Breathe

Design Document

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OBJECTIVE:

The objective of this project is to develop a mobile app, called Breathe, which allows the end-user to monitor their stress and anxiety levels by measuring the resistance of their skin (GSR) as this is correlated to stress level. This will be accomplished by creating a small, band-like device that the user can wear throughout their day that will transmit their GSR level to the Breathe app on their phone. Enabling this will be a small Arduino board with a built-in Bluetooth Low Energy module that will read the analog value of skin resistance and transmit the measurement as an integer to the phone using Bluetooth. This integer will then be modified so that it is out of one hundred such that a level of one hundred is the highest possible stress level the user could have. As a result, when this value reaches a high value, the user will be able to receive tips on how they can destress. Overall, through using these tips and the available monitoring of stress, it is the goal of this app to reduce the stress level of the adolescent and adult demographic who are in stressful environments.

TECHNOLOGIES:

This app will be made using Phonegap, which is a tool that packages web technologies, such as HTML, CSS, and JavaScript, into a cross-platform mobile app. This app employs the phone's built-in browser so that existing web technologies can be used to develop for different types of phones. However, the benefit of Phonegap is that it allows these technologies to also utilise the native APIs of the phone through Phonegap JavaScript plugins so that richer apps can be made.

Overall, the technologies that will be used in Breathe include:

- Phonegap (HTML, CSS, JavaScript)
- Phonegap JavaScript audio plugin (used to play sounds in the app)
- Phonegap JavaScript Bluetooth Low Energy (ble-central) plugin (used to communicate with the GSR device)
- Ionic Framework (provides useful CSS objects and styles like dropdown menus, toggles, etc., and icons in vector (SVG) format)
- Charts.js (a JavaScript library used to make graphs that will be used to graph the user's GSR over time)

TARGET DEVICES:

The Breathe app will target iPhone devices running at least iOS 9 from the iPhone 4s onwards. As Phonegap is a cross-platform tool, if time permits, it will be possible to also create an Android version of the app with minimal code changes and tweaks at the end of development.

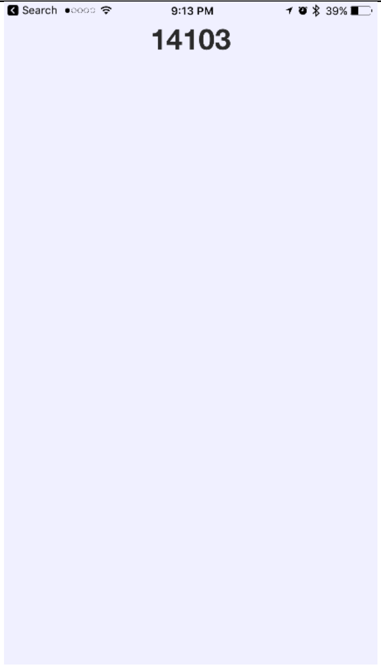
TIMELINE:

A tentative deadline of late December is what is being sought for the Breathe app and device. The objective is that by the Christmas break, an alpha version of the app and device will be ready in a fully-functional state. Then, throughout January and February, bugs and glitches will be identified and removed and testing with the device and app will be able to commence to collect data.

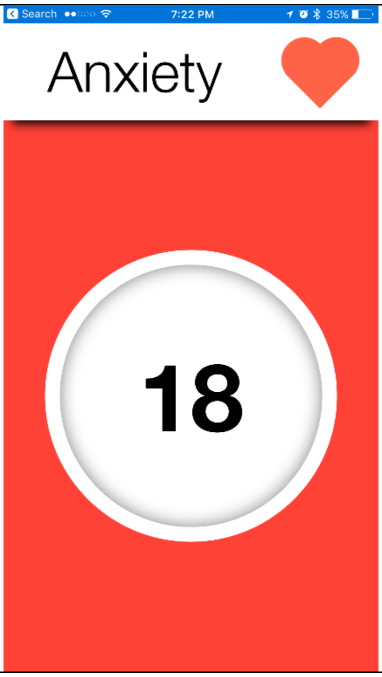
MILESTONES:

- Concept ✓
- Basic app layout ✓
- Arduino successfully transmitting data ✓
- GSR sensors developed such that readings are recorded as integers (IN PROGRESS)
- App can read the Arduino's readings ✓
- App is logging and timestamping the data as it comes it in ✓
- App can graph the data (PARTIALLY, IN PROGRESS)
- App has error handling (PARTIALLY, IN PROGRESS)
- App displays tips when the reading gets too high
- App continues to record data and function even when in the background for long intervals of time
- App has a settings page that allows the user to configure the app (IN PROGRESS)
- Arduino can run off of battery power
- Arduino and sensors are packaged together in easy-to-wear band
- App has final layout
- App is tested for bugs (internally)
- App is tested by a test group to isolate any bugs that have gone unnoticed
- App and device used to collect data
- Findings on data are analysed so they are presentable

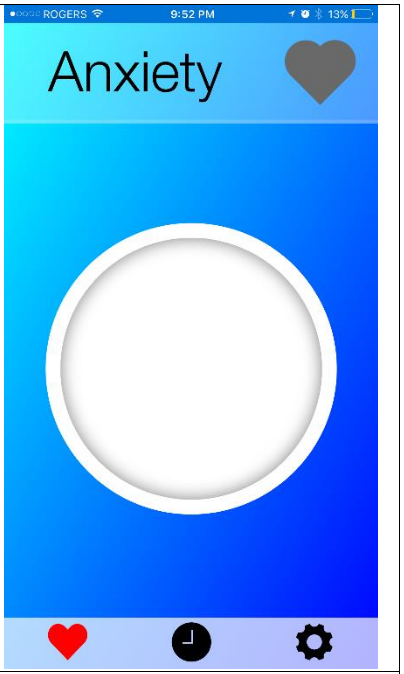
App Throughout Time



23 September 2016



26 September 2016



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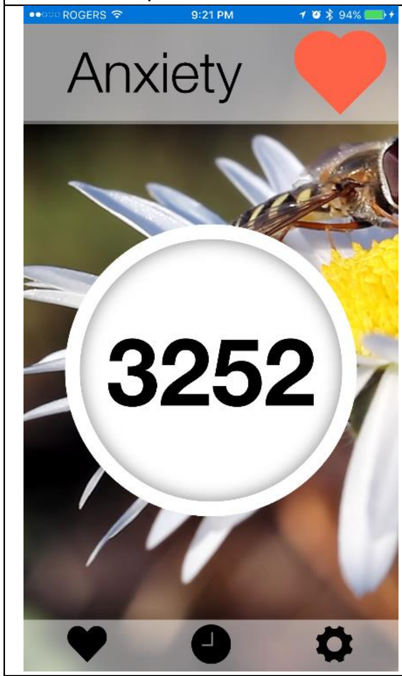

