Codename: Chill Out

A real-time stress detection and reduction application for Android devices paired with the Microsoft Band v2

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OVERVIEW

Stress is a biological reflex that can arise when an individual is faced with a difficult situation. It's a feeling that everybody deals with in one form or another. Routine stress, the most common form, is a product of job–related pressures, family, and a variety of other daily responsibilities. Put simply, routine stress occurs because people care. They care about providing for their loved ones, building close friendships, having successful careers, and just being happy. So, if stress is an uncontrollable reaction to caring about the outcomes of a certain challenging circumstances, then how does one reduce the amount of stress he or she faces? Care less about the outcomes? Not quite – that would only lower his or her motivation. The primary objective of this application, Codename: Chill Out, is to instead help the user alleviate the challenges of the given circumstances.

In order to accomplish the central task, the application must first achieve two sub–goals, namely detecting the user's stress level and recognizing the user's

contextual environment. In the case of stress detection, in addition to the emotional response, stress also has physical manifestations. An elevated heart rate and increased perspiration levels are the two this project will focus on. Using the Microsoft Band, the application periodically takes readings of these two biometric indicators. The system determines if the wearer is experiencing symptoms of stress and catalogues the results. As for achieving contextual awareness, the application relies on a variety of sensors in the user's android phone partnered with detailed calendar events. True contextual awareness involves obtaining answers to the following questions:

- *What activity is the user doing?*
- *How is the user doing the activity? (e.g. actively moving around or sitting)*
- *With whom is the user doing the activity?*
- *Where is the user doing the activity?*

  The data collected to answer the questions above for each event throughout a user's day combined with stress level readings enables the application to find correlations between particular events and increased stress. From there, the application suggests actions the user can take to better avoid regularly facing overly strenuous conditions in his or her life.

INTERACTION MODEL

Another goal of this application is to minimize the amount of input required from the user as much as possible. In an ideal world, the application would be almost completely passive – only requesting the user indicate whether or not a given suggestion is found to be useful. However, this is evidently not an ideal world because people would not need methods to substantially reduce their stress in an ideal world. Thus, the actions executed by the application (green) and the user interactions (blue) are as follows:
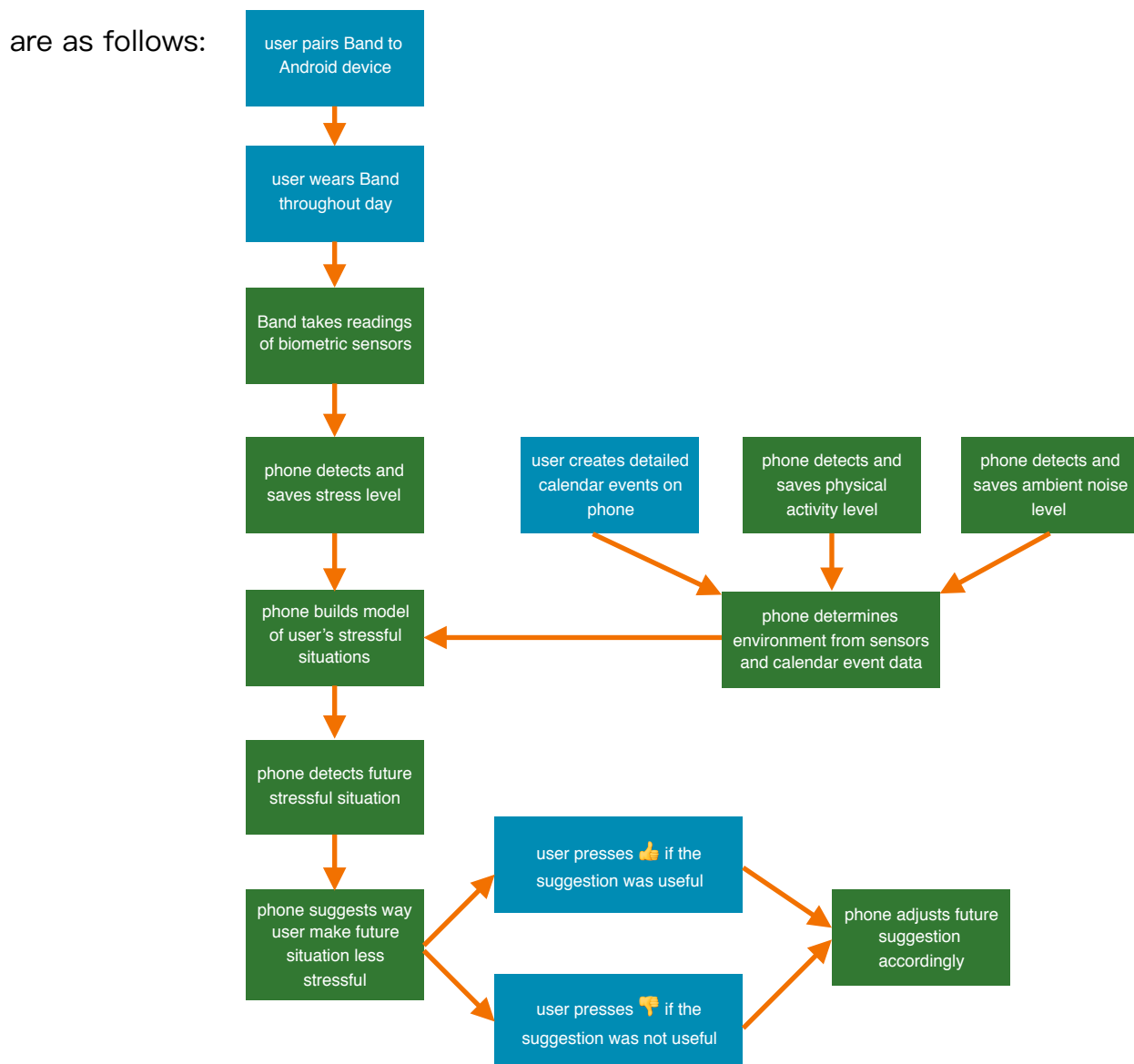
As show by the chart on the previous page, the vast majority of work the user is required to perform in order to take full advantage of the application's features is creating detailed calendar events for daily activities. An example of such *detailed* information is:

Event Title	study for machine learning exam
Event Time	6pm to 10pm
Event Participants	John Doe, Jane Smith
Event Location	Gelman Library

This level of precision allows the application to associate different characteristics with a unique combination of people, locations, and types of events. It could learn whether a specific mixture of the user's classmates are particularly loud while studying together and determine if that has a positive or negative impact on the user's stress level during exam time.

Besides regularly entering calendar event information and indicating whether or not a given suggestion to reduce stress is found useful, the user's interaction with the application is limited. The home page of the application on the user's phone displays a list of previously detected stressful events, the suggestion it made to reduce the level of stress, and the user's feedback on the suggestion. This allows the user to review a form

of his or her stress history to better understand what factors contribute to a personally stressful environment. Again, this is passive consumption for the user and requests minimal effort.

The rest of the work is carried out by the Android application. As long as the user is wearing the Microsoft Band paired with his or her phone, the necessary sensor data can be collected. The application interprets the data and builds a stress model custom to the user. This model is never exposed at user level in its entirety due to its complex nature. Future versions of the application may include a simplified version of the user's stress model and will hopefully reduce the number of calendar event details to make equally accurate and useful suggestions.