breezy

A Project By

Marcus Smith
Gabriel Arreola
Danielle Kenwood
Sreesha Venkat
Audrey Leung
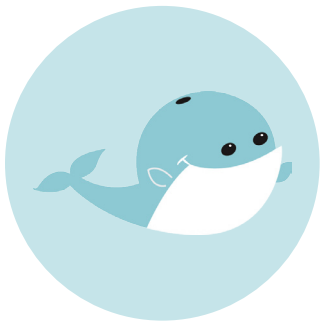
Project Description

Breezy ensures the safety of children struggling with asthma and provides peace of mind to their caregivers. The child's smartwatch constantly reports their vitals to the caretaker's phone, and sends an emergency alert if it detects anomalies that could signal the onset of an asthma attack. In addition to automatic sensing, the child can send a manual alert through the watch. If an attack occurs, the watch provides tools to alert bystanders and breathing exercises to stabilize the child. Meanwhile, the caretaker is alerted with their child's location and current vitals so that they can quickly respond to the situation.

Design Process

Brainstorming Process

While brainstorming for a potential app idea, we all stayed as open-minded as possible to any ideas that fit into the broad scope of the health and wellness field. As a result, our 50 ideas were extremely diverse in nature and ranged from apps that allowed schizophrenic users to detect the presence of others in a room, to ones that caused the physical device to vibrate in a way such that it would cancel out shaking in users who were prone to tremors.

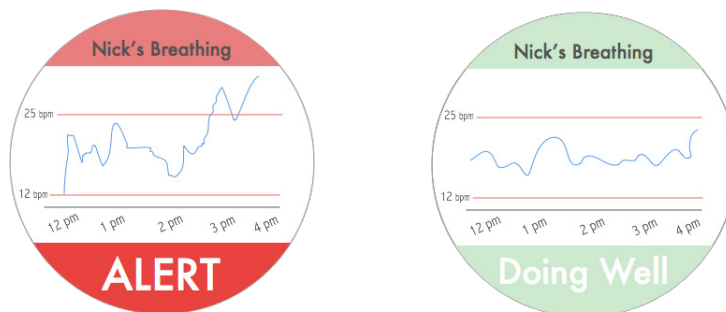# Brainstorming Process
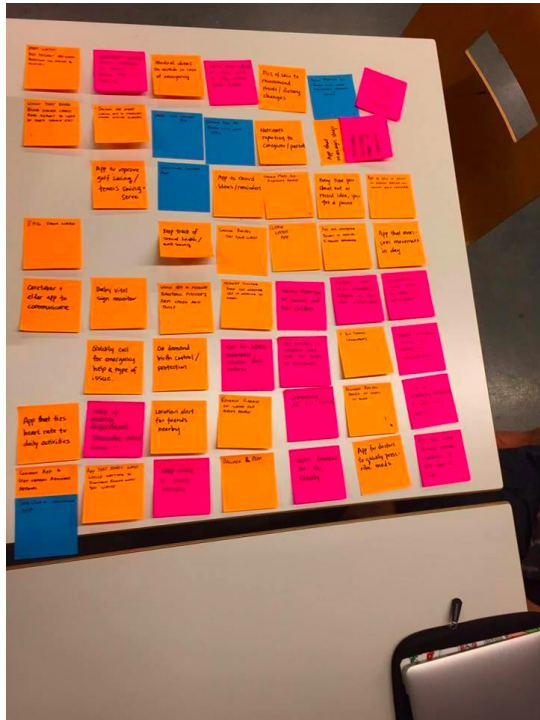
Our 50 ideas on individual sticky notes.

Brainstorming Process

Very early sketches for child's smartwatch.

Very early sketches for parent's smartwatch.

Brainstorming Process

Summary

After sifting through our app ideas and using Figma to mock up 8 of them, we ultimately settled on 3 final ideas. The first was an app that allows users with Alzheimer's to tap watches with a loved one and bring up pictures/memories of the two together so that they're better able to remember them. The second was an app that tracks breathing in children with lung conditions so that parents/guardians can monitor irregular or fatal breathing patterns when the child is unsupervised. Our final idea was an app that tracks efficiency of a user's sleep and user's depressive tendencies in order to visualize the correlation between the two, then reminds the user to sleep earlier if there is a positive correlation. Of those three ideas, we decided to continue to expand upon the second and created several mocks that communicated our initial vision for the parent's and child's watch app.

Contextual Inquiry

For our contextual inquiries we aimed to interview people that fell into either of our target user groups:

- Children with breathing difficulties between the age 5-15
- Caregivers of children who have breathing difficulties

In addition, we interviewed a doctor who specializes in family medicine and has treated several children with asthma. While conducting these interviews, we wanted to know more about what it's like to go through an asthma attack, what the best practices are during one, and ultimately how to incorporate these practices into features on our application.

Contextual Inquiry

Process and Environment

For each interview we made sure that we went through a predetermined set of questions outlined for each target user group, but also allowed for a free and open conversation to take place. For these interviews, we utilized a master-apprentice style process to observe our interviewees with asthma as they walked us through what it looked and felt like to go through an asthma attack in their homes (everything from initial chest pains to the process of using an inhaler/nebulizer).

