also found out that, “Sleep deprivation can affect motor function, mood and cognitive functions, all of which could affect a young student athlete’s performance and injury risk.
b. Societal Problem

Many weightlifters neglect some factors that are crucial to increasing their lift effectively as possible. Weightlifters lack proper guidance which hinders their progress. Weightlifters also lack sleep. Lastly, weightlifters ignore critical target intensities (RPE).

c. Solution Description

The solution to this problem is the software, SuperU, an application that works in tandem with your phone and smartwatch devices to provide weight lifting guidance and other
training information in real-time, in addition to creating a plan custom tailored to the user, based on a learning algorithm that takes the date gathered during each workout to allow the user to progress safely and effectively towards their goals.

d. Solution – SuperU

SuperU will give you the fastest approach to the results the user’s personalization. This platform will also guide user to workout at the most beneficial intensities which is RPE. It also helps you learn some good training techniques to help you in your workout journey. Maximizing your sleep to maximize good results. This platform will help you prevent progress plateaus; you will see results by the app guiding you. This also gives you interface that is easy to use and track progress.

2. SuperU Product Description

a. Summary

SuperU is an application that is open to the public. It is specifically for weightlifters and trainers. It will help guide weightlifter to prevent them from not seeing results by assigning them trainers.
a. Goals and objectives

The goal of the application is to give Weightlifters the platform to learn new training techniques and get trained by the app trainers. Users are allowed to create an account to give them a profile. SuperU help store data based on fluctuating sets as heart rate, intensity and sleep pattern. The application also stores data based on static goals such as weight, height and any health limitation such as asthma. This application utilizes a smartwatch devices and Fitbit API to extrapolate variable data sets. The hardware necessary for this application would be accelerometer/motion detection and a heart rate monitor. The application will process the data into a proper routine algorithm.

2.1 Key Product Features and Capabilities

a. Mobile Client Application

The weightlifters will be able to create an account. The weightlifter will be able to visualize progress and view data history. The lifter will also have access to custom generated workouts and plans and schedules. With the help of an RPE generating algorithm, will use recorded parameters such as the sleep, previous RPE and 1RM and sore.
Trainers will be able to visualize client and data history. The trainer will also have access to change and modify generated custom client workout plans and client’s schedules.
b. Cloud Architecture

1. Database (Firebase)

   The database will be firebase which will be used to store all the user profile data like Name, Email, Password, Date of Birth, Heart Rate and Sleep Score. This database will store weekly information such as a start date, end date, average body weight, and average body fat ratio. It also saves the exercise set information like reps, RPE, sets and the weights as well. The database will store the generated recommended exercise set information such as reps, RPE and sets. They store active day information such as date, body weight, body fat ratio and sleep score.

   All the data stored from the Fitbit will go directly into Firestore using Firebase functions. Backup and free up data will be in the database.

c. Fitbit/ Smartwatch API

   The Fitbit/ Smartwatch will connect with the smartphone SuperU client. They also record data such as heartbeat, accelerometer, etc. It allows highly relevant data collection with respect to the training.

d. Administrator

   The administrator will have the access to add and remove users manually. Admins will be responsible for database maintenance and repair. Admins will be responsible for data migration.
2.2 Major Components (Hardware/Software)

a. Hardware

1. Smartphone or Equivalent Smart Device which will run the SuperU application
2. Fitbit or Equivalent Smartwatch which will track the fluctuating data point such as heart rate and sleep patterns

b. Software

The software are going to be able to work with both iOS and Android. For language, we will use Java for android and swift for iOS. For UI/UX we used Android Studio(XLM/Java) and swift as well for iOS. For internal Database, SQLite for both.
Android and iOS. For Cloud Database, both Android and iOS will be using Firebase. For Version Control, both Android and iOS will be using Github and Jira. And lastly, Testing, Android will use JUnit then iOS uses XCTest.

c. Database: External Storage Firebase

1. Cloud Based Database, NoSQL
2. Firebase Auth offers multiple secure methods to authenticate
3. Stores and syncs data between users and devices – at global scale
3. Identification of Customer Base

a. Who is this product for

This product is for weightlifters, powerlifters, bodybuilders and personal trainers. The product will also be available for anyone who is trying to get stronger.

b. What will it be used for

Weightlifter will use this platform to help increase their lifts. Trainers will also use this platform to analyze the progress and modify the workout plan generated by the algorithm for the weightlifters.

c. Who else might this benefit

Gyms might benefit from this product as well.

