

The background of the slide features a light purple color with a pattern of thin, white, wavy lines that flow across the entire surface. In the center, there is a solid blue rectangle. Inside this rectangle, the word 'saix' is written in a white, lowercase, sans-serif font. Below it, the words 'PROCESS BOOK' are written in a white, uppercase, sans-serif font.

saix

PROCESS BOOK

MEET THE TEAM



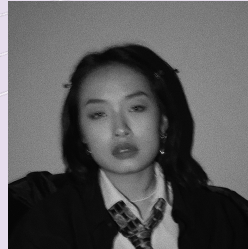
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CONTENTS

Problem.....	4
Biofeedback.....	8
Target Audience.....	15
Research.....	22
Concepts.....	48
Concept Refinement.....	59
Prototype.....	65
User Testing One.....	72
Further Refinement.....	91
User Testing Two.....	95
Final Concept.....	99

PROBLEM

PROBLEM

Stress is a major health risk.

Despite being something we deal with each and every day, prolonged stress increases your chances for everything from the common cold to cardiovascular disease.

That being said, despite all its negative effects, how you view and handle stress allows you to go as far as creating your own positive biology.

STRESS CAN BE...



Mental



Physical



Emotional

TOPIC OF INTEREST

Taking a more physical approach to stress reduction for those in fast-paced work environments, with concepts like biofeedback training, haptic stimuli, and even classical conditioning.

BIOFEEDBACK

WHAT IS BIOFEEDBACK?

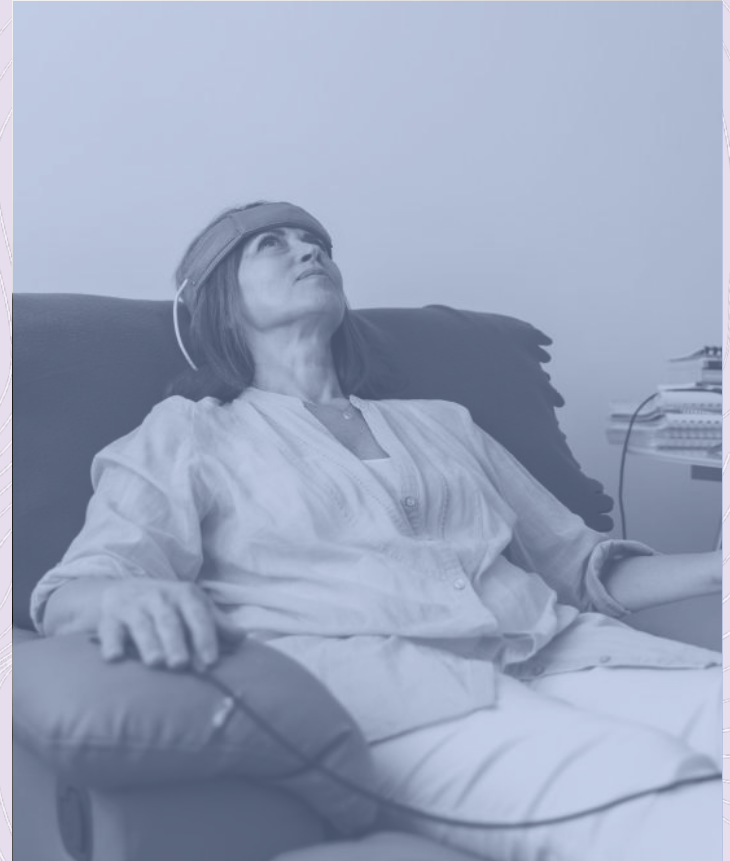
/ˌbɪoʻfɛdbak/

noun

A process that focuses on **learning to control** your body's involuntary physiological responses to stress.

The use of technology in some way to monitor physical reactions in order to manage anxiety, stress, and distress.

Dr. Karin Cabeza

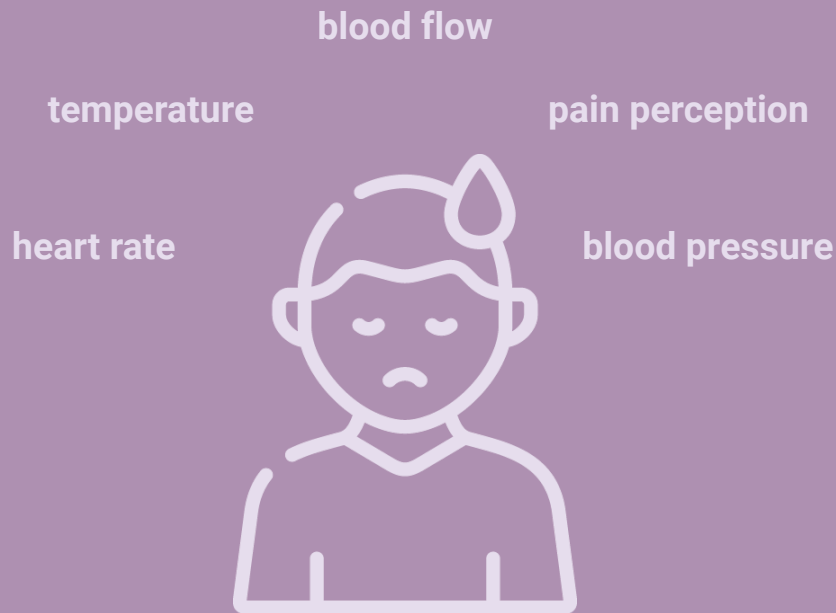


Based on the visual feedback, the user
learns to modify their **voluntary responses**,
to achieve healthier **involuntary responses**
for future exercises.

WHAT DOES THIS MEAN?

(VeryWell Mind) <https://www.verywellmind.com/what-is-biofeedback-2794875>

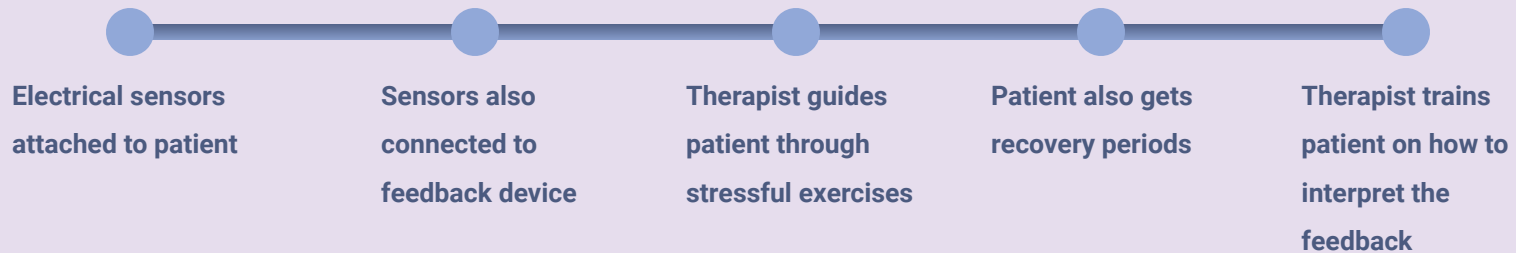
The user goes through **exercises** where they deal with things they **can control**-- like breathing or muscle tension-- to lower vitals they **can't control**, such as:





“Biofeedback therapy
is a process of
training as opposed
to a treatment.”

PROCESS





GOAL

For the user to be able to see
lasting results without
continued use of an instrument.

TARGET AUDIENCE

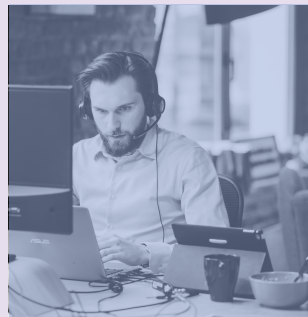
TARGET AUDIENCE

People in fast-paced work environments with tight deadlines.



Life or Death

First responders
Pilots
Hospital employees



People Heavy

Customer service reps
Lawyers



Heavily Collaborative

Advertising employees
Construction teams
Film production teams

WHY THESE GROUPS?

These constitute some of the **highest-stress** jobs.