Tasks and Themes

- Most of the older children tended to keep an inhaler with them in case of an asthma attack during the day.
- It was very common for younger children to accidentally forget their inhalers at home.
- All of the interviewees who had asthma said that their condition was typically activated/aggravated by allergies and/or physical activity.
- Many of the child interviewees and the doctor we interviewed stressed the importance of remaining calm during an attack, as panicking would only serve to make the situation worse.

After conducting our contextual inquiries, we determined that the top five user needs were as follows:

1. Child users prefer any sort of device to be inconspicuous/not interfere with daily activities.
2. Child users with mild asthma need a feature that helps them calm down and regulate breathing, as asthma attacks can trigger panic attacks.
3. Child users, especially younger ones, need a way to remember to bring their medication with them.
4. Child users need a way to communicate with bystanders for help, as asthma attacks make it nearly impossible to speak.
5. Parents/caregivers want a quick way to see how their child is doing without having to sift through lots of data and information.

Scenarios

In developing our application, we envisioned several scenarios where a child with asthma would need a way to quickly communicate with others in order to receive the help they need. We came up with two different scenarios.

Scenarios

Scenario #1

Child with asthma struggles to breathe while sleeping, but nobody is immediately around to help because they are alone in their room. Breezy automatically senses the anomaly in breathing and sends a notification to the parent/caregiver's phone, allowing them to immediately respond and help their child.

Scenario #2

Child with asthma is walking home from school and suffers an asthma attack. After sending an alert to his parent, he is able to use Breezy's 'Distress Message' feature to grab the attention of a bystander who would have otherwise been unaware of the emergency. After hearing the message, this bystander is able to help the child by giving him his medication before the parent arrives to take over.

Scenarios

In both of the aforementioned scenarios, Breezy's features not only ensure that children and parents have a way to communicate during an asthma attack, but that each moment after an attack is used in the most efficient way possible. In the second scenario in particular, Breezy's 'Distress Message' feature ensures that the child is helped by bystanders, rather than wasting time waiting for a parent to get to them — something that could ultimately make the difference between life and death, as response in the minutes after an asthma attack occurs are the most crucial.

Initial Wireframes

In approaching and developing design ideas for our app, and taking our contextual inquiries into account, we quickly realized that it would be targeting two diverging audiences: children with asthma, and the parents/caregivers who watched over them. Because both of these user groups had such differing needs, we decided to alter our original mocks and exclusively dedicate the smartwatch portion of our application to children, and the smartphone to parents. Additionally, as our app would be used in emergencies, we wanted to ensure that both the watch and phone had a clean and calming design — ultimately making them easier to navigate during stressful situations.
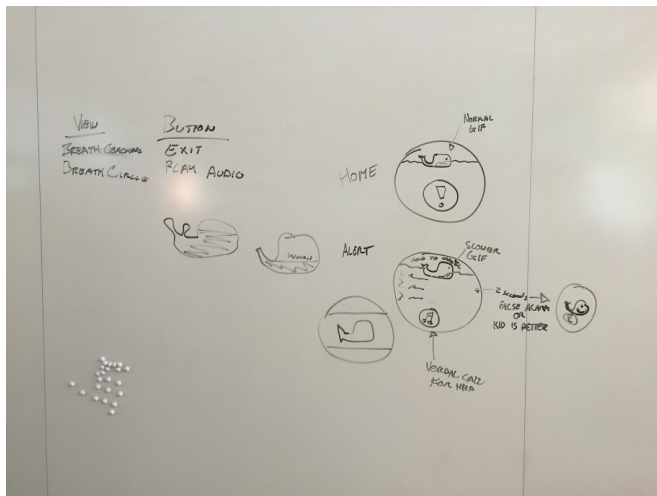
Initial Wireframes

Child's Watch

Since the primary feature on the child's watch app is an emergency button, we figured that should take up a large amount of space on the main screen of the child's watch. The main focus in designing each of these views was to relay information to parents in a clear and succinct manner, so that they wouldn't be wasting time trying to decipher graphs and data to understand how their child was doing. Next, we thought through how to visually present a breathing exercise for the child. Some ideas were to have a water level inside a whale outline gently rise and fall, or have a whale move up and down with the waterline. We found that some other websites and apps use an expanding and shrinking circle to calm breathing, which would work well with our circular watch face.

Caregiver's Phone

We decided on providing caregivers with three main views: child's current respiratory and heart rate, respiratory and heart rate over time, and child's location. The main focus in designing each of these views was to relay information to caregivers in a clear and succinct manner, so that they wouldn't be wasting time trying to decipher graphs and data to understand how their child was doing.

Initial Wireframes

Our first wireframes on a whiteboard, and our second wireframes using marker and paper.

