Product Requirements Document v2

Team: TranquiliTEA

Sponsor: Artera

Project Title: Tranquil

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Introduction

Our project tackles the issue of the current mental health crisis, specifically with anxiety. It incorporates the use of wearable technology and a mobile application that offers resources that assist those prone to anxiety and stress. Overall, we use personal medical data including heart rate variability to identify when the user is feeling anxious. Upon detecting that a user has anxiety, the application prompts the user via a push notification asking if the user wants to transition to the phone application to provide stress relief. Once they open the app, they can choose from an AI chatbot, breathing exercises, or journaling to combat the anxiety. These resources can be accessed at all times, not just when the app determines that an anxiety attack is happening. The user can also see their stress mitigation progress in a history section that shows their average daily heart rate fluctuations and improvements after using the application.

Problem Significance:

This problem is important because many people suffer from chronic anxiety and do not have many options to effectively handle their symptoms and reduce high levels of anxiety.

When the anxious thoughts begin to emerge in the background, it can be hard for them to find the relief they need in the moment. Anxiety makes it difficult to stay focused and complete day-to-day tasks. There are few applications out there available today for people with anxiety, but they rely on the user to actively set aside time to work through their anxiety. This becomes overwhelming or stressful for many people and they end up falling off the habit of using these applications. Our application provides a quick solution that is minimally invasive in people's daily lives to combat their anxiety. It is difficult to remember to use the crucial tools these applications provide when an anxiety attack is happening. Our application addresses this problem by automatically prompting the user when they are experiencing anxiety. Working through these techniques is a more effective solution because it provides customized relief to the user in a timely manner, as opposed to addressing the anxiety after an attack.

Current Solutions:

There are currently only a few applications that users can utilize to cope with anxiety. "Calm" provides guided meditation and breathing exercises. "What's Up?" lets users track their mood. "Moodnotes" is helpful for journaling. And "MindShift" uses cognitive behavioral therapy to mitigate anxiety symptoms. Each of these apps have their own advantages, yet none of them notify the user to use the app's tools when the user is feeling anxious, and the features offered are minimal. There are also a variety of wearable devices available for anxiety treatment. "Apollo" is a wearable band that uses vibrations to help your body and mind calm down. "Muse" is a wearable headband that can guide your mind to safe spaces. "Oura" is a ring that improves your circadian rhythm when sleeping. These current wearable devices have mixed reviews. Some people rave that they are life changing, whereas others say they are not effective in helping them address their chronic stress and anxiety. Furthermore, the steep prices of these devices make them impractical to many of the potential users that could benefit from them the most. Our application combines anxiety detection, stress level tracking, prompted guided meditation exercises, and journaling techniques to bring a more effective and customized solution to our users.

Project Outcomes:

The outcome of this project is to reduce anxiety levels of users willing to utilize the application and wearable technologies. By giving a biometric analysis, the user can be sure

that the activities they are doing to calm them down are actually making them less anxious and are keeping their vitals stable. Furthermore, through this app, patients can visualize their improvement over several days as their biometric data and self-reflections will be recorded and analyzed. This application would serve to improve mental health for all that use it. Users can also identify triggers of their anxiety with the notifications. If a user constantly gets a notification that they are anxious while participating in a certain activity, they can more easily recognize what activities cause them the most stress in their daily lives .