These also constitute some of the **fastest-paced** jobs.

Stakes are high, time is low; a fast-acting, solution-oriented, biological treatment is the **best fit** here.

Simply put, because they **need** it the most.

NEED #1

Busy people want an **instantaneous** effective method of relieving their stress **while at work.**

NEED #2

Busy people may need to take a more **self-regulated approach** to their stress reduction.

NEED #3

Busy people **cannot** use a method that calls for **a lot of time** out of their daily life or **a lot of interruptions.**

SO HOW'S IT WORK?



User completes short, cyclical biofeedback exercises **at home** with an **app and wearable pair**.



A **haptic stimulus** is present for all exercises completed.



While at work, biofeedback wearable **monitors vitals**.



If stress gets above a certain threshold and becomes negative, the same **haptic stimulus intervenes**.



User can use what they have learned to calm themselves down **in the moment**.

EXPECTED OUTCOME

Create a product that makes biofeedback therapy **accessible for day-to-day use**, provides a **quick and effective** way to mitigate workplace stress, and is **distraction free** for fast-paced work environments.



PRIMARY RESEARCH

Survey

Aimed at people who are more prone to stress than others. Goals include discovering pain points for work stress, touch points for current stress relief methods, and familiarity/comfort level with wearables.

User Interviews

Target demographics.

Expert Interviews

To include clinical psychologists and behavioral therapists, biofeedback therapists, equipment technicians.

RESEARCH

Wor

Our group
There are
All answer

1. How o

☐ Under

☐ 18-2

☐ 30-39

SURVEY

The survey focused on working stress and wearable devices. We aimed to find the **demographic characteristics, cause of working stress, and acceptance of wearable devices.**

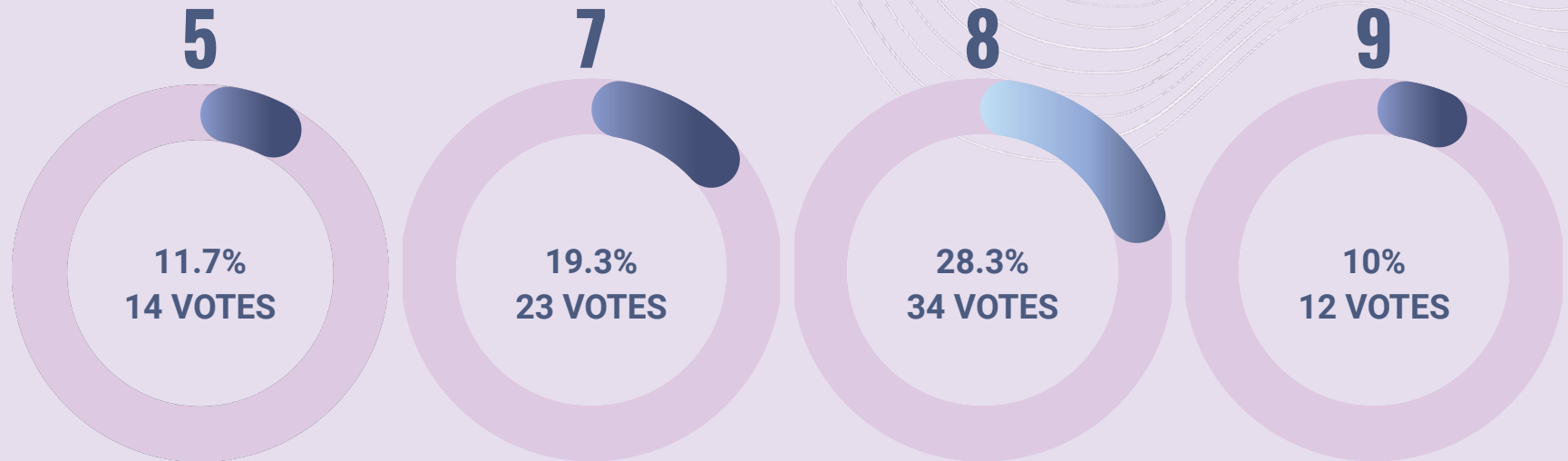
18 MULTIPLE-CHOICE

120 RESPONSES

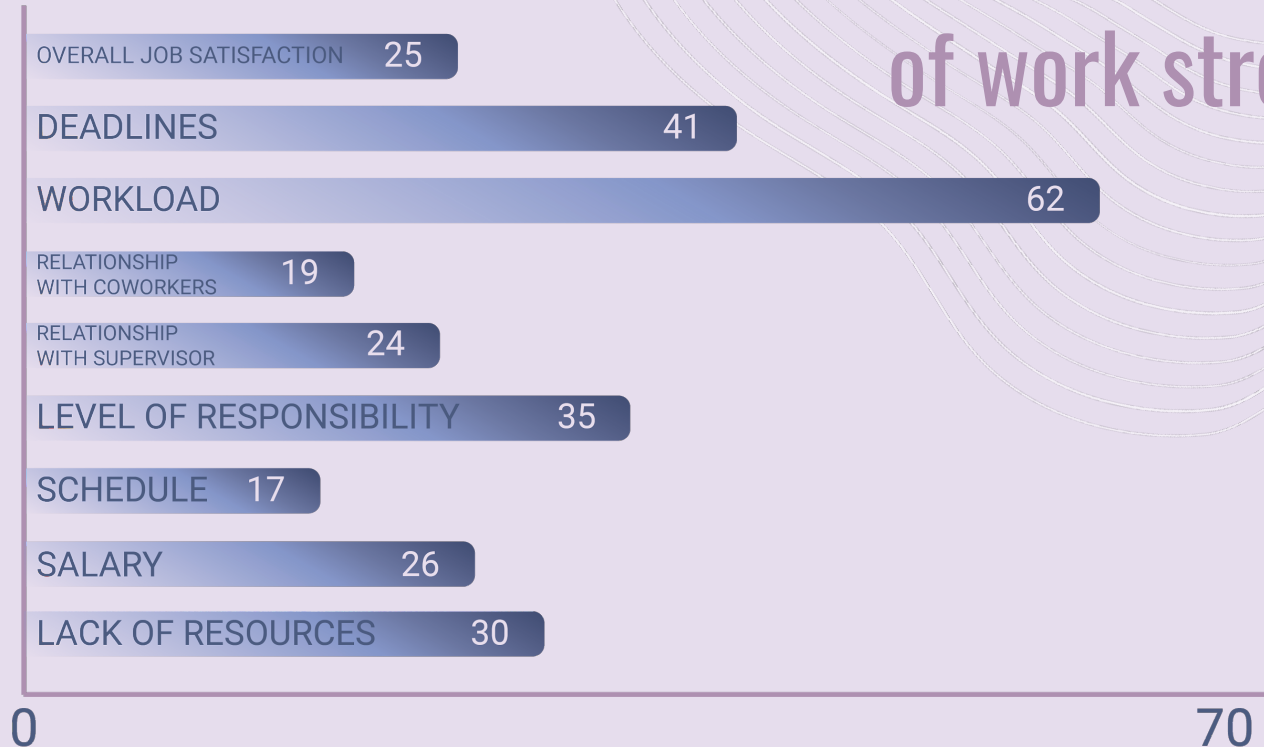
What is your type of employment?



On a scale of 1-10,
how stressed do you feel at work?



Which of the following aspects of work stress you out?

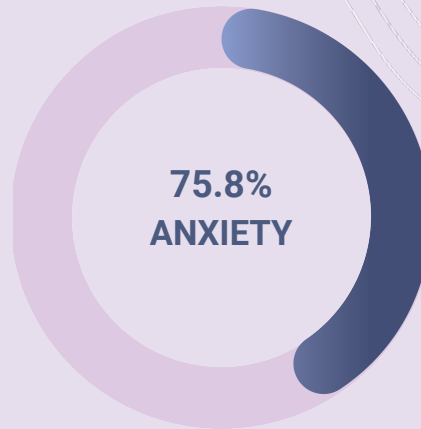


What symptoms of stress do you experience?