Initial Wireframes

Summary

These initial ideas came together during our class work sessions as we sketched up potential ideas for the interface. After our brainstorming session, we knew that we wanted the child's end of our application to have a playful look and feel, but also wanted the interface to be simple in order to minimize user error and enable younger users to go through features of the app quickly. The latter consideration is very important as time is of the essence during an asthma attack. We wanted to maintain this simplistic feel in our design of the parent's phone application as well. In creating these initial designs, our group also decided to use a blue whale as our mascot because it has the largest lung capacity of any mammal, which allows them to breathe easily. While our users may suffer from asthma, our app hopes to make their experience just as Breezy. Moreover, whales are known for being gentle, so the sight of them should help promote our idea of staying calm.

Intermediate Designs

After sketching out our initial wireframes, we moved to Figma to create low-fidelity mockups of our screens. While many of the features that we outlined in our wireframes were maintained in our Figma mocks, we still had to decide upon the best way to layout these features and which colors would keep the layout as clean looking as possible.
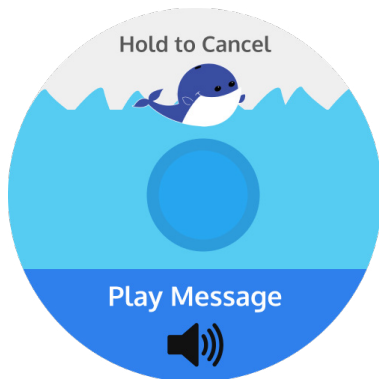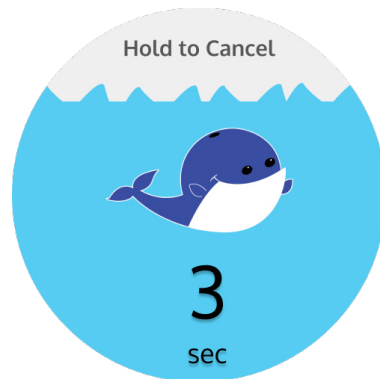
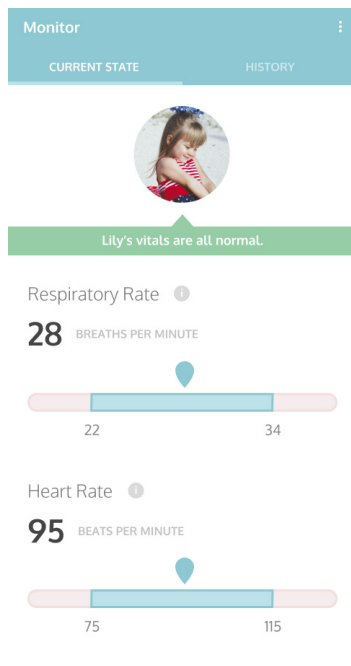# Intermediate Designs

Breezy

Loading Screen

!

EMERGENCY

Main Screen

Hold to Cancel

Play Message

Attack Screen

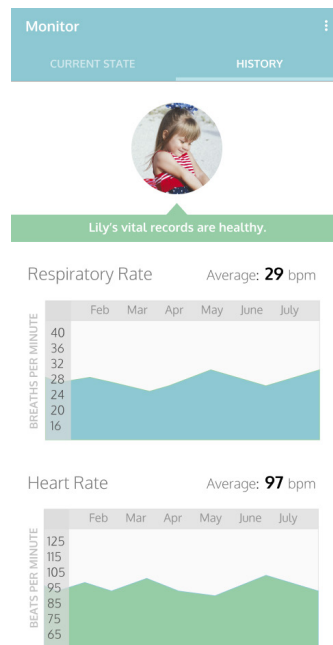Hold to Cancel

3

sec

Cancel Screen

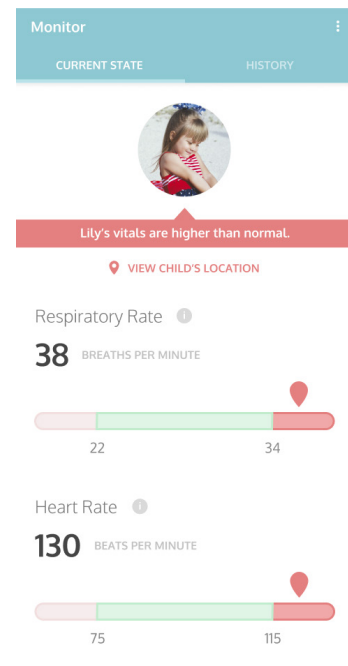Mockups for child's smartwatch.

Intermediate Designs

Main Screen

History Screen

Emergency Screen

Mockups for caregiver's phone.

Intermediate Designs

Summary

As seen in our intermediate mockups, we maintained our initial desire to keep the app as minimal and calming as possible by using very few colors and simplifying any language we used — something that was especially important for the watch app, as children as young as 5 could potentially be using it. Because we knew our audiences were diverging, we also made the decision to make the color schemes across the watch and phone apps slightly different. While both are simple, the smartwatch application has a more playful feel because of the brighter colors we used, ultimately making it more suited towards the younger audience that would primarily interact with the watch. The phone, however, has more muted colors as it's geared towards an older audience.

