Requirements Document

CSC 490

Jacob Johnson

Tyler Hetherington

Londen Haskins

Due Date: October 20, 2020

Instructor Comments/Evaluation

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Abstract

Our project aims to provide live auditory feedback to users while they are walking, running, biking, or doing any form of distance-based cardio. Currently, the best way to make sure you're running on pace is to check your watch and do some minor calculations in your head. We plan to simplify that process by making phones do the work instead. Our app collects GPS data and uses that along with the user's desired pace to process these calculations and provide auditory feedback based on their current deviation from that pace. The app also collects live heart rate data to ensure that the runner is not exceeding their maximum heart rate while still receiving the health benefits of an elevated heart rate during exercise. This document serves to define the requirements to create this application.

Introduction

Background/Overview of Project

Current running applications excel in providing post-run data and analytics. However, those apps are currently lacking in the ability to provide live auditory feedback. It is difficult for runners to gauge their current pace without owning a smartwatch or shifting their focus from keeping their pace to calculating their pace. Our project aims to simplify that process by automatically calculating their pace and providing live auditory feedback to the runner based on their desired pace and GPS data provided from their smartphone.

While this project is similar to other running apps, we separate ourselves by adding the live auditory feedback functionality. The feedback aims to make sure the runner is maintaining their desired pace and their heart rate is not exceeding their maximum heart rate. Our app will connect to a heart rate monitoring device to track the user's heart rate as they are running. This allows for our app to notify the user if their heart rate begins to rise to dangerous levels. The user will also have to input their age before running to calculate a proper heart rate range and maximum heart rate.

Outside of the live feedback, our app will also provide the basic functions of other running apps. This includes a pre-exercise interface that allows users to set their desired pace and frequency of feedback. Also, the user will be provided with post-exercise statistics that will be logged. These statistics include distance, average mile time, and average heart rate. The data will be stored and available for the user to view in the future.

Objective of Project

The objective of this project is to give auditory feedback to the user while they are running during their training session. This auditory feedback will be based on the user's desired pace and heart rate throughout the exercise. Our overall goal is to allow the user to solely focus on their exercise while the app is doing all the pace calculations. This will be done by using location data. The app will gather location data and use it to calculate whether the user is running at their desired pace. We also want to make sure the user is not overworking themselves by raising their heart rate to potentially dangerous levels. Using an external heart rate device will allow the app to give feedback if the user ever reaches their maximum heart rate.

Constituents/Team Details and Dynamics

To make sure this project will be successful, all members of the group must contribute as much to the project as possible. The group is comprised of Computer Science majors Jacob Johnson, Tyler Hetherington, and Londen Haskins. All three members have expressed their backgrounds in technology, so there is an understanding of each other's technical skillset and where we can excel through the length of the project. It is important that there is clear communication throughout the entire project to ensure its completion with minimal difficulty. This will be achieved by using Discord and communicating through email. To make for easy access to files and recording real time changes, we will be using Microsoft One Drive for creation of all documents.

Application Domain

Project Context

The primary domain for this project is athletic training. Athletes from all skill levels can benefit from this project. Amateur athletes can use this to gauge their current fitness level. It also allows amateur athletes to understand pacing and how to maintain a consistent pace. This project would benefit high-level athletes when they don't have direct access to a coach. Normally professional runners have coaches that tell them their current pace when they pass them. However, when coaches may not be available this project provides the same results that a coach would. A specific example of when that could be useful is the COVID-19 situation where athletes may not be able to physically work with coaches for reasons outside of their control.

See *Appendix I* for additional information on specific terminology used throughout the document.

Initial Business Model

Operational Environment

The coding languages that will be used include Kotlin and Java. Multiple APIs will also be used in the building of this project. Those include TextToSpeech, CompanionDeviceManager, BluetoothManager, ServiceConnection, and FusedLocationProviderClient. This project is intended for mobile devices operating on the Android operating system. Thus, the application will be available on the Google Play Store.