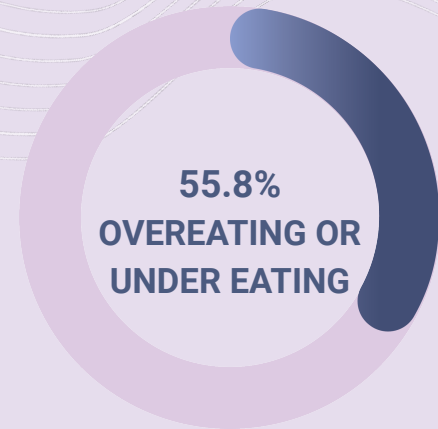
ON BODY



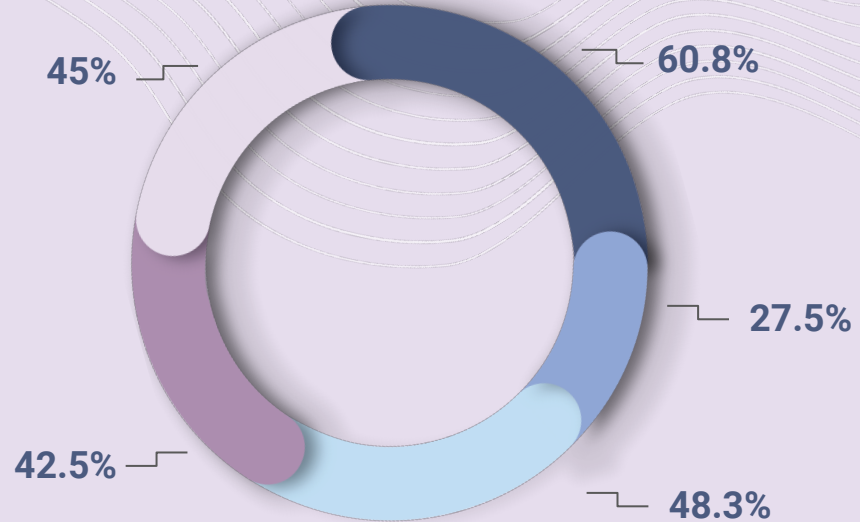
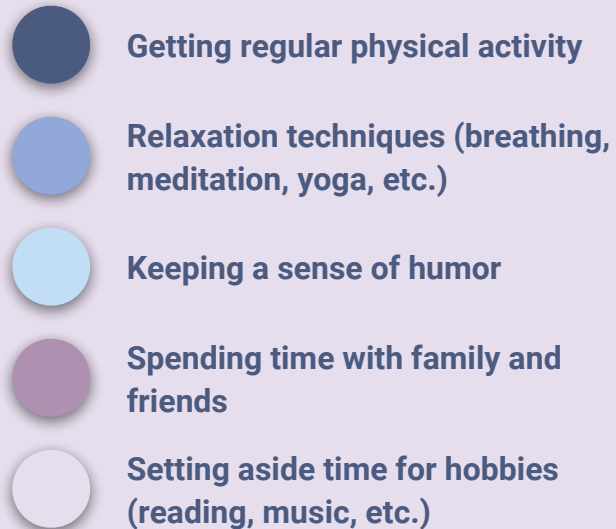
IN MOOD



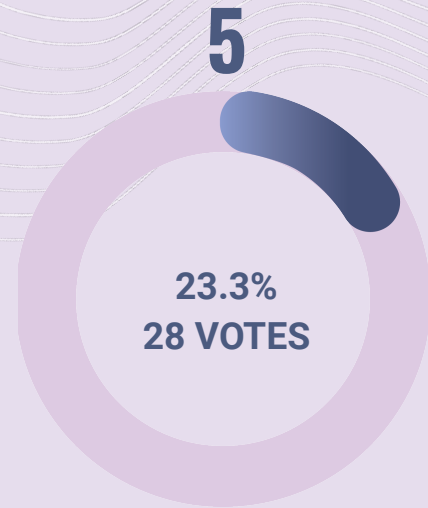
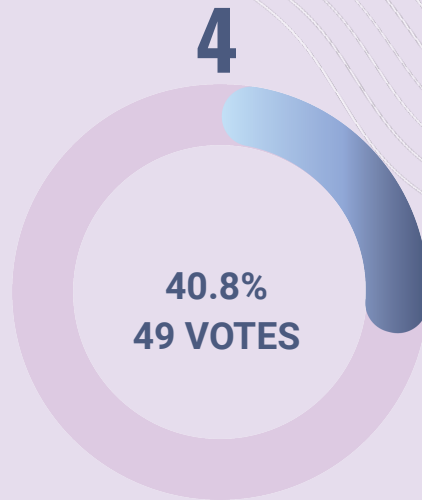
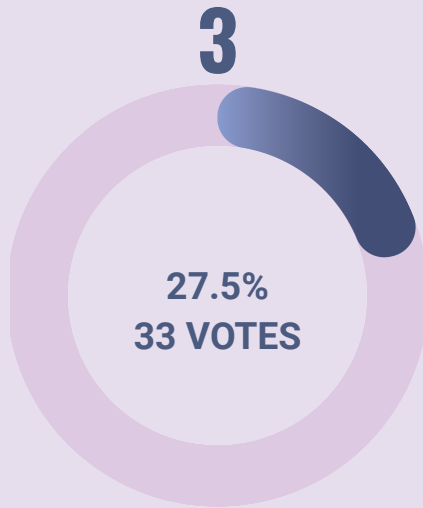
IN BEHAVIOR



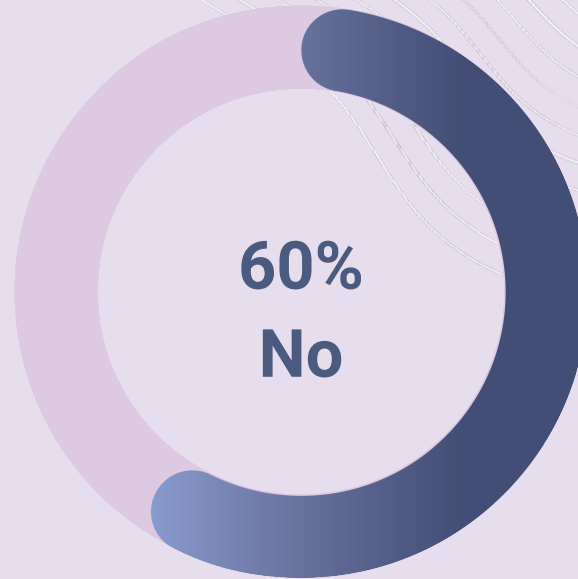
How do you relieve work-related stress?



How comfortable are you with using wearable devices?



Do you currently use a wearable device regularly?



SURVEY INSIGHTS

- Fast-paced jobs and jobs heavy in communication cause more stress than other types of work.
- Workload and deadlines were the main complaints, reinforcing our demographic choice.
- The older people got, the less likely they were to have or want a wearable.

USER

INTERVIEW

These interviews focused on people who work in **life or death jobs**, creative fields with **high levels of collaboration**, and jobs that require **communication** with the public. We aimed to know their working stress, stress relief methods, and experience with wearable devices.

19 INTERVIEW QUESTIONS

10 INTERVIEWEES

USER INTERVIEW INSIGHT

People differ in their stress tolerance.

"I usually work for 15 hours if I do have surgery. However, compared with other hospitals, the pace of my work is slow."

The way people relieve stress is related to their living habits and hobbies.

"I used to spend 6 hours talking with my friends. In regards to sketching and running, I will do these everyday for 30 min. It became a habit of mine."

People are impatient with the effectiveness of a new approach to stress relief.

"... if given a week of time it has an effect, I will stick to it. If not, I will give it up."

Many people think wearable devices are unnecessary because they are not part of their daily habits already.