User Studies

In conducting user studies and keeping a detailed critical incident log, we aimed to find out which aspects of our design were best serving user needs and which aspects needed work, or didn't address a user need at all. For these studies we interviewed two users. User One was a 45-year-old woman who is a parent to a child with asthma, and User Two was a 21-year-old man, who grew up with mild to severe asthma and continues to have occasional asthma attacks.

User Studies

User One Feedback

User One really emphasized the need to be able to get information about her child quickly without having to sort through lots of graphs and data. Aspects of our design that appealed to this need were found in our decision to make the application fairly minimal, with emphasis placed on important figures through different font sizes and weights, and in creating a 'status banner' that succinctly told parents how their child was doing. Some weaknesses uncovered during the study were that our design didn't make great use of color to convey status (i.e., we alternated between blue and green to convey healthy), and that certain stats and figures were unclear in their meaning or hard to interpret.

User Two Feedback

User Two raised several questions during his interview, the most pressing being "How long would it take to open the app, and how would the user do that?" From his study we learned that users would not be able to read or see the screen while they were holding a button on it, ultimately making it difficult to know when their alert had been canceled. The user was surprised and happy with the audio message feature and thought that it would have been a helpful tool for his childhood, but also said that it would be important for him to know if the parent had received the message.

User Studies

Summary

After conducting our user interviews, collecting feedback, and evaluating what needed to be improved upon, we found that caregivers were mainly frustrated with the app's confusing use of colors and unclearness in what certain measurements meant, whereas child users wanted a way to know that their alert had been received by their parent, and expressed difficulty in holding a screen to cancel a notification, as their finger completely obstructed the view of the screen.

Competitive Analysis

In our competitive analysis we found two companies which focused on monitoring a user's respiratory rate: Owlet and Asthma Tracker. Owlet is an app focusing on the well-being of babies with respiratory issues. Our second competitor was Asthma Tracker, an app which allows users to monitor their own vitals by inputting their own details of their attack. These two apps are the closest competitors to Breezy.

Competitive Analysis

Owlet

Owlet works by monitoring the breathing and heart rate of a child through a child's sock. Our app differed mostly in the fact that we target children from ages 5-15, and instead of monitoring through a sock, we monitor through a smartwatch. Additionally, if a child with Breezy wishes to notify their caregivers of any respiratory issues without waiting for their app to sense it, they can prompt an attack message with a simple touch on the screen.

Asthma Tracker

Asthma Tracker allows users to monitor their own vitals by inputting their own details of their attack. Our app differs in that we don't require the user to input any information about their asthma attack; we let the smartwatch take care of recording that information. We also use an interface which is more calming to people with asthma attacks. Additionally, we offer ways to lessen the intensity of an asthma experience, such as simulated breathing exercises, audio alerts, and emergency messages to caregivers of the patient.

Competitive Analysis

Summary

After analyzing our competition, we made important decisions about what we should and should not implement with Breezy. In terms of design we learned that softer colors, like those used in Owlet, were probably best for a calming experience for the user. Additionally, we lessened the amount of input fields in attempt to make the experience as seamless as possible.

User Flow & Design Changes

In moving forward with our final designs, we wanted to incorporate feedback from our users as much as possible in order to improve our app. We modified our intermediate designs accordingly in Figma and created a user flow.