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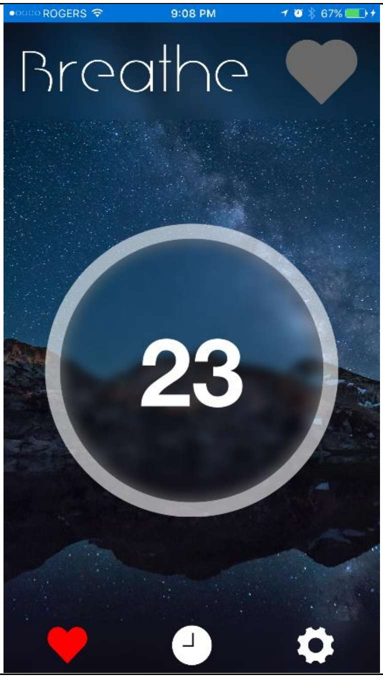
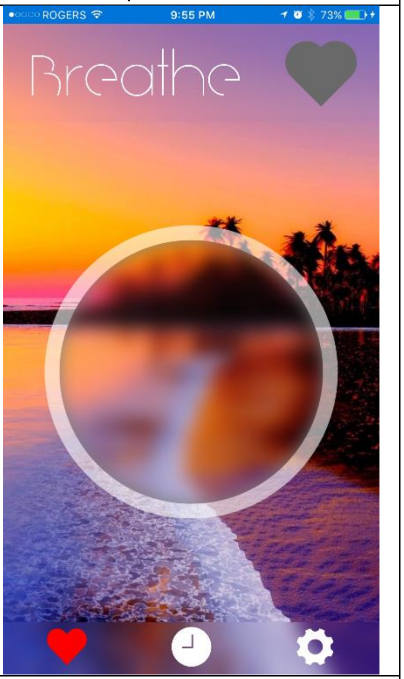
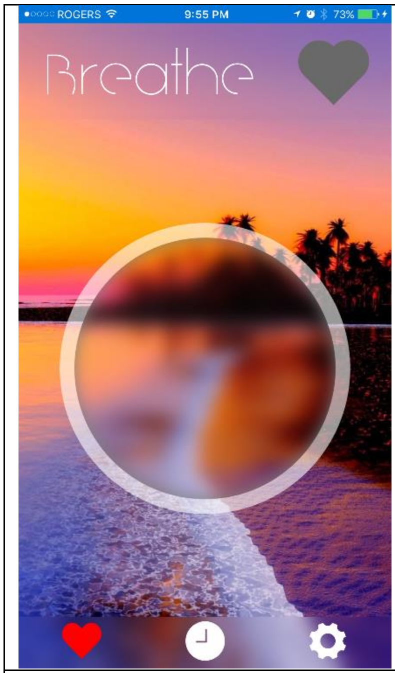


6 October 2016

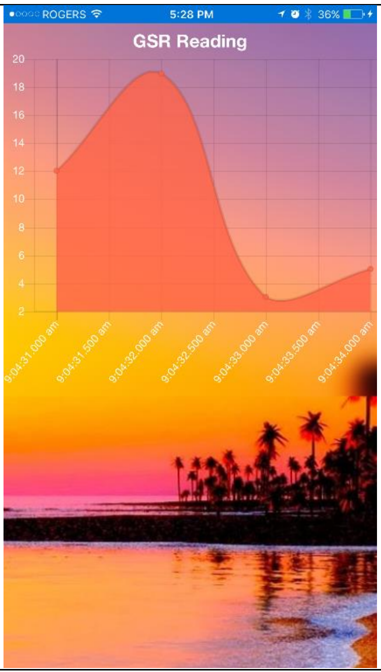


6 October 2016

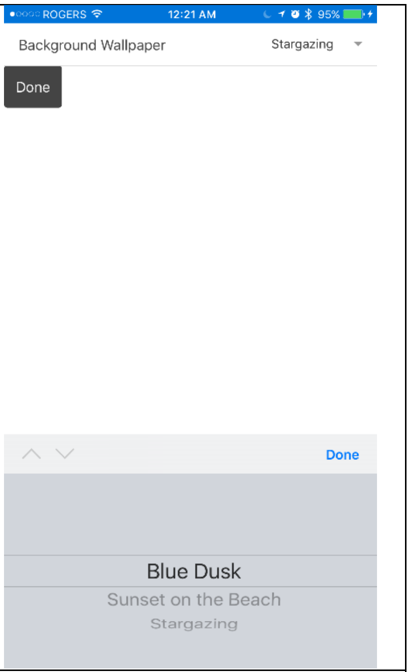
Latest Version (As Of 13 October 2016)