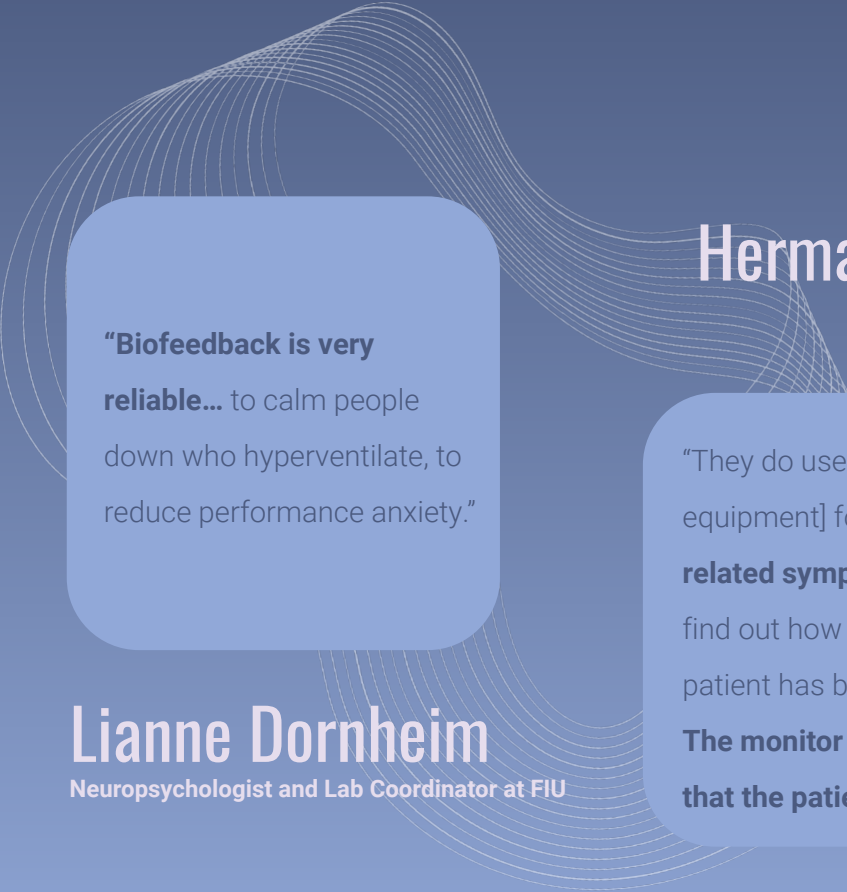
"I used to have a bracelet, but I used it for a week and it didn't work. [I stopped using it] because I found that the health function in the iPhone can replace the bracelet."

EXPERT INTERVIEW

The goal of these interviews was to discover the perspectives of different health professionals on **how people deal with stress, the connections between different approaches, and the possibilities of biofeedback use to lower stress.**

15 VARIED INTERVIEW QUESTIONS

5 INTERVIEWEES IN 4 DIFFERENT SPECIALTIES



"Biofeedback is very reliable... to calm people down who hyperventilate, to reduce performance anxiety."

Lianne Dornheim

Neuropsychologist and Lab Coordinator at FIU

Herman Strong

ICU Nurse

"They do use [this equipment] for **stress-related symptoms** and to find out how long the patient has been this way.

The monitor can tell a story that the patient can't..."

"Online therapy is an important part of our society. It allows people to work on a schedule that works for them. **Telehealth...** makes therapy **more accessible** for a wider amount of people."

Eb Roberts

LCMHC, JD, BC-TMH

"I, personally and professionally, believe in **people learning how to control themselves**. It's based on how engaged and willing people are, but people can **see** what they are doing is **working**."

Dr Karin Cabeza

Biofeedback Therapist

Psychologist with Memorial Health Physical Therapy

"Another struggle I seem to find is a large **lack of ability to self-soothe**. I work a lot with my patients on being able to self-soothe themselves **without** looking for **external factors** to do this (alcohol, drugs, people, places, things)."

Alexandra Gleason

LMFT

EXPERT INTERVIEW INSIGHT

- No matter what therapy method was assessed, **slowing down breathing and heart rate** was a recommended stress reduction method.
- Instructions need to be **both clear and specific** to put stressed people at ease.
- Exercises learned **must be practiced daily** by the patient at home to see results. People must be open and willing to change.
- People who are in a lot of pain or suffering are more willing to try **just about anything** that may help.

PAIN POINTS

What stresses our users out



**INEVITABILITY OF
PRESSURE**



**SHORT TERM
EFFECTIVENESS
FOR RELIEF**



**LACK OF
CONSISTENCY**



**DISTRACTING
ENVIRONMENT**



**HUGE EXPENSE ON
TIME AND MONEY**

TARGET AUDIENCE

People in fast-paced work environments with tight deadlines.