User Flow & Design Changes

WEAR

MOBILE

WearDataLayer
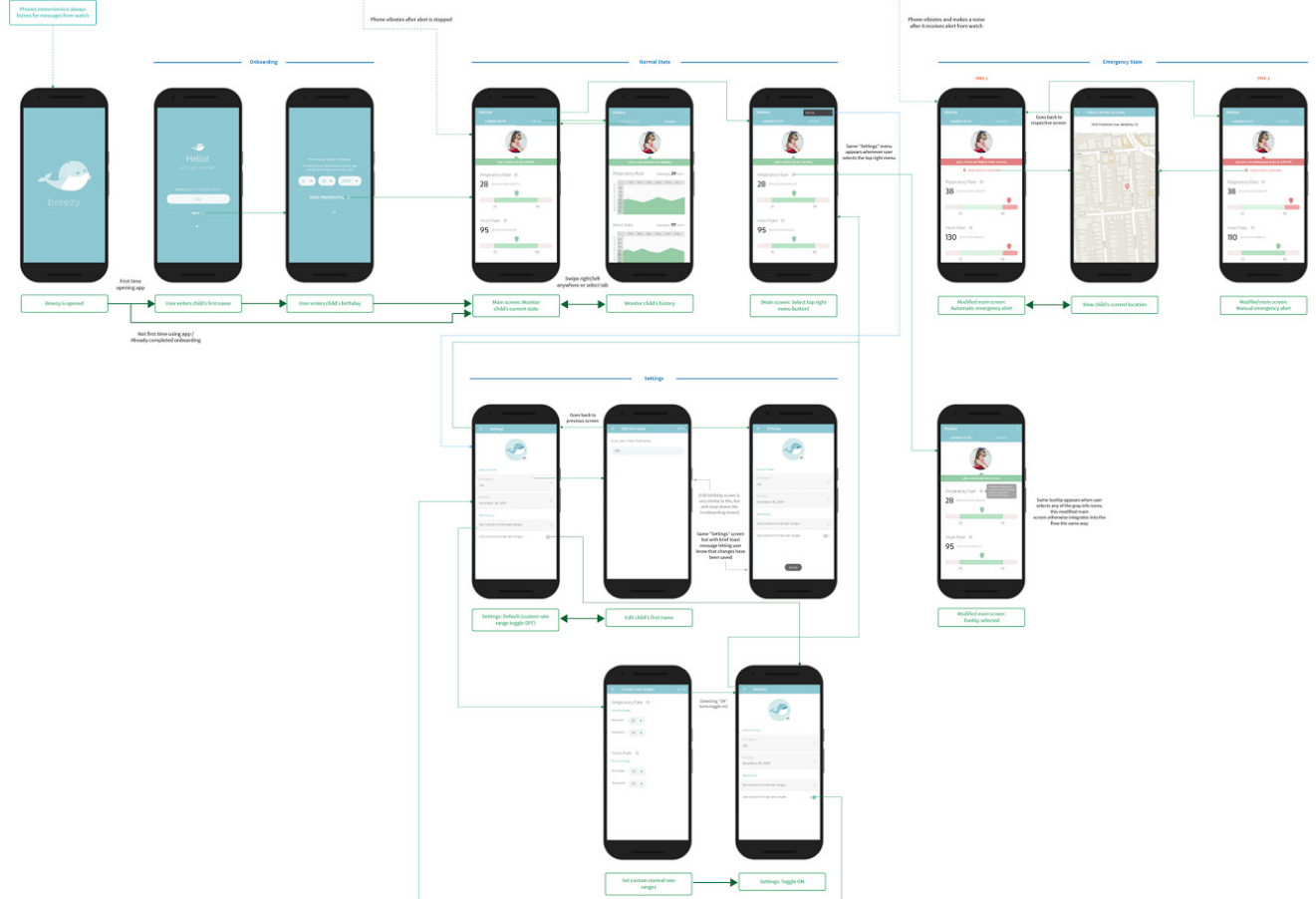
User Flow & Design Changes

Summary

As seen in the flowchart, our final designs address all of the user needs that were brought up in our user interviews. To address the user who expressed concern about colors being confusing on the phone app in the previous iteration, we made sure to display colors with intention in our final design, exclusively using green to express a healthy state and red to express an emergency. On the child's end, we made sure to show a toast that told them their message had been successfully sent to their parent, and also eliminated the 'Hold to Cancel' screen that caused so many difficulties. Instead, we implemented a two-step cancellation process that would be easier for users to navigate, while simultaneously reducing the chance of an accidental cancellation.

Competitive Analysis

Summary

After analyzing our competition, we made important decisions about what we should and should not implement with Breezy. In terms of design we learned that softer colors, like those used in Owlet, were probably best for a calming experience for the user. Additionally, we lessened the amount of input fields in attempt to make the experience as seamless as possible.
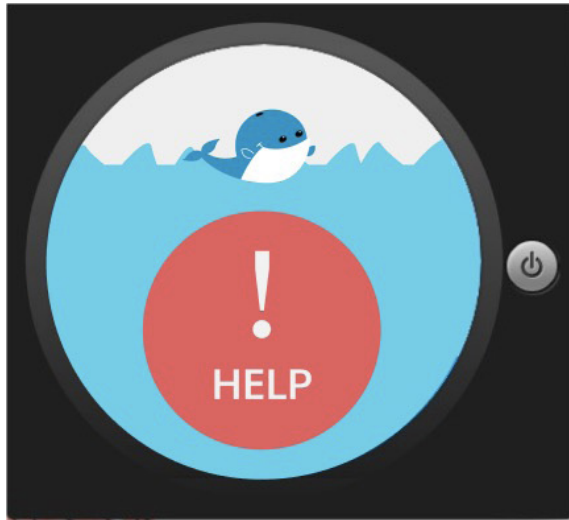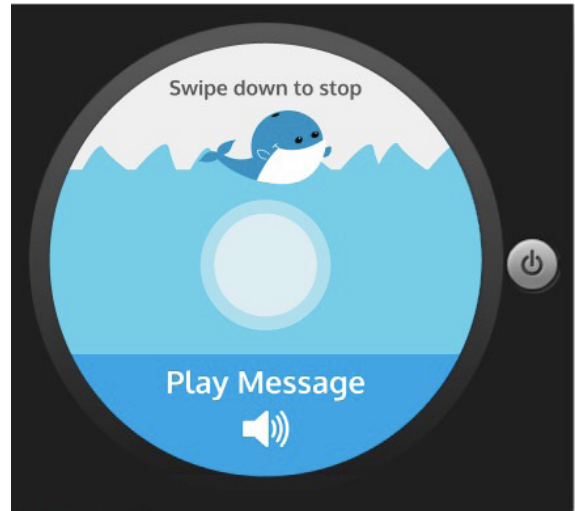
Final Design

