Design Document

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CODENAME: CHILL OUT

Objective

The primary objective of this mobile application, Codename: Chill Out, is to help users reduce and or eliminate factors that lead to stressful situations in their day-to-day lives. In order to accomplish this central task, the application must achieve four sub-goals, namely detecting a user's stress levels, recognizing the user's contextual environment, determining which factors of the events in the user's calendar are most likely to lead the user to be stressed, and providing suggestions to reduce or remove those factors from the situation. The user will be able to provide feedback on the quality of the suggestion, which the application will use to improved future suggestions.

Users

Given the nature of stress and the fact that everyone deals with it in one form or another, everyone with a smartphone is a potential user of this application. However, to be slightly more specific, here are a few examples of users who may benefit the most from what this application has to offer:

- People who receive a lot of pressure from their jobs — Someone who is often overwhelmed by the amount of work he or she is expected to complete or is made uncomfortable in his or her work environment by a boss and/or colleague.
- Students — Primarily high school and college students. Students often have a lot to juggle and are not always experienced enough to know how to deal with many difficult situations in social, academic, or extracurricular environments.
- People with a lot of responsibilities outside of work — Anyone who has to regularly take care of family, such as parents or older siblings, or is simply responsible for assuring someone other than his or herself is safe and properly cared for.

User Interactions

Every user interacts with the application in the same way, regardless of his or her primary source of stress. For starters, the user must be wearing a Microsoft Band connected to his or her smartphone. The Band allows the application to capture biometric sensor data, which enables the application to determine the user's stress level. From there, in order to get the best and most accurate results, the user must catalogue detailed calendar events for every contextual change he or she experiences in a given day. For example, a sequence of calendar events of a single parent with two younger kids may look like:

Time	7:00	9:00	11:30	12:30	1:30	5:30	7:00	8:00	9:00	9:30	10:15
Event Title	Get kids ready for school	Work on project	Meeting with boss	Lunch with friend	Work on project	Soccer game	Dinner with team	Fix kitchen sink	Walk dog	Put kids to bed	Watch TV
Participants	Harry, Sally		Mr. Banks	Dave		Sally	Sally		Clifford	Harry, Sally	
Location	Home	Office	Office	The Sandwich Shop	Office	City Elementary	The Pizza Palace	Home		Home	Home

Once the user has entered the events above into his or her calendar, which can be done at any point before or even during the event, he or she is done with the majority of the work required for that given day. If the application predicts that "Meeting with boss" will be a stressful event, a notification appears on the user's phone with a suggestion to help reduce the user's stress level during the meeting. Depending on whether or not the suggestion is useful, the user can give it a "Thumbs Up" or "Thumbs Down." This allows the application to improve and better customize future suggestions.

Functional Components

- Noise level monitor — Using the microphone in the user's mobile device, the system tracks a change in noise level over the course of an event and between events. The noise level is relative, which means the monitor is not measuring an absolute value of noise but rather determining whether or not there has been a noticeable increase or decrease in the noise level of the user's surrounding environment.
- Physical activity level monitor — Tracks relative physical activity and overall movement of the device both during and between events. The physical activity level is more of an absolute value than the noise level.
- Stress monitor — Using biometric sensors in the Microsoft Band, e.g. heart rate sensor and GSR sensor, the monitor determines whether or not the biometric readings are elevated. Factoring in physical activity, which could also be the cause of elevated heart rate and perspiration levels, the monitor determines if the user is stressed or not stressed.
- Contextual environment builder —Taking in the event data from the user's calendar and combining it with the user's stress level, physical activity level, and the surrounding noise level, this component builds a model of the user's surrounding environment and contextual situation.
- User data model — The model contains information specific to a given user. It stores past events, different particularly stressful situations and factors that may have caused them, and suggestion feedback in addition to all of the users personal information.
- Stress/Event correlation detector — Given a user model, this component which events and factors are particularly stressful and updates the user model accordingly
- User Interface — Allows the user to interact with data contained in his or her user model, primarily to view past event and stress history
- Stress reduction suggestion system — Given a user model, which contains the users stress factors and past suggestion feedback, and a future stressful event, this component makes a suggestion personalized for the user to help reduce his or her stress level during the given event.