Description of Data Sources

This project requires significant data to function properly. The primary sources of data will come from the tracked GPS location of the smartphone. The necessary data includes the user's location along with the time when they are at that location. Another important piece of data is the user's heart rate that will come from the heart rate monitoring device if used. All this data will be put through calculations to provide the feedback to the user either live, in auditory form, or after the workout in text form on the app.
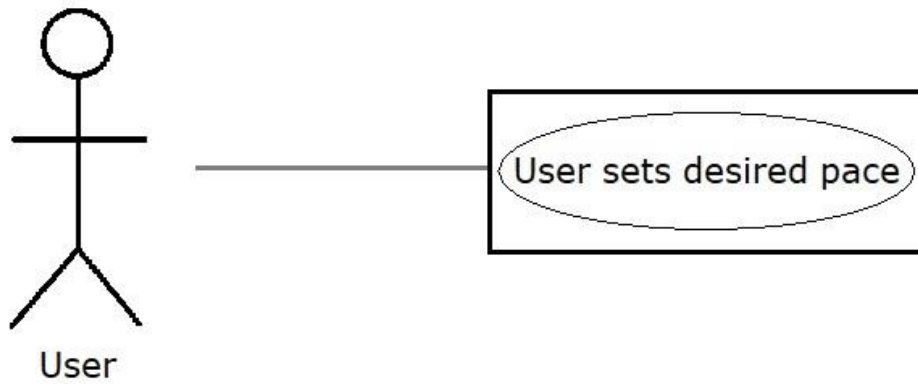
Use Case Diagrams
*User Choses Training Type*
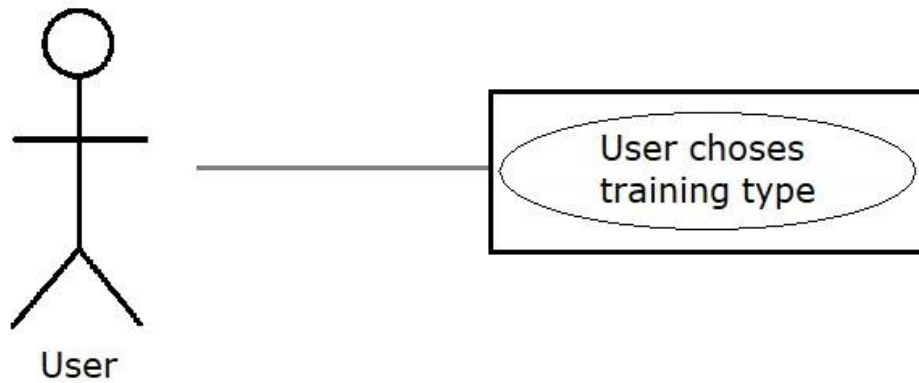
User

Steps:

1. User starts a new run for training session.

2. User selects either Long Run or Interval Training for training type.

3. The user can set if they will be using a heart rate monitor for current session.

User Sets Desired Pace

Steps:

1. If Long Run was chosen as run type, the app prompts the user to input the desired pace.

2. If Interval Training was chosen as run type, the app prompts the user to input the time intervals for training session.

3. App will test for connection to a heart rate monitor if selected in training type selection.

User Sets Age
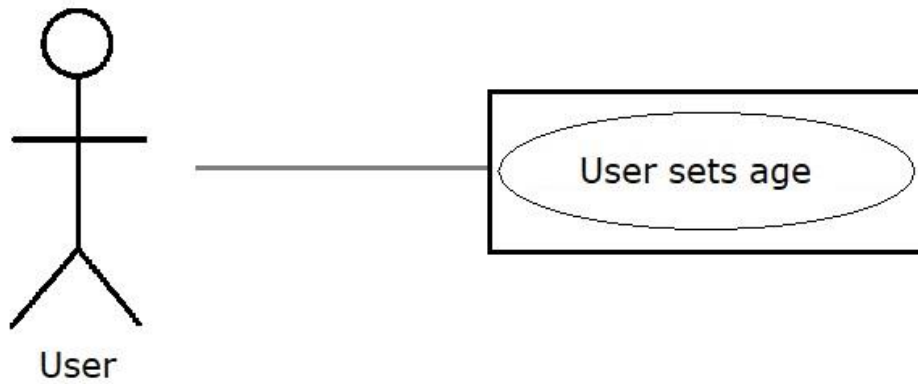
Steps:

1. If user set that they will be using a heart rate monitor, app will prompt the user to input their age.

2. User inputs age.

User Receives Pace Feedback
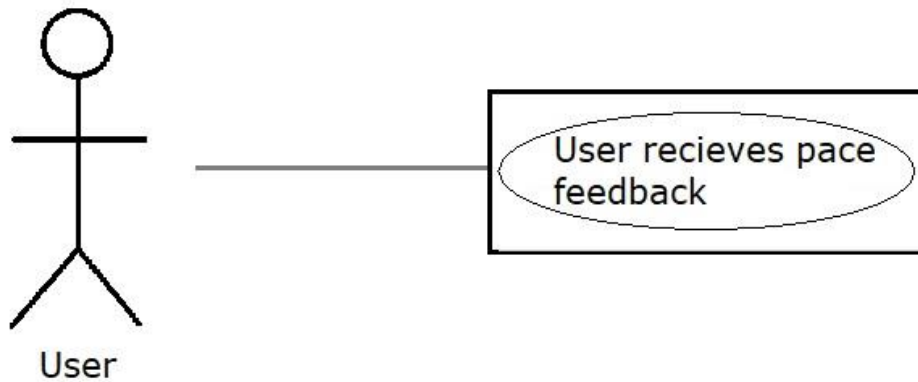
Steps:

1.   The user will start their training session.

2.   App will start recording location data and heart rate data being sent from heart   rate monitor.

3.   App will calculate current the user's pace, compare user's heart rate with the ideal   and maximum heart rate.

4.   Every quarter mile, the app gives auditory feedback based on user pace.

5.   If user heart rate exceeds maximum heart rate, the app will audibly notify the user.

User Views Post-Run Statistics
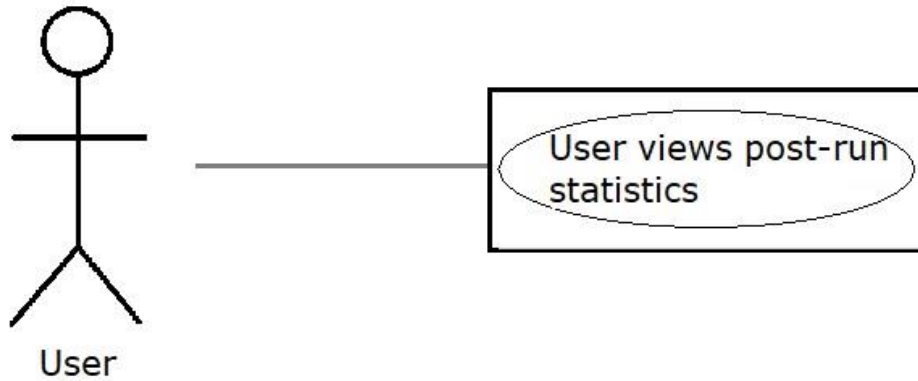
Steps:

1.   The user selects to view post-run statistics.

2.   If user completes a training session, the app immediately displays recorded statistics.

3.   App displays distance, pace (by mile time), and average heart rate.

Initial Requirements

Functional

There a multiple functional requirement for this project. The application must take a required user input of desired pace along with an optional input of user's age. This is optional because it is only necessary for the connection with a heart rate monitoring device. Once the run starts, the application will gather location data and heart rate data. This data will calculate current pace and compare current heart rate with ideal heart rate range and maximum heart rate. In quarter mile intervals the application will provide auditory feedback based on the user's pace. The application will also provide auditory feedback if the user's heart rate reaches their maximum heart rate. After the exercise is over, the user can view the post run statistics provided by the application.

Nonfunctional

Our application must be easy to use and navigate. The interface must look polished and organized. Response times for audio feedback should not be an issue. This is because it is provided in quarter mile intervals and the fastest a human has run a quarter mile is roughly 42 seconds. This should provide ample time to gather the data and run calculations. As for location reliability. That would primarily hinge on the accuracy of the data provided by the smartphone device.

Documentation

Throughout the creation of this project multiple documents will be created to explain different aspects of the project. A proposal document explains the project idea and how users will benefit from its creation. This requirements document is a written explanation on what the project plans to achieve. The specifications document will provide more details regarding this project. The design document will explain how the document is going to be

made. The user manual will provide the user with information on how to use the smartphone application.

Testing / Revisions

Throughout the creation of this document it was continuously proofread. Sections were also run through a proofreading software (Grammarly) to identify any grammatical mistakes that are not picked up by Microsoft Word. Multiple sections were partially rewritten and revised to present the content in a clearer manner. The paper was worked on using Microsoft Word on OneDrive shared by the group. Group members read through the document multiple times to find any mistakes in continuity or grammar. Lastly, our group reviewed the outline provided on d2l to ensure we've covered all the necessary information.

Appendix I: Technical Glossary

API (Application Programming Interface) – A computing interface that defines interactions between multiple software intermediaries.

Android – Google's mobile operating system

Auditory Feedback – Feedback provided with sound

BluetoothManager – API used to manage Bluetooth connections

CompanionDeviceManager – API used to manage connections between devices

FusedLocationProviderClient – API used to gather location data using Google Maps

GPS (Global Positioning System) – A navigational system using satellite signals to determine a location

Java – A programming language developed by Oracle

Kotlin – A programming language designed by JetBrains

Pace – Average amount of time per mile

ServiceConnection – API used to monitor state of application service

TextToSpeech – API that synthesizes speech from text

Appendix II: Team Details

Workflow leader: Jacob Johnson

Jacob Johnson – Jacob was the lead author of the document. Contributing to every section and being a driving force in the document's creation. He also continuously proofread the document throughout its creation.

Tyler Hetherington – N/A

Londen Haskins – Londen supported creation of the document in the making and detailing of the use cases. And editing of sections over creation to ensure features and topics are clearly conveyed.

Appendix III: Workflow Authentication

I, _____, hereby attest that I have performed the work as documented

herein.

Signature: _____   Date: _____

I, _____, hereby attest that I have performed the work as documented

herein.

Signature: _____   Date: _____

I, _____, hereby attest that I have performed the work as documented

herein.

Signature: _____   Date: _____

Appendix IV: Writing Center Report

Cal U Vulcan Learning Commons Report

Client: Jacob Johnson

Staff or Resource: Nathan Z.

Date: October 19, 2020, 4:00pm - 5:00pm

What course was serviced by this visit?: CSC 490

Did the student request that the instructor receive a visit report?: Yes

Please provide any additional comments relevant to this session.:

I reviewed to page 6 of the document. The document reads well, and the project seems interesting. Most of my recommendations dealt with spacing and formatting. The guidelines gave only general formatting instructions, but since you selected APA for the style you were using, I made APA formatting suggestions. If you have any questions, comments, or concerns, you can email me at any time at Zis0062@calu.edu.

How did the process of this consulting session address the established goals?:

I reviewed the document and made suggestions regarding formatting, grammar, and style.

Report also in your email inbox