Our final design closely resembles that of our final flowchart.
We made few modifications with respect to iconography and colors so as to better the user experience. Colors on the watch were modified to match the phone colors a bit more closely.
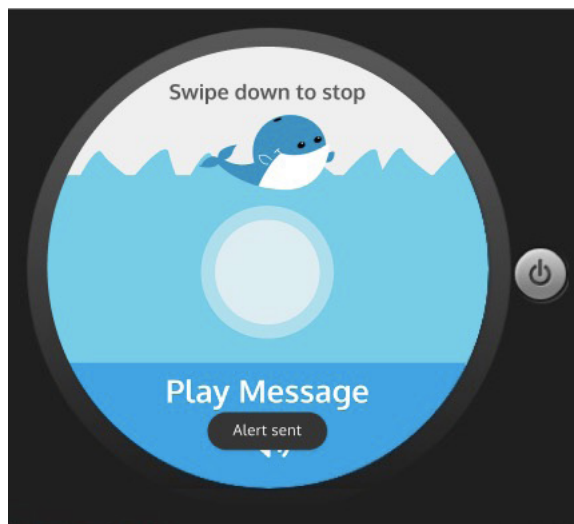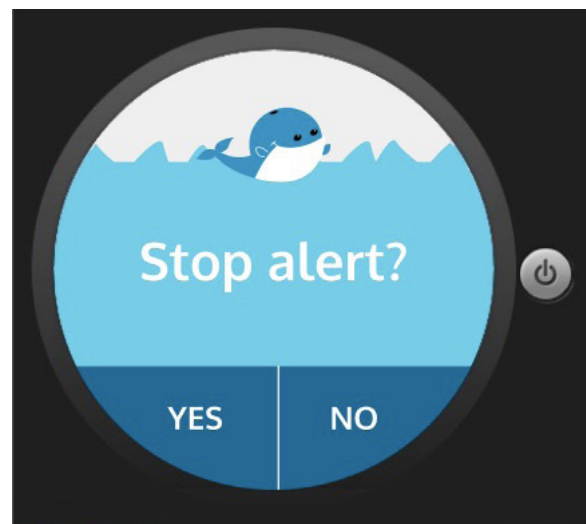
Final Design

Main Screen

Attack Screen

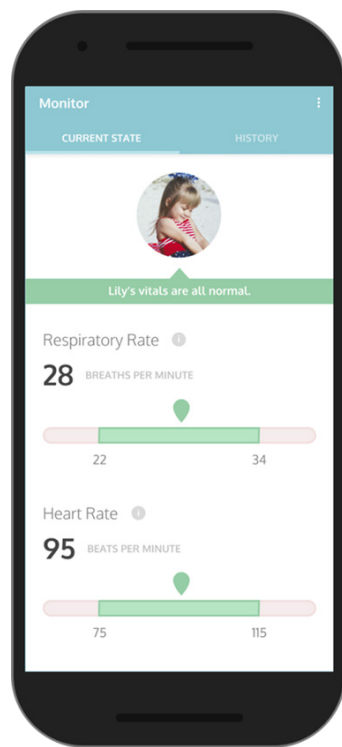Attack Screen - Toast

Cancel Screen
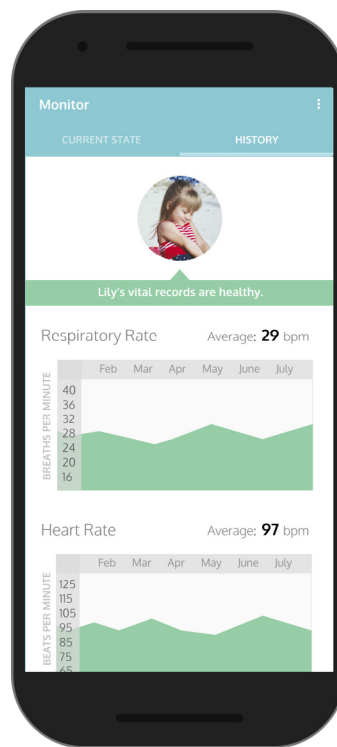
Mockups for child's watch.

Final Design

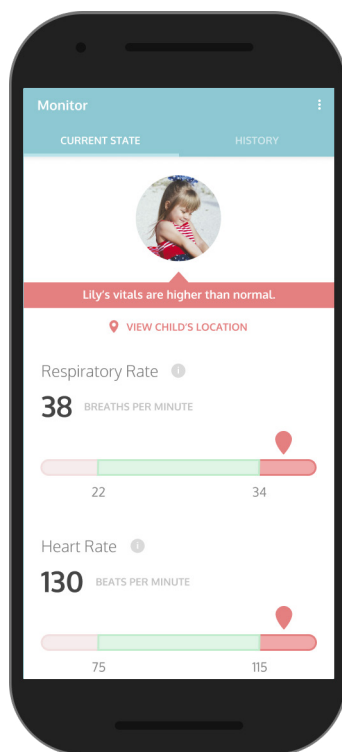**Reminder Screen**

Mockups for child's watch.