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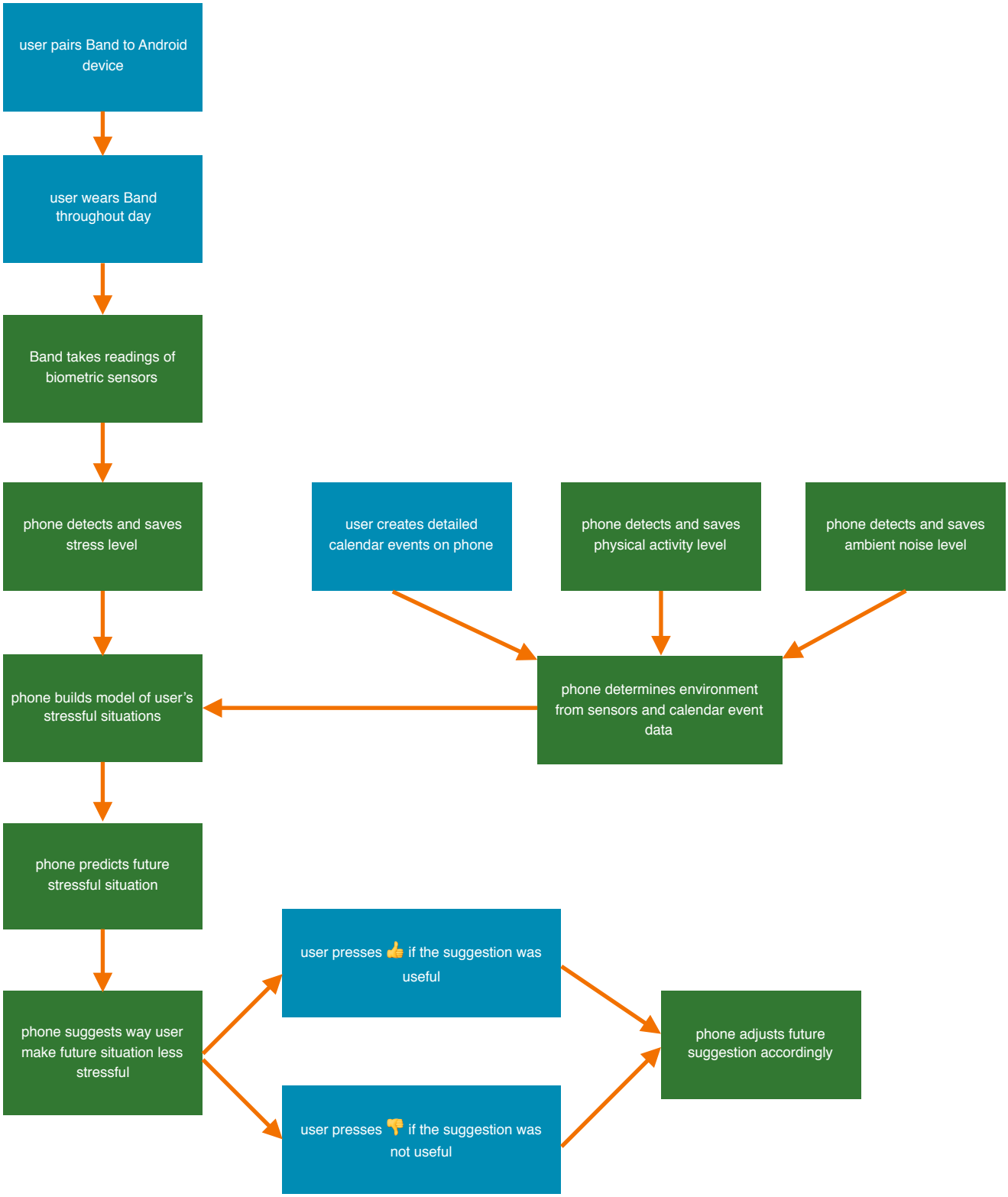

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Requirements

- **Noise level monitor**
  - Functional Requirements
    - Uses microphone to take sound level readings
    - Detects relative noise level and change in noise level
  - Non-Functional Requirements
    - Performs operations efficiently to minimize cost on battery, memory, and time
- **Physical activity level monitor**
  - Functional Requirements
    - Determines movement level of mobile device
    - Determines relative physical activity level (e.g. step count) of user
  - Non-Functional Requirements
    - Performs operations efficiently to minimize cost on battery, memory, and time
- **Stress monitor**
  - Functional Requirements
    - Detects whether biometric feedback from sensors is elevated or normal
    - Determines if user is stressed or not stressed
  - Non-Functional Requirements
    - Performs operations efficiently to minimize cost on battery, memory, and time
    - Scaleability, a way to easily support additional dimensions of data
- **Contextual environment builder**
  - Functional Requirements
    - Builds model of contextual environment and assigns it to the given event

- Non-Functional Requirements
  - Performs operations efficiently to minimize cost on battery, memory, and time
  - Scaleability, a way to easily support additional dimensions of data
- **User data model**
  - Functional Requirements
    - Holds user information
  - Non-Functional Requirements
    - Efficiently modifies and manipulates user data
- **Stress/Event correlation detector**
  - Functional Requirements
    - Determines stressful factors of past events
    - Predicts future stressful events
    - Updates user model with most recent stressful factors
  - Non-Functional Requirements
    - Performs operations efficiently to minimize cost on battery, memory, and time
    - Scaleability, a way to easily support additional dimensions of data
- **User Interface**
  - Functional Requirements
    - Allows user to view past stress events
    - Allows user to change feedback on past stress events
  - Non-Functional Requirements
    - Intuitive design to make it easier for user to perform certain actions

- **Stress reduction suggestion system**
  - Functional Requirements
    - Suggest ways user can reduce stress level for given event
    - Adjusts future suggestions based on user feedback
  - Non-Functional Requirements
    - Performs operations efficiently to minimize cost on battery, memory, and time
    - Scaleability, a way to easily support additional dimensions of data and various levels of user feedback