Initial Project Milestones: Specification, Design, Prototyping

Some project milestones are a basic layout and design of the interface that the user will be able to see. We want to aim for this application to be inclusive of people with disabilities so they are also able to benefit. First, we will decide on the metrics to work upon for deciding anxious behavior through an API. We want to focus on the chatbot and backend aspects of the app working first then start focusing more on the front end user interface once we can test some of the core aspects of the application. We can then prototype the application once we have all of these basic features implemented, and from there work on further improving the user experience.
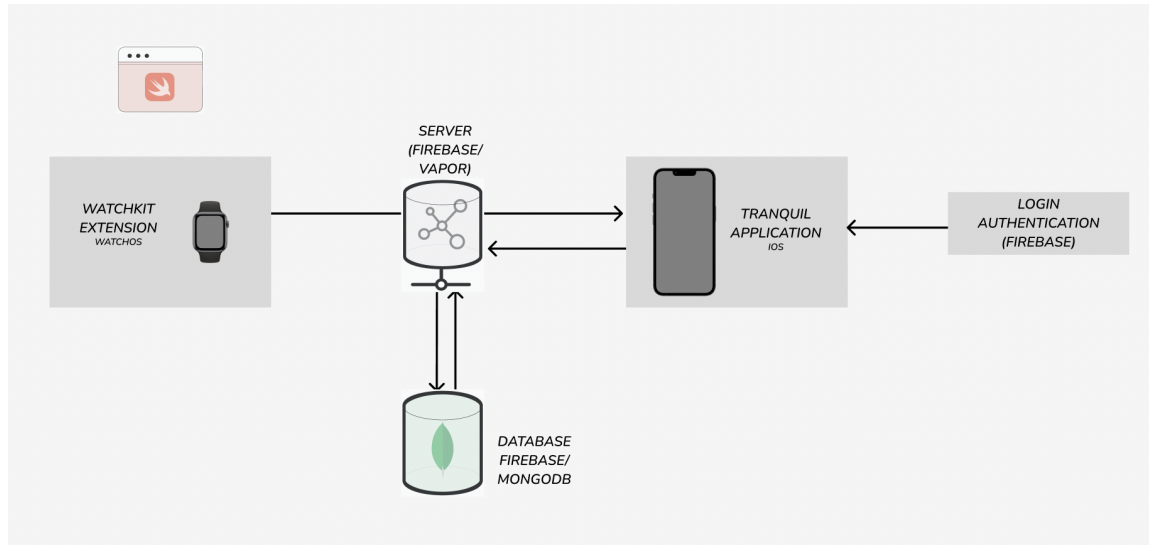
Team Goals:
- User friendly for different age groups, as well as making the benefits of the application as accessible as possible.
- Seamless integration between the apple watch and the phone application.

Team Assumptions:
- Application must be able to differentiate non-anxious activity such as exercise, where the user will have a heightened heart rate and other metrics similar to being under a lot of stress.
- The user is looking for a new application or method to cope with their anxiety.
- The user owns an Apple watch that tracks valuable health metrics that can be integrated with our iOS application.

System Architecture Overview

High Level Overview

User Interaction and Design

1. *Login*

2. *Watch Connection*

Frame 1 (Start)

Frame 2 (Unsuccessful)

Frame 4 (Home)

Connection Successful

Connecting to Apple Watch...

Connection to Vana's Apple Watch Successful

Home

Tranquil

Breathing Exercises · Journal · History · AI Chatbot

Connection Unsuccessful

Retry

Frame 3 (Successful)

Tranquil

Connection Unsuccessful

Retry

3. *Notification when Anxiety Spikes*

Frame 2 (Prompt)

Tranquil

What would you like to do next?

Breathing Exercises

Journal

AI Chatbot

Frame 1 (Wa...

Tranquil

Is everything ok? We noticed a spike in your vitals

I'm doing fine !!! · Go to App

Go to App

4. *Breathing Exercises Feature*

5. *Journaling Feature*

6. *Past Anxiety History Feature*

Tranquil

Breathing Exercises

Journal

History

AI Chatbot

Tranquil

Weekly Recap
• Actual • Average

200
150
140
125
100
90

MON TUE WED THU FRI SAT SUN

Journals Written: 2

Breathing Exercises Completed: 10

Average Stress Level: 65/100

Most Stressful Time: 2 -4 pm

System Models

UML Diagram

App.swift
Entry point

LoginView.swift
Login view
- emailAddress : string
- password : string
- signIn() : bool
- signUp() : bool

HomeView.swift
Homepage
- navBreathing() : boolean
- navJournal() : boolean
- navAIChatbot() : boolean
- navProfile() : boolean
- navHistory() : boolean