Ages 18-49

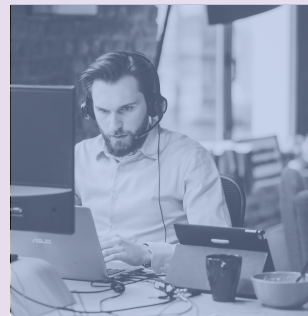


Life or Death

First responders

Pilots

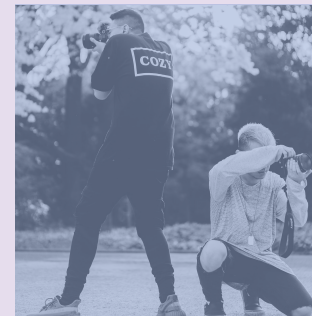
Hospital employees



People Heavy

Customer service reps

Lawyers



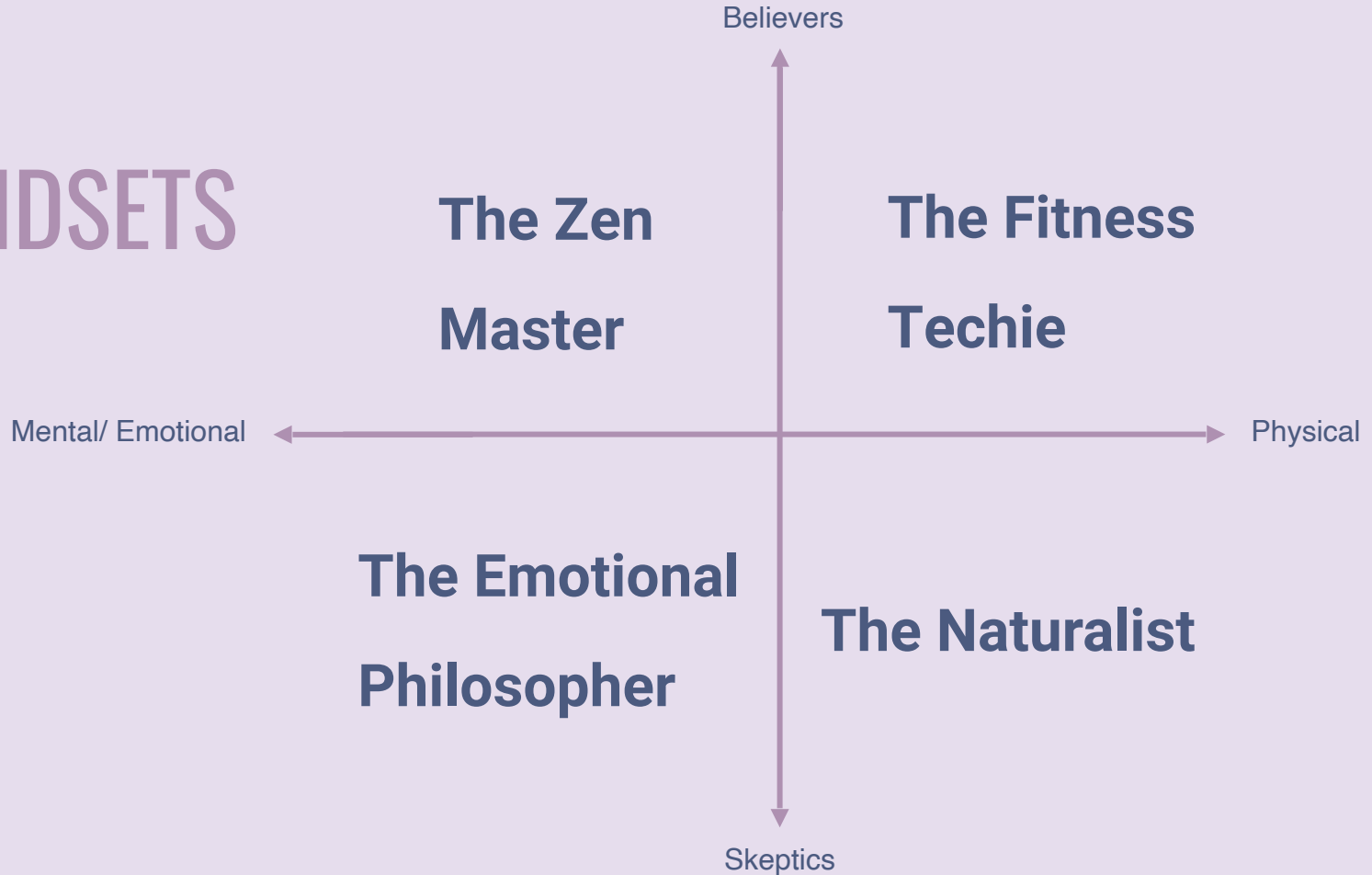
Heavily Collaborative

Advertising employees

Construction teams

Film production teams

MINDSETS



"I have almost all of them
[wearables]. Wristbands, watches,
and all the good electronics that go
around your neck."



Believers

The Fitness Techie

Physical

- Gets out their stress in a physical way such as exercise
- Uses wearable devices such as a smartwatch or Fitbit
- Is open to trying new things and stays up to date with the latest technological trends

1/10
interviewees



- The type to walk or perform a physical activity for relief
- Does not own a wearable and is not sure they would ever want to
- Doubts that wearables give back reliable information
- Not much of a tech person

"I'm not going to buy it. ... I'm not very interested in this kind of high-tech product."

The Naturalist

Physical

Skeptics

- Might throw themselves into their work or read to help with stress
- Uses no wearable technology and is more critical of it because they are not sure if it works
- Prefers personal interaction over interaction with a device but is often open-minded of it.



3/10
interviewees

Mental/ Emotional

The Emotional Philosopher

"Last week I had a theory exam, so I read books and reviewed the exam in my break time, which can relieve my pressure."

Skeptics

The Zen Master

Believers

- Loves to use wearables already for mental health purposes.
- Engages in mindfulness and breathing already
- Relies on support from friends
- Favors a relaxing environment

Mental/ Emotional

"I don't have a specific break, so I get up and walk around when I'm tired. I go to the balcony to get air, drink tea, or go to see my own flowers."



AFFINITIZATION

Using our information from our **secondary and primary research**, we gathered our insights, HMWs, and pain points.

AFFINITIZATION

Using our information from our **secondary and primary research**, we gathered our insights, HMWs, and pain points.

≈500 DATA POINTS

≈70 I STATEMENTS

6 HOW MIGHT WE'S

HOW MIGHT WE

make stress relief accessible to those that don't
have time or resources for comprehensive
mental healthcare?






HOW MIGHT WE?

HMW make stress relief accessible to those that don't have time or resources for comprehensive mental healthcare?

- HMW make a physical approach to stress relief that still maintains necessary individualization?
- HMW appeal to varying effort/willingness levels?
- HMW use the method to mitigate both physical and mental/emotional stress symptoms?
- HMW boost job performance in the workplace with little to no distraction?
- HMW appeal to individuals that already have set routines for stress relief?

CONCEPTS

COMPETITIVE ANALYSIS

						
Heart Rate	✓	✓	✓	✓	✗	✓
Breathing	✗	✗	✓	✓	✓	✓
App	✓	✓	✗	✓	✓	✓
Contact-free measuring	✗	✗	✓	✗	✗	✗
Focused on stress relief	✓	✓	✗	✗	✓	✓

COMPETITIVE ANALYSIS



CONCEPTS

In developing our concepts we used the **insights**, **HMWs**, and **pain points** we gathered .

3 PRELIMINARY CONCEPTS

Watchband

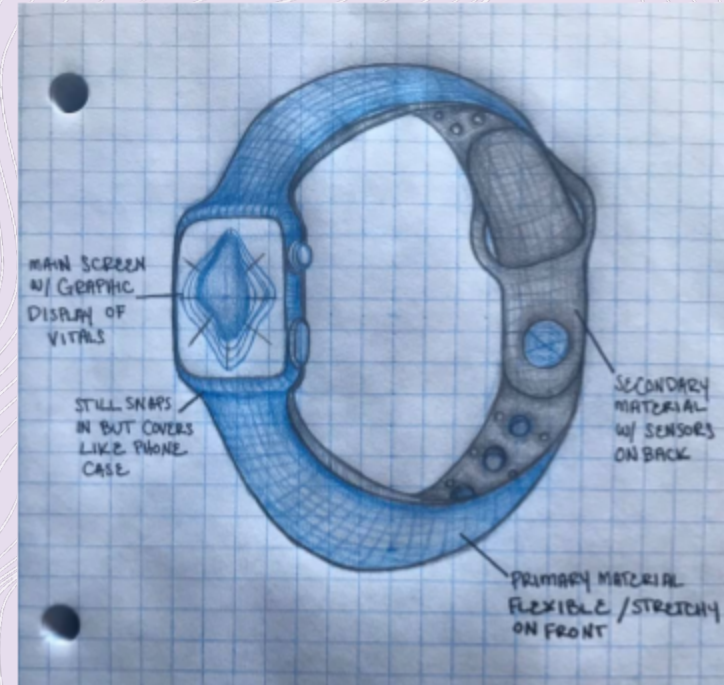
Smart Home Device

Phone Case

WATCH BAND CONCEPT

Watch band with **built in sensors** that monitors skin conductivity and temperature for biofeedback that **works in tandem with the smart watch's built-in monitoring capabilities.**

Paired with a **smart watch app** that depicts feedback visually and takes the user through guided exercises, the watch band **boosts the functionality of the watch itself** and gives the user **more control** over their bodily responses than ever before as they watch their feedback lower to normal levels.



HOW DOES IT WORK?

Using our product's ability to measure



Skin Conductivity

The skin momentarily becomes a better conductor of electricity during periods of emotional arousal.



Temperature

Body temperature rises during moments of stress. One main cause of this is narrowing of blood vessels.



Pulse

Pulse rate quickens in times of physical activity, but also during times of stress.



Breath Rate

During times of stress, breathing becomes quick and shallow. Deep breathing is also one of the quickest ways to relieve stress!

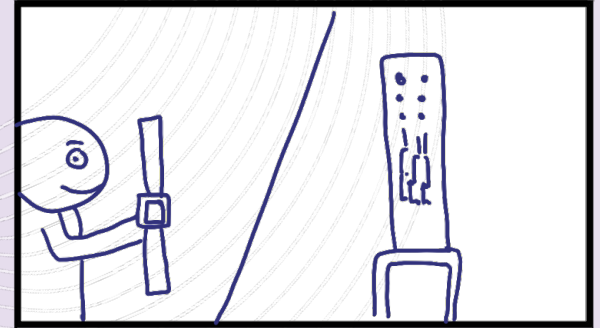
WATCH BAND STORYBOARD



The Fitness Techie's job has been very stressful.



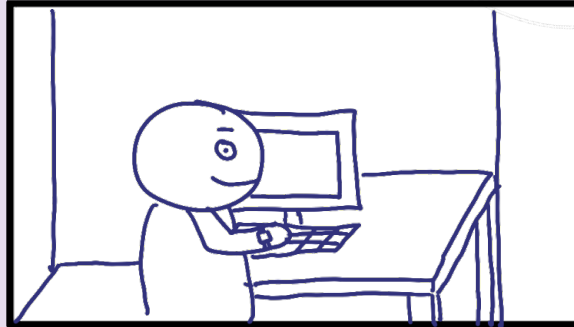
When she gets home, her mind is still focused on work, and it's driving her crazy. It's starting to take a toll on her family life.



She buys a new smart watch band and app that uses biofeedback to monitor and relieve stress.



