

Final Year Project (2023-2024)

Project Title:

**A Mobile App for
Anxiety Tracking and Management**

Student Name: Yeung Wing Pan (UID: 3035691004)

Supervisor: Dr. Choi Yi King

Project Background

Stress and anxiety have become major concerns in the modern world. The daily challenges of life have contributed to increased anxiety levels among people. It is important to address this issue because chronic anxiety can have bring negative impacts on both our physical and mental health. In a recent survey conducted in Hong Kong (MindHK, 2022), over 40% of the respondents reported experiencing feelings of anxiousness. Thus, it is important to develop effective strategies for reducing stress and anxiety to promote better mental health in the modern society.

The application aims to deal with the important aspects of anxiety management by providing features that, firstly, recording of personal anxiety levels and its causes; secondly, providing educational content on stress and anxiety management; and finally, fostering a sense of community through anonymous sharing. It is hoped that the application can offer comprehensive and individualized solutions to user, which can let user have a better understand and control on their anxiety. In the meantime, it still can decrease the stress using cutting-edge technologies like heart rate variability (HRV) monitoring and machine learning algorithms. The goal is to offer solutions for people who are facing anxiety and stress problems.

Project Objective

The main objective of my project is to create a user-friendly mobile application which can help user to find out the causes of stress from recording their emotions and tracking their anxiety triggers. Additionally, the application can provide suitable solutions to users for combating anxiety. More details are explained as follow:

Function 1: Anxiety Recording and Prediction: The application can record the anxiety levels and user's anxiety triggers both automatically and manually. Besides, HRV based stress prediction will be used to notify users before of their nervousness, which can encourage user to keep a record of their emotions and environmental factors through the mobile app. This can bring effectiveness to the processes of developing the Function 2.

Function 2: Data Analysis and Visualization: The data collected from user's wearable devices will be processed and then finally presented with readable graphs and charts . It is believed that this can give users meaningful information about the patterns and trends of their anxiety, allowing them to take well-informed decisions for more effectively anxiety management.

Function 3: Learning and Support: Provides users a selected library of resources on the topic of anxiety and stress management as well as guided relaxation activities in the format of videos and audio guidance.

Function 4: Anonymous Sharing Community: In order to develop a supportive community where people can connect, empathize, and benefit from others, a secure, anonymous platform for users to express their feelings as well as their struggles with anxiety has to be established.

Project Methodology

Equipment and Platform Set Up

Development Environment

The Swift programming language and SwiftUI framework for iOS devices will be used to create the mobile application. For coding, testing, and debugging, Xcode, Apple's integrated development environment (IDE), will be utilized.

Updated Testing Devices

iPhone and Apple Watch are chosen as the main testing devices. In order to ensure the function of iPhone and Apple Watch can be fully accessed, all testing devices are required to update the latest version OS.

System Architecture Design

Client-Side: The iOS-based mobile application is going to function as the client. It will handle user interactions, data entry, and information display.

Server-Side: The database will be hosted by the server. It will be in charge of handling data analytics, storing user data, and delivering the client with information and techniques for dealing with stress.

Technical Implementation Details

Function 1: Anxiety Recording and Prediction

HRV Data Collection

Requesting HRV data from wearables like the Apple Watch through framework HealthKit. In the meantime, use data synchronization and routine updates to gather the most recent HRV measurements.

According to Apple Developer Documentation, HRV data now in the updated Apple Watch can only be collected as SDNN (Standard Deviation of Normal to Normal Interval) but not a raw HRV data. In addition, Apple Watch does not support collecting HRV SDNN data in real time and HRV measurement cannot be triggered by programming. Altini (2023) suggested that the Breathe application in the Apple Watch has a higher possibility of triggering HRV measurements. Therefore, in the collection of HRV data, users will be encouraged to start the Breathe application before when recording their mental states to measure their latest HRV records.

Automatic Recording

Models will be created by using machine learning approaches such as classification algorithms that can quickly identify HRV patterns connected to anxiety levels.

Manual Recording

A user-friendly data entry interface will be designed that enables users to enter information on anxiety, including emotional state, triggers, and symptoms. Use data validation to confirm the accuracy of user-submitted data.

HRV Prediction

A predictive model will be developed by considering relevant factors, user-specific trends, and historical HRV data. The model can finally

implement real-time HRV prediction and deliver notifications on time.

Notification

Notification will be sent immediate messages to users' devices.

Function 2: Analytics and Visualization

Data Visualization

It is planned to choose appropriate data visualization libraries or frameworks for creating interactive charts and graphs. Additionally, it is essential to ensure that visualizations are responsive and work well on different screen sizes.

Interactive Interface

Implement features for users to interact with data visualizations, including zooming, panning, and filtering options.

Function 3: Learning and Support

Video and Audio Content

Select suitable contents from Internet which can help users to learn more about anxiety management and coping techniques. Collaborate with other mental health professional channels, referring our user to learn stress coping techniques through the collaborative partners.

Rating and Reviews

Create a user-friendly system for users to rate resources and leave reviews.

Function 4: Anonymous Sharing Community

User Profile Management

User profile and all personal details are all private. Only user's self-defined username is public.

Content Posting

Rich text editors will be incorporated and media upload capabilities

for users to create and share content. Meanwhile, content moderation tools will be implemented to identify and remove inappropriate or abusive posts.

Comments and Interactions

Real-time comment and interaction features will be developed with message queuing systems for efficient communication.

Project Schedule and Milestones

Phase 1: Inception (October 1, 2023 - January 7, 2024)

October 1 - October 15, 2023:

- HRV Data Collection and Automatic Recording implementation for for Function 1.

October 16 - October 31, 2023:

- Manual Recording implementation for Function 1.

November 1 - November 15, 2023:

- HRV Prediction and Alert Mechanism Implementation for Function 1.

November 16 - November 30, 2023:

- Perform integration testing of Function 1.
- Allocate time for thorough testing and debugging.
- Data Visualization and Interactive Interface implementation for Function 2.

December 1 - December 31, 2023:

- Video and Audio Content integration for Function 3.

January 1 - January 7, 2024:

- Rating and Reviews part Implementation for Function 3.
- Allocate time for initial testing and debugging of Functions 1 - 3.

Phase 2: Elaboration (January 8, 2024 - April 22, 2024)

January 8 - January 21, 2024:

- First presentation to review progress.
- Finish Function 1 - 3.
- Start Function 4: Anonymous Sharing Community Implementation.

January 22 - February 15, 2024:

- Complete Content Posting function implementation for Function 4.

February 16 - March 15, 2024:

- Complete Comments and Interactions implementation for Function 4.
- Allocate time for testing and debugging of Functions 4.

March 16 - March 31, 2024:

- Final presentation to review progress.
- Conduct integration testing of Functions 1 - 4.

April 1 - April 14, 2024:

- Bug-fixing and addressing issues identified during integration testing.
- Finalize and test the entire application.
- Complete the project report.

April 15 - April 19, 2024:

- Final presentation

Phase 3: Construction

April 23 , 2024:

- Finalize and test the entire application.

Reference

Altini, M. (2023, February 23). Apple Watch and Heart Rate Variability (HRV): a complicated relationship. <https://marcoaltini.substack.com/p/apple-watch-and-heart-rate-variability>

MindHK. (2022). What is the mental health situation in Hong Kong? <https://www.mind.org.hk/mental-health-in-hong-kong/>