ProfileView.swift
Profile
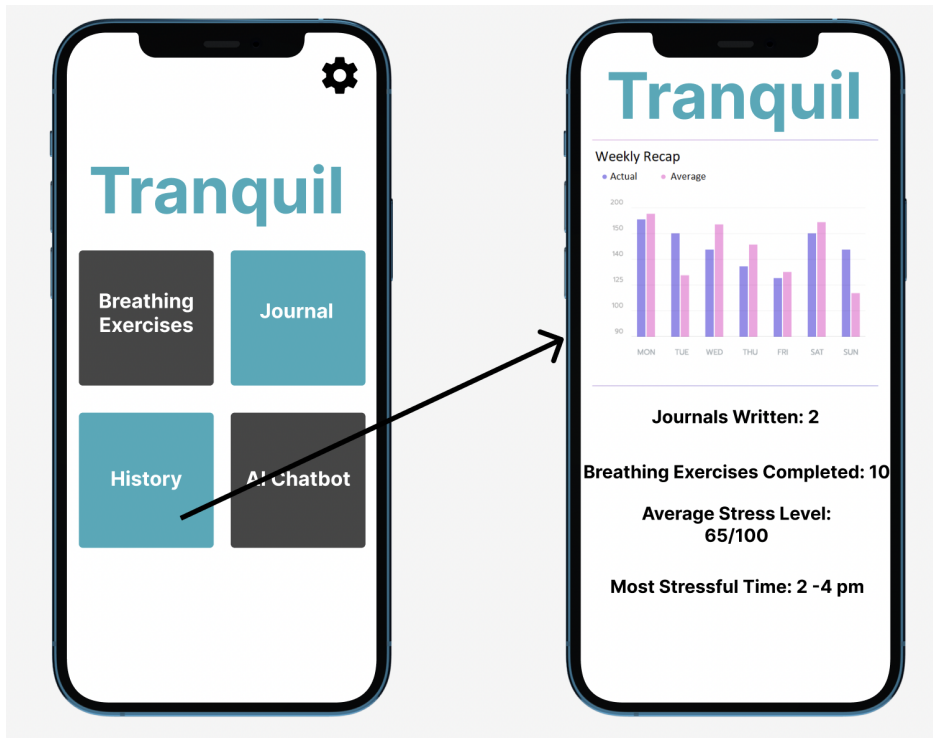- emailAddress : string
- password : string
- name : string
- picture : image
- firebaseToken? : string
- change...() : bool

HistoryView.swift
Past history of stress levels
- journalsWritten : int
- exercisesCompleted : int
- avgStressLevel : float
- mostStressful : string
- viewLastWeek() : boolean
- viewLastMonth() : boolean

BreathingView.swift
Breathing exercises
- startExercise() : boolean
- nextExercise() : boolean
- prevExercise() : boolean
- createExercise() : boolean

JournalView.swift
A place to journal thoughts
- currentEntry : string
- prevEntry() : boolean
- nextEntry() : boolean
- navCalendar() : boolean

AIChatbotView.swift
AIChatbot
- currentConversation : string
- ... : boolean

WatchNotif.swift
Notification on the watch
- dismiss() : boolean
- goToPhone() : boolean

NotificationView.swift
Notification from watch
- navBreathing() : boolean
- navJournal() : boolean
- navAIChatbot() : boolean

Sequence Diagrams: UI Interactions

1. USER LOGIN AUTHENTICATION
SIGNING IN AND SIGNING UP

USER	WEBPAGE UI	BACKEND API	DATABASE

ENTER VALID EMAIL + PASSWORD

POST /USER (WITH CREDENTIALS)

QUERY CREDENTIALS

RETURN USER ID

HTTP RESPONSE WITH USER ID

USER LOGIN

ENTER INVALID EMAIL + PASSWORD

POST /USER (WITH CREDENTIALS)