Main Page

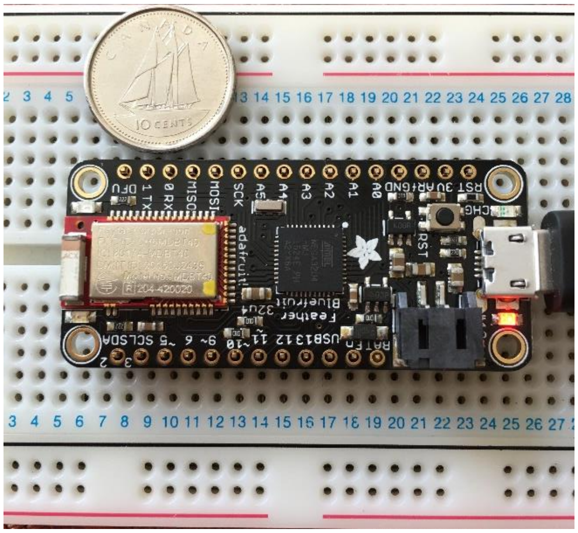


History Page



Background Wallpaper: Stargazing

Settings Page



Arduino with Built-in Bluetooth Module

User Interface & Scripting:

Device

This app is designed to run on iPhones; however, an Android version may be possible if sufficient time is available at the end of the development. This is possible because the app will be made using cross-platform web technologies, such as HTML, CSS, and JavaScript. made possible through Phonegap, which packages these technologies to allow them to run within a native