Final Design

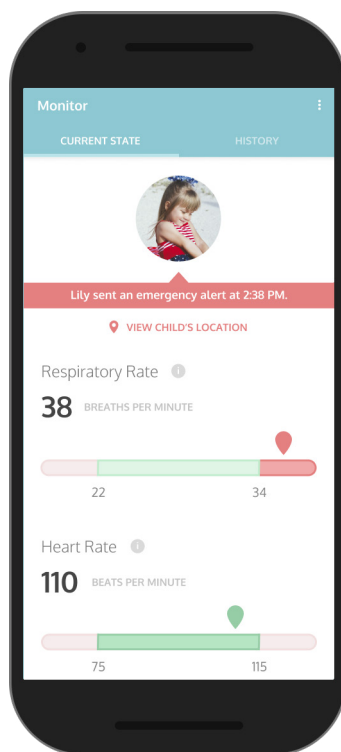**Current State / Main**

History

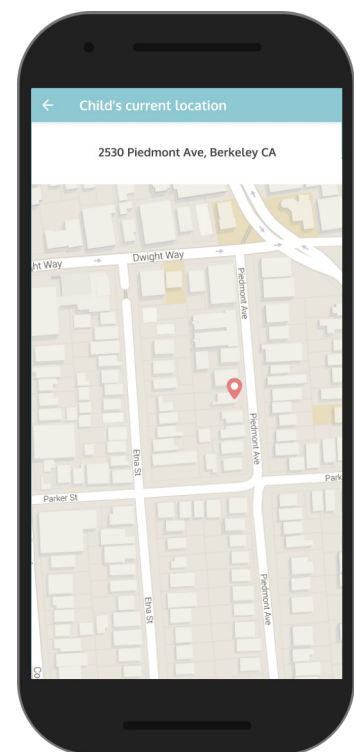Mockups for caregiver's phone: normal state.

Final Design

Auto Emergency Alert

Manual Emergency Alert

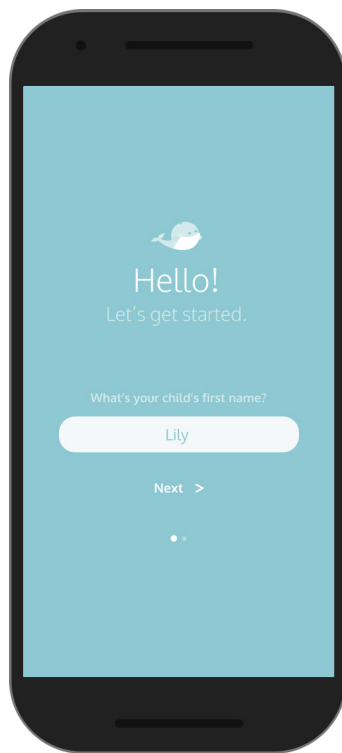**Current Location**

Mockups for caregiver's phone: emergency state.

Final Design

Loading Screen

breezy

Onboarding: Part 1

Hello!
Let's get started.

What's your child's first name?

Lily

Next >

Onboarding: Part 2

What's your child's birthday?
This helps Breezy automatically use the right
average rate ranges as your child ages.

12 ▾   28 ▾   2009 ▾

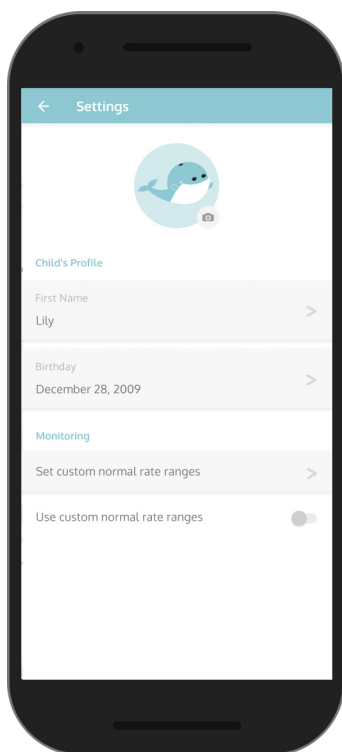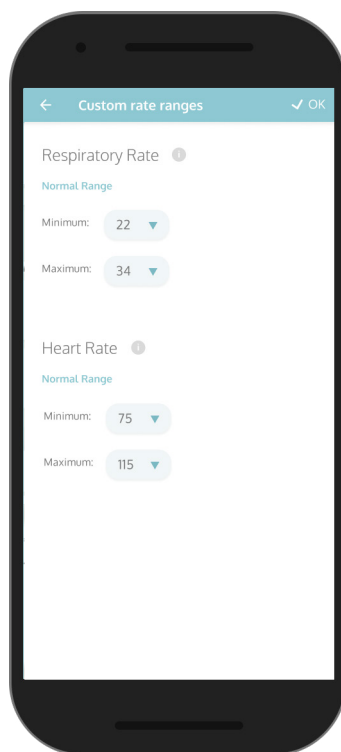**Start Monitoring >**
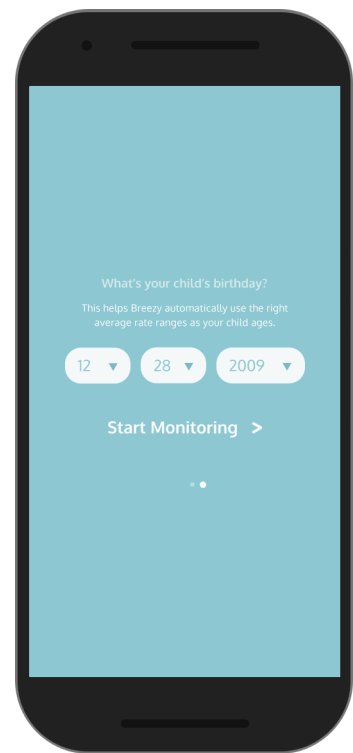
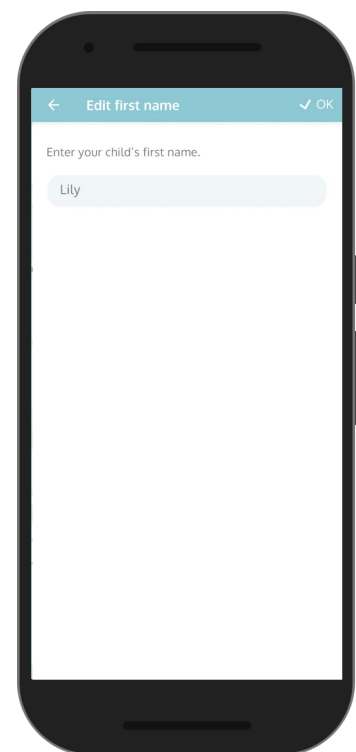Mockups for caregiver's phone: loading and onboarding.