QUERY CREDENTIALS

RETURN USER ID

HTTP UNAUTHORIZED RESPONSE

DISPLAY INVALID LOGIN

2. USER VIEWS HISTORY
QUERYING HISTORY DATA

USER	WEBPAGE UI	BACKEND API	DATABASE

NAVIGATE TO HISTORY VIEW

GET /HISTORY_OVERVIEW/<ID>

QUERY<ID>

RETURN HISTORY OVERVIEW

HTTP RESPONSE

DISPLAY HISTORY INFORMATION

CLICK VIEW LAST MONTH

GET /HISTORY_MONTH/<ID>

QUERY<ID>

RETURN HISTORY OVERVIEW

HTTP RESPONSE

DISPLAY LAST MONTH'S INFORMATION

3. USER VIEWS JOURNALS
STORES CURRENT JOURNAL, QUERIES PAST

USER	WEBPAGE UI	BACKEND API	DATABASE

NAVIGATE TO JOURNAL VIEW

PUT //JOURNALS/<ID>

QUERY<ID>

RETURN SUCCESSFUL/UNSUCCESSFUL WRITE STATUS

RETURN SUCCESSFUL/UNSUCCESSFUL WRITE STATUS

CLICK PREVIOUS JOURNALS

GET //JOURNALS/<ID>

QUERY<ID>

RETURN PREVIOUS JOURNAL

RETURN PREVIOUS JOURNAL

DISPLAY PREVIOUS JOURNAL
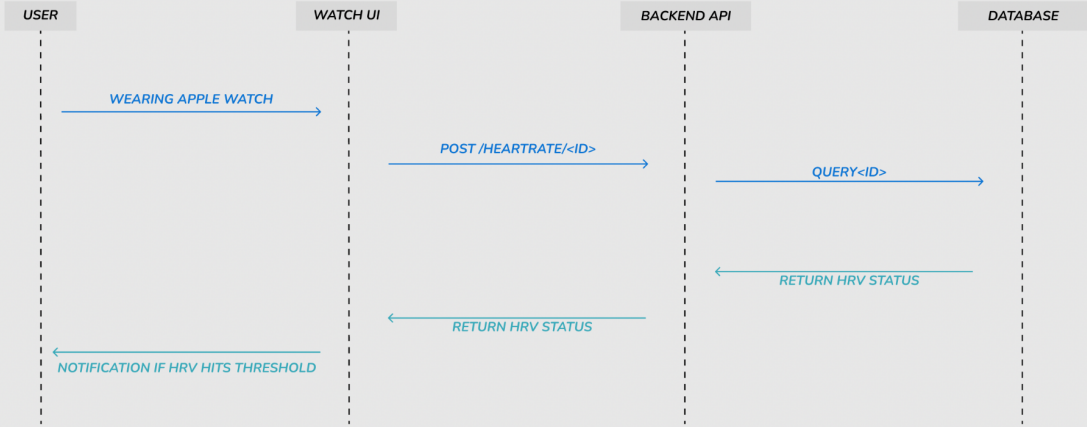
Sequence Diagrams: System Interactions

4. STORING HEARTRATE
STORES HEARTRATE, UPDATES HRV, NOTIFIES IF SPIKE

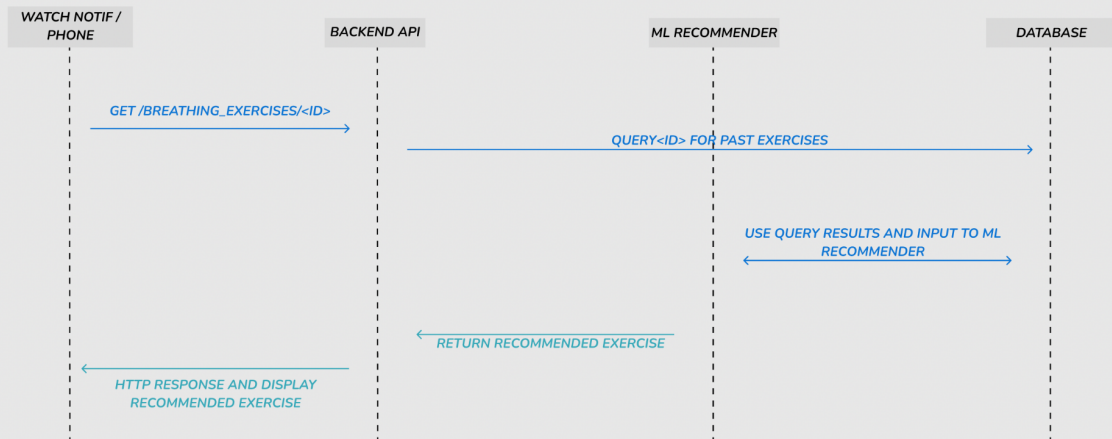| USER	WATCH UI	BACKEND API	DATABASE

WEARING APPLE WATCH →

POST /HEARTRATE/<ID> →

QUERY<ID> →

← *RETURN HRV STATUS*

← *RETURN HRV STATUS*

← *NOTIFICATION IF HRV HITS THRESHOLD*

5. ANXIETY DETECTION LOGIC
UPDATES HRV, USES LOGIC TO SEND NOTIFICATIONS IF SPIKE

WATCH	BACKEND API	BACKEND LOGIC	DATABASE

POST /HEARTRATE/<ID>

QUERY<ID>

UPDATE HRV FOR PAST X MIN.