app. Phonegap also allows the app to interact with native hardware APIs, such as the Bluetooth Low Energy API through Phonegap plugins. Being coded in HTML, the app is designed to be to responsive, so that it appears properly on every screen size. The app is also developed to be shown in portrait orientation only.

Live GSR Reading

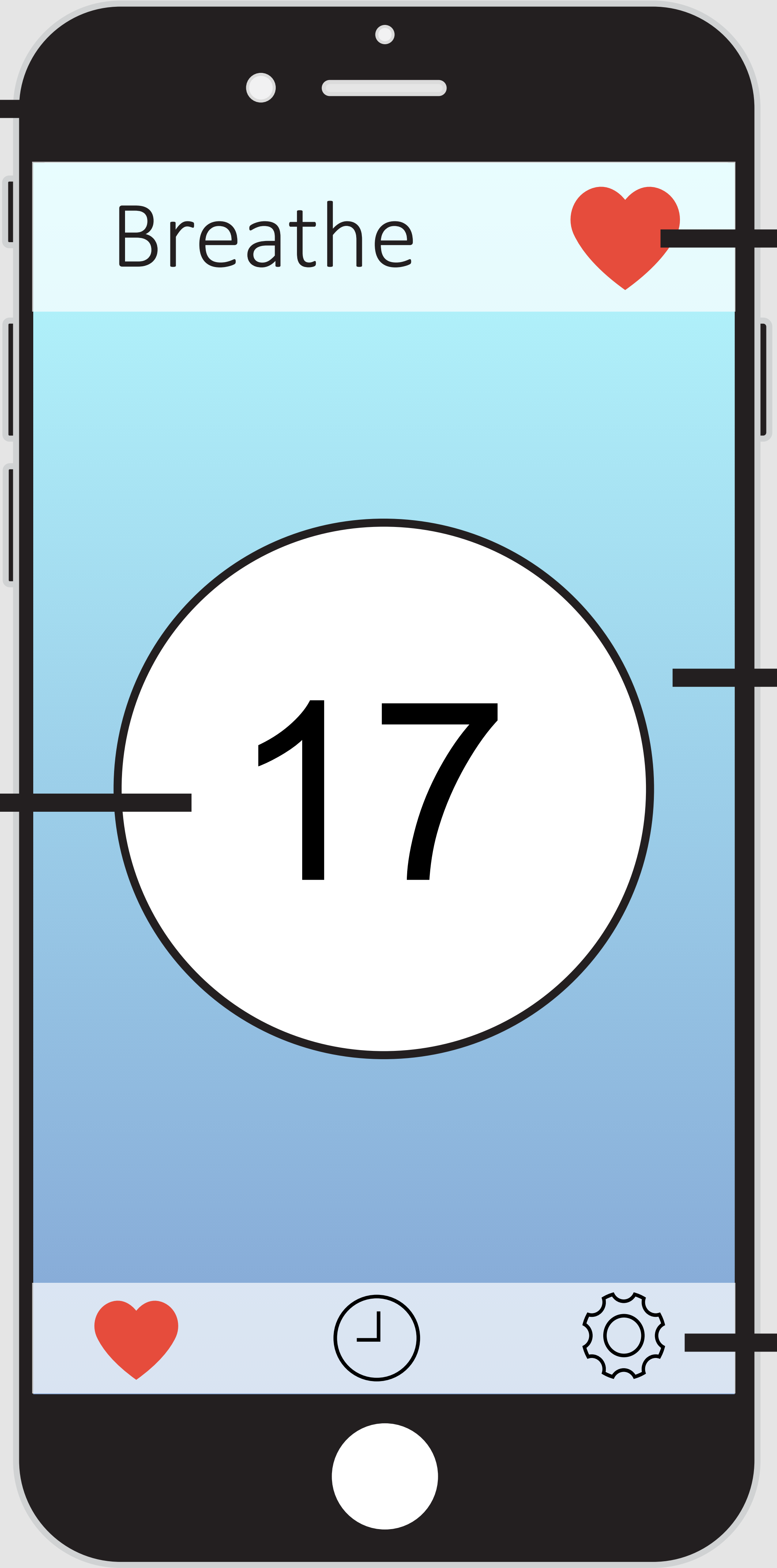
This displays the user's live GSR reading to them within an easy-to-see circle. This reading will display the user's GSR rate out of 100, where 100 is the highest possible GSR rate for the user.