User Roles and Stakeholders

Users:
- **Weightlifter**: Individual that trains to increase their lift.
- **Trainer**: If enabled, analyzes the progress and workout plan generated by the algorithm and is able to modify the workout plan for the weightlifter.

Stakeholders:
- **Gyms**: The gym will hire trainers and distribute the application to them.
4. SuperU Prototype Description

The prototype we have at the moment should be the same as the final product. The only change functional that should be different from the real world product will be the “Client’s data is collected for workout plan”. This data will be simulated for previous weeks normal functionality for current day.

4.1 Prototype Functional Goals and Objectives

Much like the final product, the prototype will be able to take the various user profile data like RPE, etc. to create a unique workout plan for the simulated user. It should include their actual and expected improvement and if needed, allow the possibility of signing on with a
mentor. This future trainer should be able to access all the data of their provided client in combination, enabling several customers at once. Then they should be free to change the strategy of their client as they see fit. With the Fitbit API, the prototype should have complete features, facilitating quick connectivity with compatible wearables. All the administrative backend functionality you would expect from the final product should also be enabled, facilitating regular maintenance of the database.

4.1.1 Simulate real-world data

With the user inputted values, The SuperU team will be able assess a number of various types of users, from simulated experienced powerlifters all the way to a newcomer with bad form and or any medical problem. All other data like heart rate, sleep pattern, etc. will be via. Tester and will be fully functional.

4.1.2 Produce a simulated routine based on data set

The only thing about the routine that is simulated would be the data used to generate it. The simulated data will run through the SuperU algorithm and based on the dummy data points given by the testers, create a personalized routine for the prospective customer. It will then be applied to the results of the calculations performed by hand to ensure that no anomalies are present.
4.2 Prototype Architecture (Hardware/Software)

The hardware to be utilized for the prototype will be the same for the real world product which will be Android or iOS based smartphone or equivalent smart device, as well as Fitbit or any other compatible smart watch with the Fitbit API. The softwares for the prototype are going to be able to work with both iOS and Android. For language, we will use Java for android and swift for iOS. For UI/UX we used Android Studio(XLM/Java) and swift as well for iOS. For internal Database, SQLite for both Android and iOS. For Cloud Database, both Android and iOS will be using Firebase. For Version Control, both Android and iOS will be using Github and Jira. And lastly, Testing, Android will use JUnit then iOS uses XCTest.

4.3 Prototype and Capabilities

The prototype will be capable of all the functionalities that the real world product will have. Which are:

- Monitor heart-rate and estimated RPE in real-time via smart wearable.
- Monitor your average and resting heart-rate throughout the day for comparison so it may better estimate the RPE.
- Collects sleep patterns gathered via the smart wearable.
- Store your information, calculate your routines, and show you your current and projected progress.

This will include fitness prompts, reminders if your sleep habits are bad, and regular warnings for your next workout to get good sleep.
4.4 Prototype Development Challenges

The problem we had was deciding if we want to build our own API or go with Fitbit’s API which in the end the team decided to go with FitBit’s API for now. It might be opened to change later on. One problem we had was the design. It was hard to design how the interface should look like because we ran out of ideas but as a team, we worked on them to make sure it was good by the time it was due.
5. Glossary

a. **Rating of Perceived Exertion (RPE)** - A way of measuring physical activity intensity level based on objective parameters and the person’s experience[1].

b. **One-Rep Max (1RM)** - The maximum amount of the weight you can lift for a single repetition of a given lift[1].

c. **Weightlifter** - One who lifts heavy weights for exercise, muscle strengthen ing, or athletic competition.

d. **Plateau** - State where a lifter fails to improve their 1RM for a long period of time.

6. References