PERFORMS OUR ALGORITHM FOR RESPONSE

RETURN HRV STATUS

RETURN HRV STATUS

DISPLAY NOTIF IF SPIKE
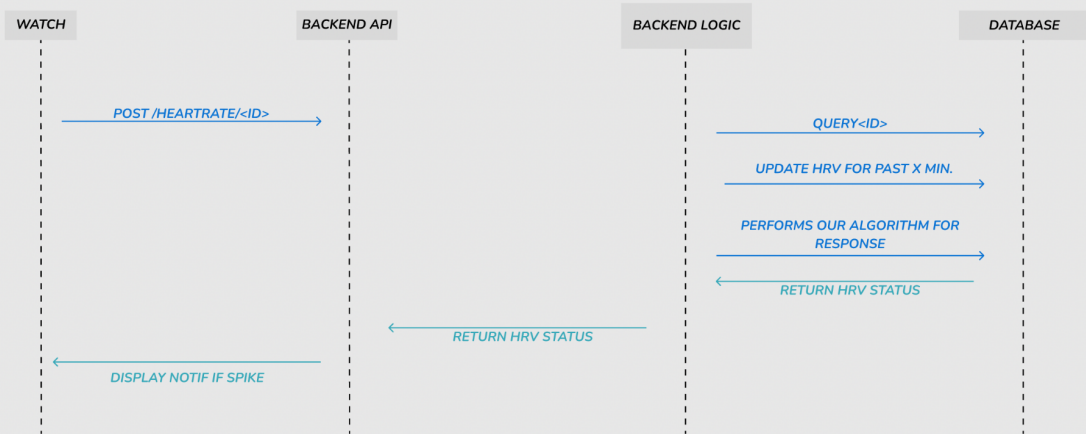
6. BREATHING EXERCISE RECOMMENDATIONS
SYSTEM CALCULATION FOR MOST EFFECTIVE BREATHING EXERCISE

WATCH NOTIF / PHONE	BACKEND API	ML RECOMMENDER	DATABASE

GET /BREATHING_EXERCISES/<ID>

QUERY<ID> FOR PAST EXERCISES

USE QUERY RESULTS AND INPUT TO ML RECOMMENDER

RETURN RECOMMENDED EXERCISE

HTTP RESPONSE AND DISPLAY RECOMMENDED EXERCISE

User Stories

1. As a new user, I can register for an account where registration data is stored globally, so that a user can log in and log out.

   Acceptance Criteria: After downloading the app, there should be a registering page that lets the user sign up for an account, and possibly verify through email. This should also create an entry in the database to store the user's data.

   Github: https://github.com/capstone-team9-artera/tranquil/issues/4

   Time Estimate: 2 hours

2. As a registered user, I can open the app and already be logged in and my profile data already stored in the database.

   Acceptance Criteria: After opening the app for the first time and signing up, the user does not have to log in again whenever the user opens the app the next time.

   Time Estimate: 1 hour

3. As a new user, I can easily integrate my watch data with the iOS application, so that app can use the biometric data.

   Acceptance Criteria: After downloading the app both on the watch and iOS app, the user is prompted to link the data from the watch to the phone. If one or the other app is not downloaded, there should display a screen prompting you to download the other. Check or confirmation that data is actually on iOS application

   Github: https://github.com/capstone-team9-artera/tranquil/issues/6

   Time Estimate: 10 hours

4. As a developer, I can ensure the watch is sending frequent data to the iOS app in the background while the apps are off.

   Acceptance Criteria: After the user downloads both apps on watch and iPhone, we can access the user's heart rate data through Healthkit to monitor in the background.

   Github: https://github.com/capstone-team9-artera/anxiety_app/issues/6

   Time Estimate: 10 hours

5. As a developer, I can detect anxious levels of heart rate through an algorithm that notices the change in heart rate over a period of time.

Acceptance Criteria: While monitoring the users live heart rate data, if there is a sudden increase from the previous value, this will be assumed as anxious behavior.

Github: https://github.com/capstone-team9-artera/anxiety_app/issues/7

Time Estimate: 3 hours

6. As a user, I can be notified on my Apple Watch when I am having increased anxiety, so that the user is alerted and can manage symptoms in the app.

   Acceptance Criteria: When the user is notified on the Apple Watch, they should be first prompted if they are exercising or not. If not, a screen will pop up directing the user to their phone where they will be guided to a helpful resource based on the intensity of their anxiety.

   - Maybe expand and add stories about creating a baseline and then false positive cases

   Github: https://github.com/capstone-team9-artera/tranquil/issues/2

   Time Estimate: 5 hours

7. As a user, I can participate in guided breathing exercises on the app after being notified, so that the user can manage their anxiety/decrease the user's heart rate/stress.

   Acceptance Criteria: A guided breathing exercise animation/screen pops up onto the screen and lasts for a few minutes until the user's heart rate or stress levels decrease.