She begins using the band and doing the exercises the app gives her.



After a while, she begins to notice a difference.

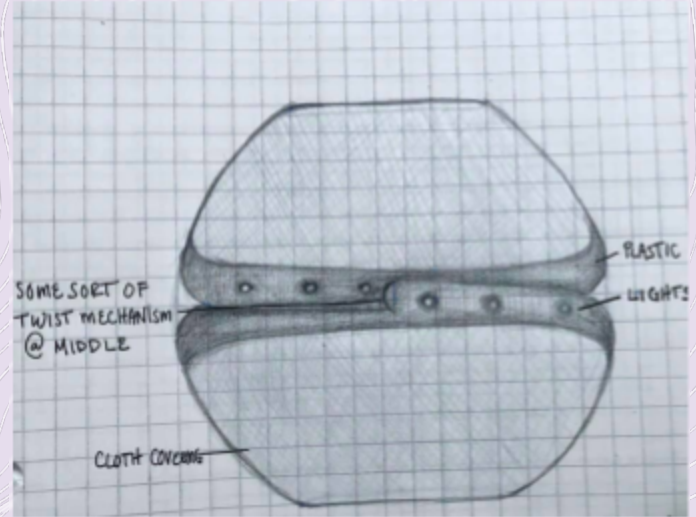


Not only is she able to stop bringing her work home with her, but she is also less stressed at work!

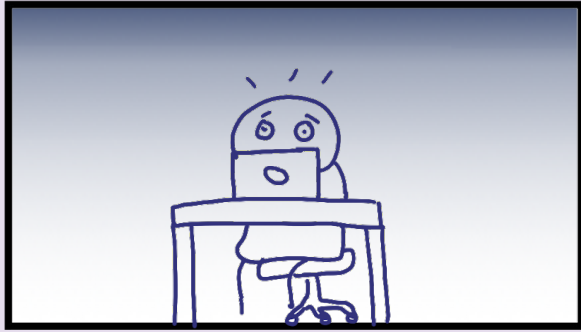
SMART HOME DEVICES

This product would be a small, affordable smart device that would **track disturbances in WiFi signals that fit the descriptions of breathing.**

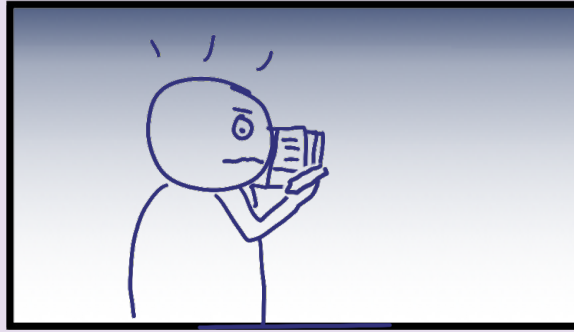
It would **verbally walk you through biofeedback exercises** at the time of your choosing, and **alert your phone or smart watch** with a custom vibration pattern when your stress level passes a certain threshold and becomes unhealthy.



SMART HOME DEVICE STORYBOARD



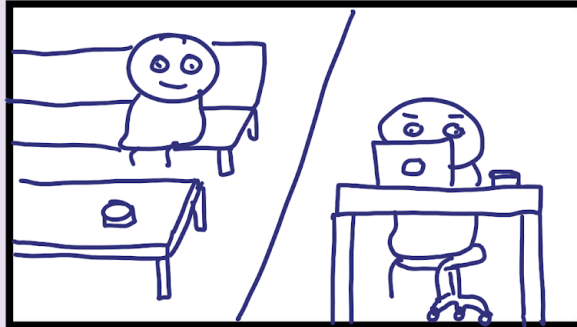
The Zen Master has been struggling with stress at work.



Her usual methods aren't working and she doesn't know what to do.



Then she comes across a small device that monitors her stress at work and home, using WiFi signals! It's not a wearable, but the technology seems cool, so she buys it.



She keeps one part at home and the other on her desk at work.

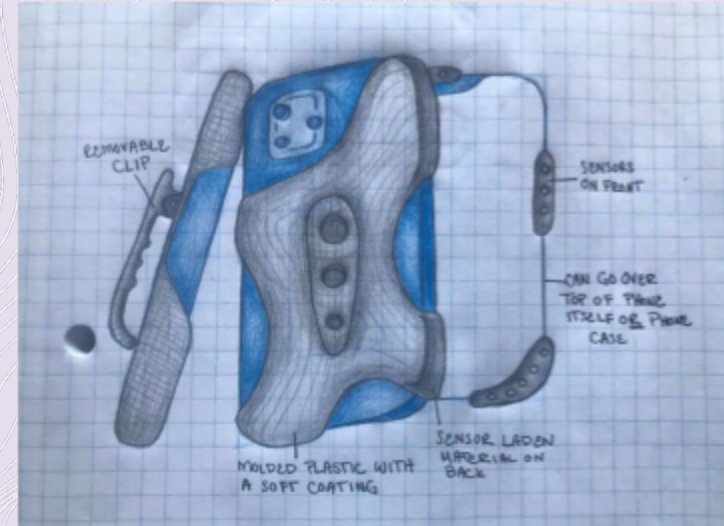


It talks her through new exercises to reduce her stress, and it works! As she continues to practice, using biofeedback and haptics, her stress level finally begins to go down.

PHONE CASE

For those not too thrilled with the concept of an extra **wearable**, this phone case would clip to the waistband of your pants and allow for **monitoring at the hip** of vitals like breathing, heart rate, and temperature.

The device is **paired with an app** for customizable biofeedback training at home and haptic alerts at work. With **sensors on both the front and the back**, the phone case is uniquely able to monitor vitals from both the hands and the hip, **no matter how you are using your phone.**



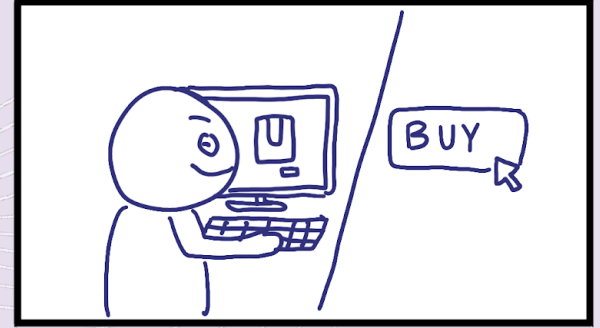
PHONE CASE STORYBOARD



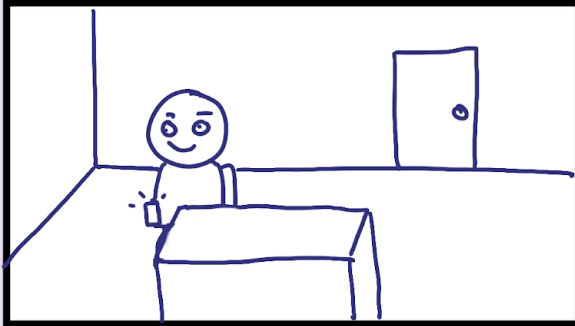
The Fitness Techie's job has been very stressful.



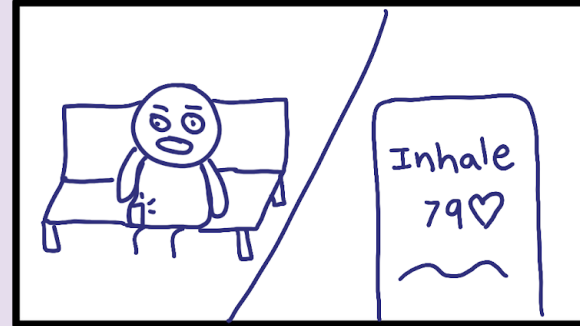
Normally, she meditates to relax, but that isn't working, which makes her more stressed. She needs to get a handle on this.



She finds a phone case with biofeedback sensors to monitor stress. She's not sure about this kind of monitoring, but she buys it anyway.



She soon discovers that it's easy to use, and it seems to be working.