On-Launch Scripting

1. Starts searching for Bluetooth Low Energy (BLE) devices using the ble-central JavaScript Phonegap plugin.
2. Tries to establish a connection with the GSR module by using its known MAC address: "6E400001-B5A3-F393-E0A9-E50E24DCCA9E".
3. Subscribes to the module's notification service so that as the reading on the module changes, the new value is automatically sent to the phone.

On-Error Scripting

1. If an error occurs while trying to scan for devices, an alert is displayed saying, "Error: Bluetooth is not supported or is turned off on this phone"
2. If an error occurs while trying to connect to the GSR module, an alert is displayed saying, "Error: The GSR module could not be connected to. Is the module on and not connected to another device?"
3. If an error occurs while trying to subscribe to the notification service, an alert is displayed saying, "Error: The notification service could not be subscribed to. Try restarting the GSR module.
4. If an error occurs while the app is running, an alert is displayed saying, "Error: The connection to the module has been lost."



Heart

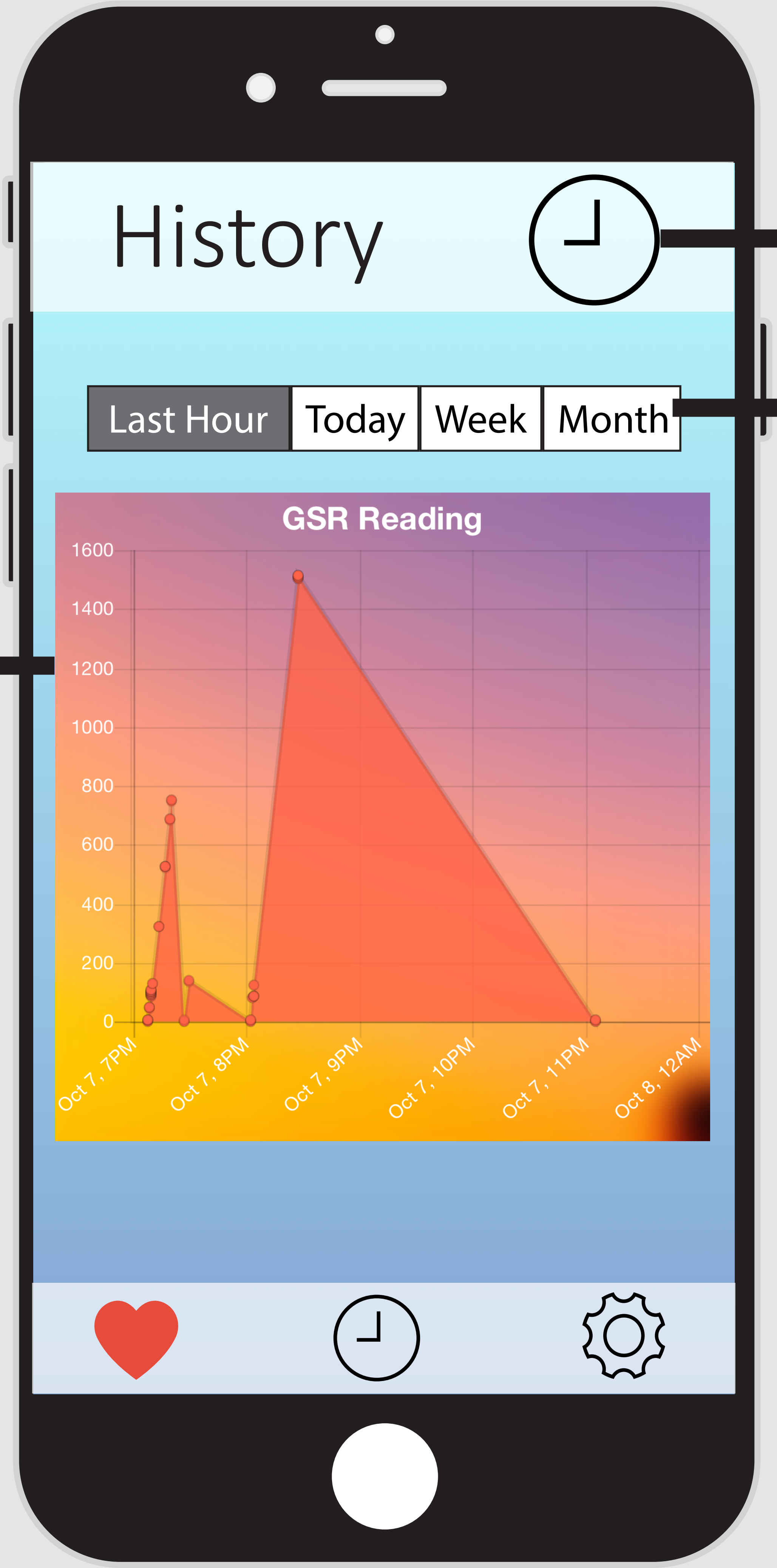
This heart is initially grey when the app is not connected to the Bluetooth Low Energy module. Once a connection is established, the heart turns red and begins to pulse, through a CSS animation, to convey to the user that the connection was successful and live GSR data is being communicated.

Background

The background of the app is configurable in the settings part of the app, allowing the user to select what type of background they wish to see in the app. These backgrounds include calming scenes such as sunsets, sunrises, beaches, and stargazing.

Navigation Bar

This allows the user to navigate between the three pages of the app. The heart icon leads to the main page, showing the live GSR reading. The clock icon leads to the history page, showing past GSR readings displayed in a graph. The gear icon leads to the settings page, where the user can edit the app's configuration to their liking.