   Github: https://github.com/capstone-team9-artera/tranquil/issues/1

   Time Estimate: 5 hours

8. As a developer, I can research relevant guided breathing exercises that offer the users many options to lessen their anxiety.

   Acceptance Criteria: Finding breathing exercises/techniques that are backed by research to prove effectiveness in lowering heart rate and implementing these techniques

   Time Estimate: 3 hours

9. As a user, I can use the AIChatBot when I am having anxiety so that after being notified I open up the chatbot

Acceptance Criteria: After being prompted, the user can immediately open up the chatbot to start texting responses or have the option of automated responses where they should receive a response back quickly.

Github: https://github.com/capstone-team9-artera/tranquil/issues/3

Time Estimate: 20 hours

10. As a user, I can use the AIChatBot when I am having anxiety so that after being notified and doing the breathing exercises I am still feeling anxious so I open up the chatbot

    Acceptance Criteria: While the user is already on the app, they can access the AI chatbot at any time to start chatting right away.

    Time Estimate: 5 hours

11. As a user, I can see my past stress levels and data from the previous week so that I can track their progress.

    Acceptance Criteria: There will be a specific page of the application that shows data visualizations of the past week, giving a general indication of stress levels in the past. Even though we store data and metrics from every day, the graph will only show data from the previous week so that it does not trigger any anxiety at the moment.

    Github: https://github.com/capstone-team9-artera/tranquil/issues/7

    Time Estimate: 15 hours

12. As a user, I would like to log in my feelings and reflections after I experience a wave of anxiety, so that I can understand and track triggers and reflect on my experience .

    Acceptance Criteria: This will take on the form of a survey with some general questions about their specific experience, with a field at the bottom to make additional comments.

    a. NOTE: maybe we can track this/perform data analysis and how this improves anxiety over time → see the result of their product

    Github: https://github.com/capstone-team9-artera/tranquil/issues/8

    Time Estimate: 10 hours

13. As a user, I will receive daily positive affirmations/encouragement so that my mood can be lifted during the day.

Acceptance Criteria: User gets a daily notification with affirmations and encouragements

Github: https://github.com/capstone-team9-artera/tranquil/issues/5

Time Estimate: 3 hours

14. As a developer, I can compile a list of proven positive affirmations and messages to send out to users that can encourage and lift their moods.

    Acceptance Criteria: Finding accredited sources that can determine positive words and phrases to include in these messages to send out.

    Time Estimate: 2 hours

15. As a user, I would like to have the ability to toggle certain features in the app so I can minimize notification spam.

    Acceptance Criteria: We will create a settings menu so that the user can customize their experience in the application so that we can better serve the user and their needs.

    Github: https://github.com/capstone-team9-artera/tranquil/issues/9

    Time Estimate: 2 hours

16. As a user, I can open the application unprompted, so I can explore the app whenever I want.

    Acceptance Criteria: User can open the app whenever and it can be used to do self-lead breathing exercises, track progress, change settings, etc.

    Time Estimate: 1 hour

17. As a user, I can seamlessly give or remove permissions to monitor my heart rate on the Apple watch.

    Acceptance Criteria: User will be prompted to give permission to the watchOS app to monitor their heart rate. The user can go into system preferences in watchOS to remove these permissions as needed.

    Time Estimate: 2 hours

18. As a developer, I can store user's health data such as heart rate levels before and after breathing exercises to determine if the anxiety lessening techniques were effective.

Acceptance Criteria: Store user's data in a database to be able to use for judging accuracy of the techniques and for other features in the app such as looking at past stress levels.

Time Estimate: 5 hours

19. As a developer, I can customize the app layout to have a variety of themes with different colors to offer multiple choices to the user's desires.

    Acceptance Criteria: The user can go to settings and choose a different color layout for the app to their own desires.

    Time Estimate: 5 hours

20. As a user I will get recommendations for specific breathing exercises as I use the application. The application will continue to learn and improve its breath exercise recommendations to best suit the users needs.

    Acceptance Criteria: ML recommender from the apple developer tools will be utilized to learn which breathing exercises are the best for the user. Occasionally giving new recommendations for different breathing exercises to test if new more effective breathing techniques can be found.

    Time Estimate: 5 hours

Appendix

Wearable Technologies: Apple Watch

App Development: Swift on Xcode, Firebase Server, Vapor Server, or different server TBD

Database Storage: SQL, MongoDB/Firebase

Software: Apple HealthKit, Apple MLRecommender, Github, Figma

Deployment: iOS app on AppStore