Using the at-home training and at-work haptic notifications, her mental exercises once again help her de-stress.

CONCEPT REFINEMENT

CONCEPT REFINEMENT

(Physical Product)

- Shape change to the physical product
- One piece
- Device no longer talks to user
- All interaction shifted to app



COMPONENTS

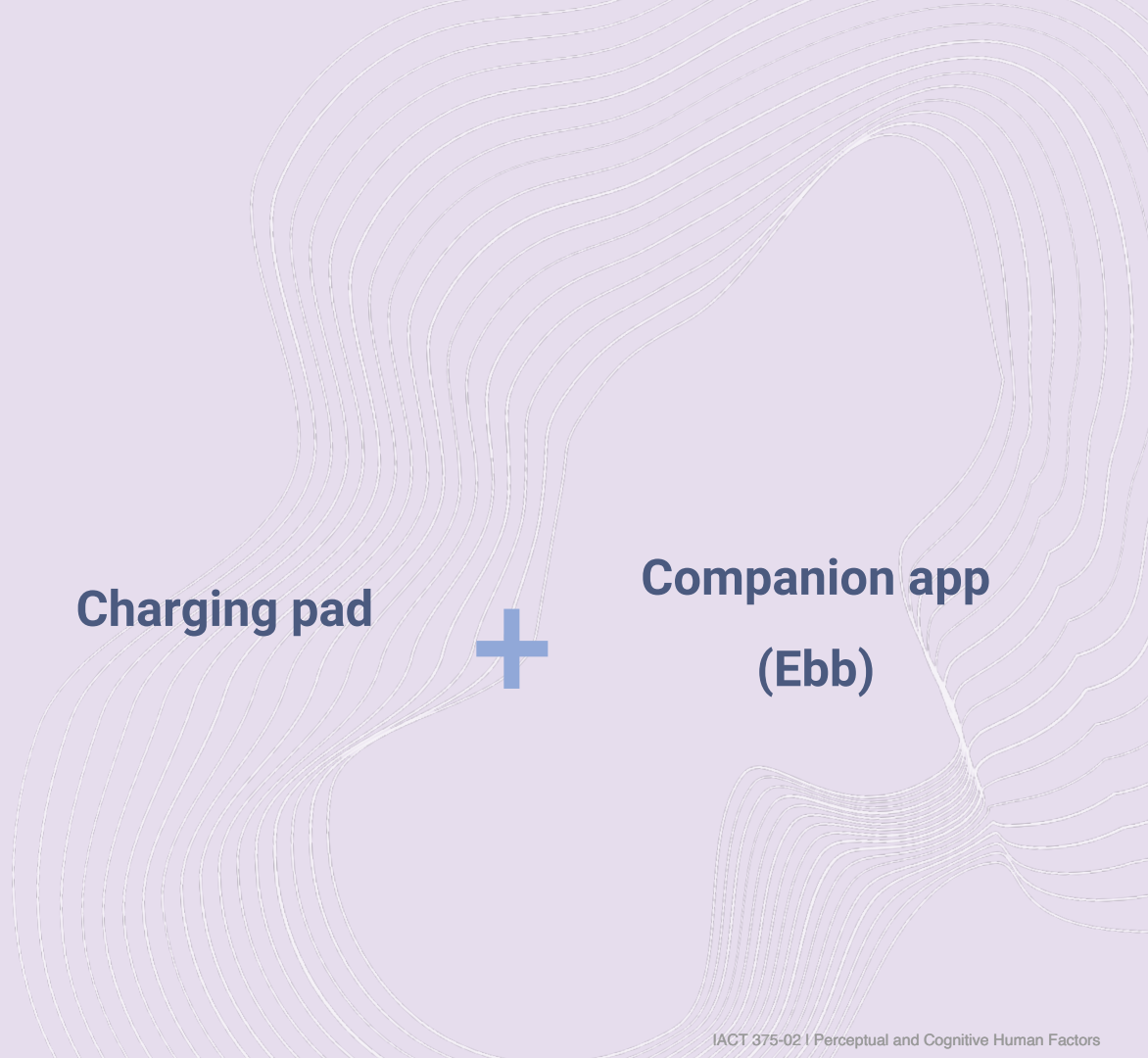
**Physical product
(Worry Stone)**



Charging pad



**Companion app
(Ebb)**



HOW IT WORKS

The device transmits wifi signals which can **bounce off the user**.

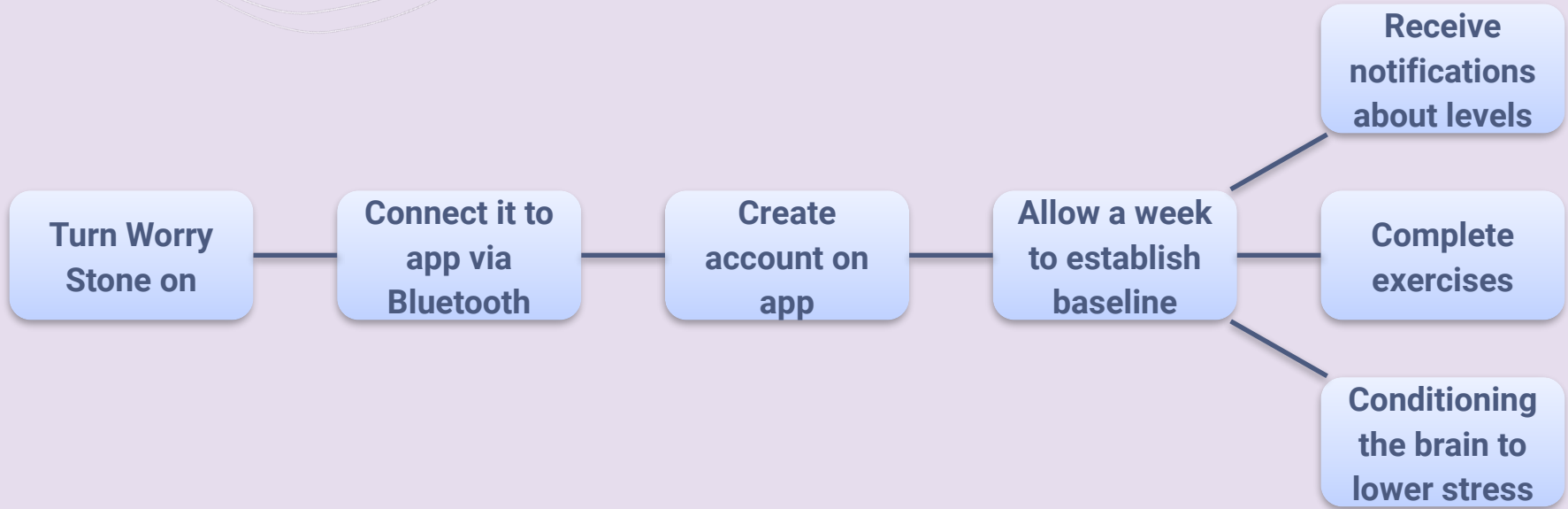
These signals can **detect changes in vitals**, such as heart rate and breathing.

If the device is strong enough, it can detect the **differences between multiple people**.

Users can be up to **24 feet away** from the device and still receive feedback.

The signals can even go **through walls**.

INTERACTION MAP



UNIQUE VALUE PROPOSITION

Taking a more physical approach to stress reduction

Combining familiar and trusted exercises in learning to control vitals with real time quantitative feedback to visually display progress and drive motivation.