Final Design

Settings Screen

Custom Rate Ranges

Edit Child's Name

Mockups for caregiver's phone: settings.

Final Designs

Summary

On our main functioning screens, we decided to change our overflow option icon, located at the top right corner, into a settings gear icon. This made sense since the overflow option only resulted in one option, which was to go to the user's settings. This meant that a user would have had to click the overflow icon and then select "Settings" to navigate to the settings screen. This was an additional step which we found unnecessary. With a settings gear, our option was more straightforward than before. We also slightly modified the colors of the smartwatch app screens, specifically the color of our whale, to create a more calming visual aesthetic for the child user and match the parent's phone colors a little more closely. Lastly, we changed the "emergency" button on the watch screen to a "help" button, simplifying the language since our users are young children.

Technical Challenges

The two main technical challenges that we faced were implementing the animated gif on the watch to lead a breathing exercise, as well as the graph of the heart rate and breathing rate. As we were coding the application, we also encountered a large hurdle in getting the watch to communicate with the phone.

Technical Challenges

Additional Information for Implementation on Physical Device

- MPAndroidChart Library:
    - https://github.com/PhilJay/MPAndroidChart

- How to animate GIF on Android Wear:
    - http://www.geeks.gallery/how-to-display-the-animated-gif-image-in-android/

Technical Challenges

Summary

In order to get the animated gif on the watch, we implemented a GIFview.java class and created canvases with the gif image cycling through as layers. For the graph, we used a library called MPAndroidChart to implement a listview with multiple line charts. However, we ended up having issues with incorporating this into our final application and decided to forgo this working functionality for this level of fidelity. Communicating from the watch to the phone also provided to be a large challenge, because the watch application and the phone application were coded separately and then combined together afterwards. Thus, their package name of the mobile and the wear apps were labeled differently, causing an inability to communicate between the two. This was quite a challenge to figure out as we had assumed the problem was due to a bug in the code rather than because of the package names, so we went through the code line by line to try and find the error. Ultimately, we were able to discover the real issue and communication between mobile and wear were able to be implemented.

Project Summary

Breezy ensures the safety of children struggling with asthma and provides peace of mind to their caregivers through active monitoring. The motivation behind our project was to better equip young children who suffered from asthma, and enable their parents with the ability to monitor them and respond quickly to emergencies.

Project Summary

Novelty and Value

Our app is valuable to users in that it provides help in the most time-efficient way possible. If the child is near their parent, Breezy's alert feature allows them to get in contact with them to quickly resolve the situation. If the child's parent isn't nearby, however, Breezy's 'Distress Message' feature allows them to still receive the help they need as soon as possible. In fact, this feature is a unique novelty in our app, and is something that many users and students in our class who had asthma as children expressed excitement in, saying that it would have been a great tool to have when they were younger.

Project Summary

Summary

Our application, Breezy, ensures the safety of children struggling with asthma attacks, and provides peace of mind to the caregivers who watch over them. The child's smartwatch constantly reports their vitals to the caretaker's phone, and sends an emergency alert if it detects any anomalies that could signal the onset of an asthma attack. In addition to this automatic sensing, the child has the option to send an alert through the watch manually. If an attack is reported, the watch allows users to play a distress message that alerts bystanders and provides breathing exercises to stabilize and calm down the child. Meanwhile, the caregiver is alerted with their child's location and current vitals so that they can quickly respond to the situation. The caregiver can also review the history of the child's vitals over time.

GitHub Repo

https://github.com/cs160-sp16/Group-12-Project.git