Clock

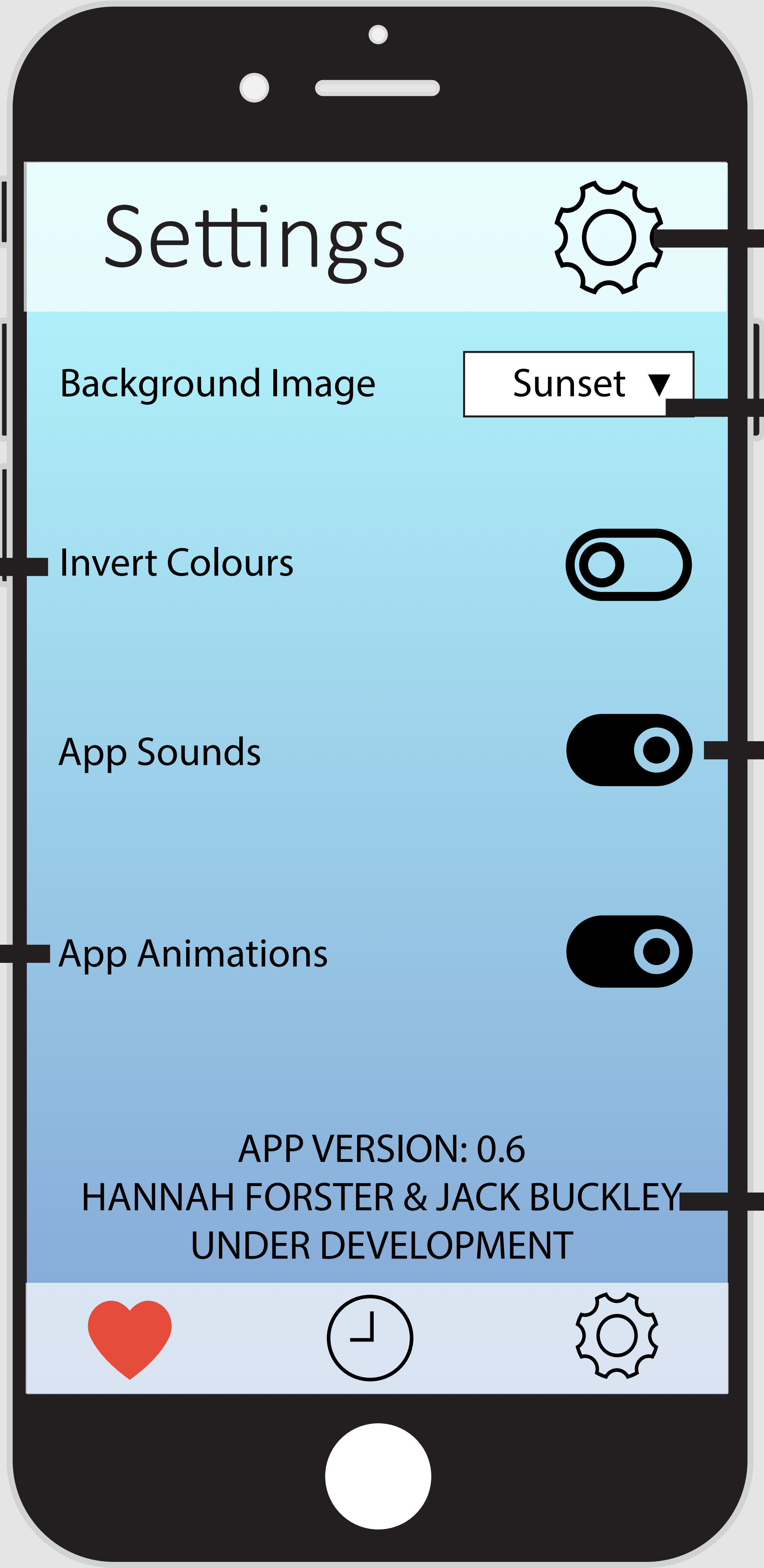
A simple bitmap to show the user that they are on the history page of the app.

Time Scale

This is where the user can select what time interval they wish to see on the graph. This will be implemented like radio buttons, meaning only one option can be selected at a time.

GSR Graph

This is where the GSR info is graphed. (This design document uses a test graph made during app development, which is why the GSR values exceed 100. In the final product, the maximum GSR value will be 100)



Settings

Background Image Sunset ▼

Invert Colours ○

App Sounds ●

App Animations ●

APP VERSION: 0.6
HANNAH FORSTER & JACK BUCKLEY
UNDER DEVELOPMENT

Gear

A simple bitmap to show the user that they are on the settings page of the app.

Background Dropdown

Selecting this item will present the user with a dropdown menu that will allow the user to select a background image for the app.

Example

Sunset
Beach
Stargazing
Sunrise
Forest

Invert Colours

If the toggle is enabled, a boolean is set to true, and a CSS filter is added to the entire HTML document to invert the app's colours.

App Sounds

If the toggle is disabled, a boolean is set to false, and the media plugin of the app is disabled so that the app's sounds no longer play.

App Animations

If the toggle is disabled, a boolean is set to false, and the CSS animations are turned off for users who find them discomforting.

About App

This displays the version of the app and any necessary info.