Wireless
monitoring without
a wearable

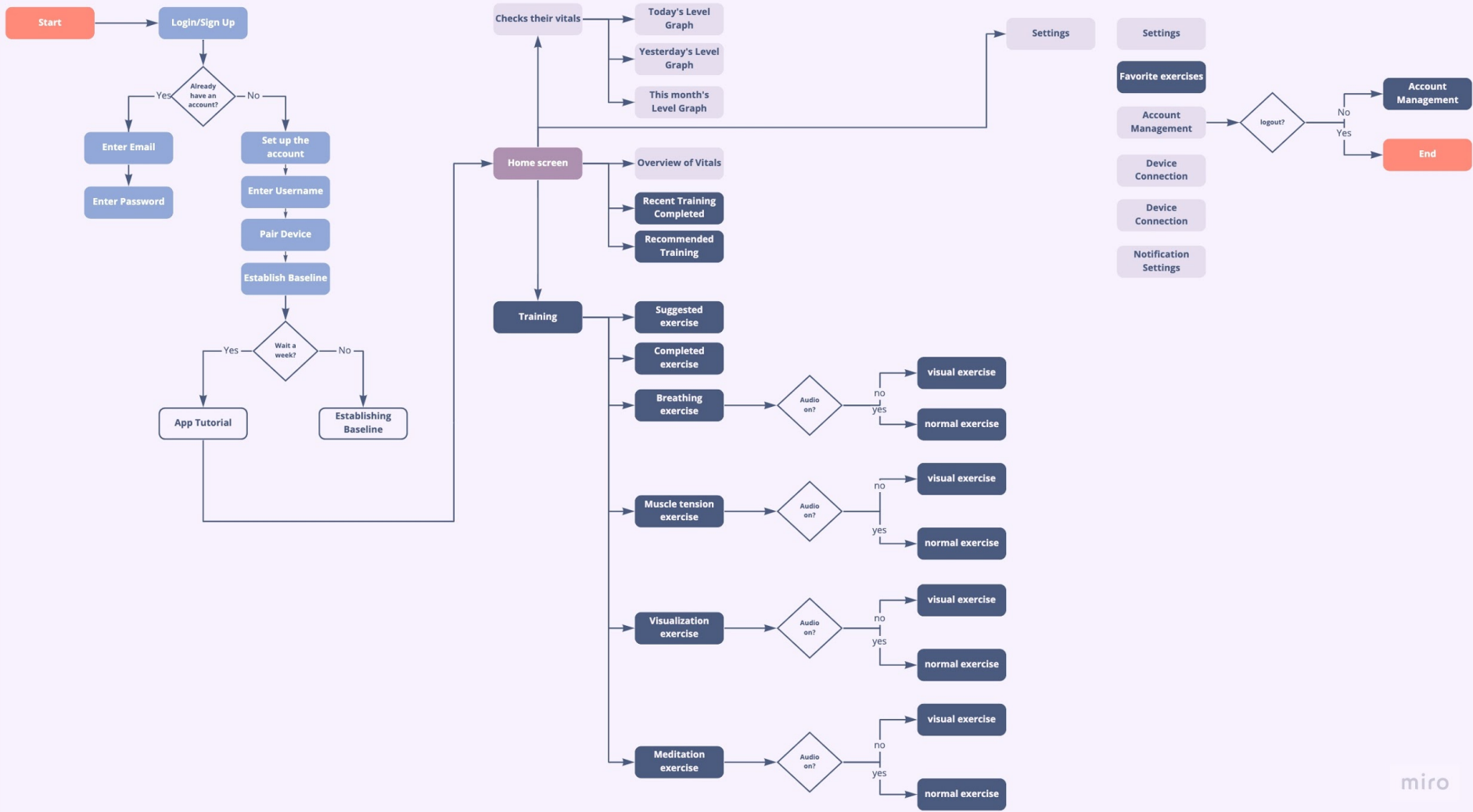
Ability to tell
differences between
exercise, rest, and
sleep periods.

Utilizes multiple
forms of learning for
greater retention

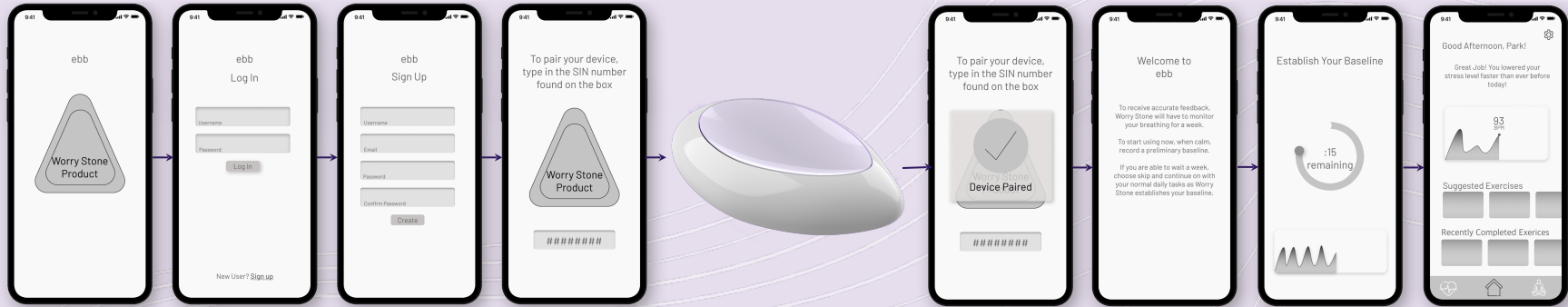
PROTOTYPE

PHYSICAL PROTOTYPES

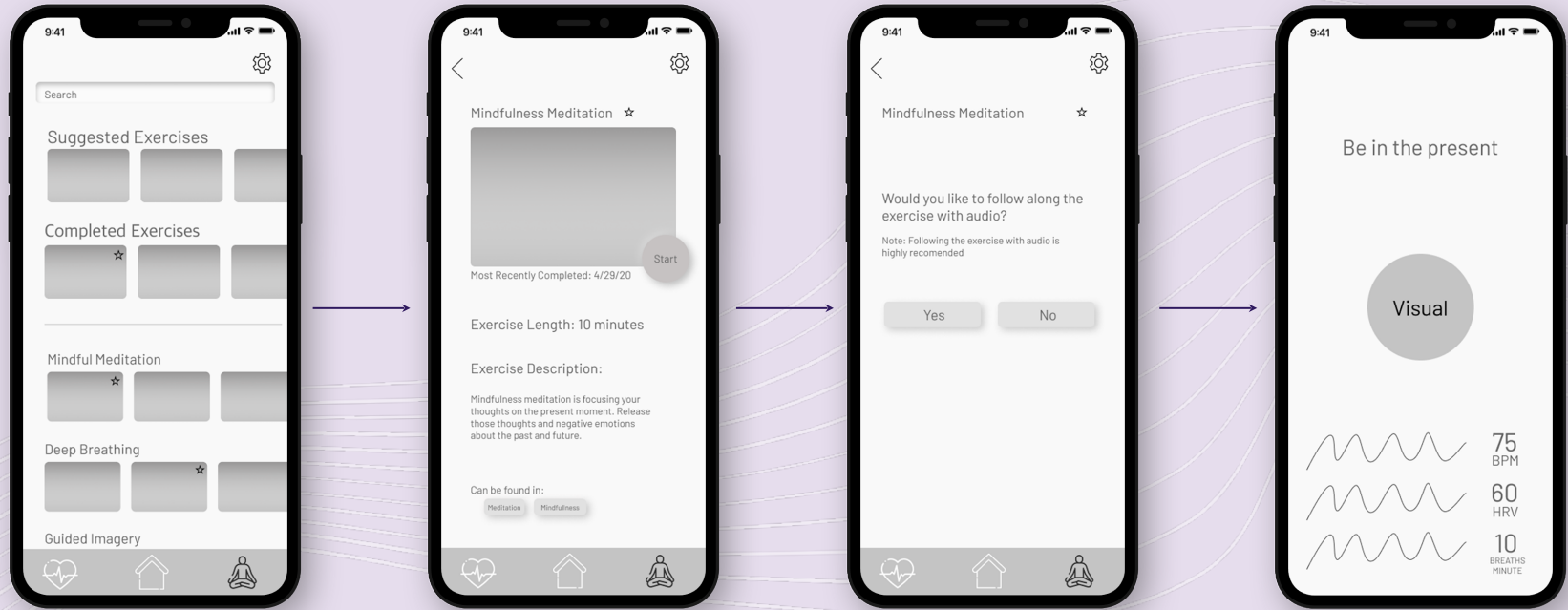




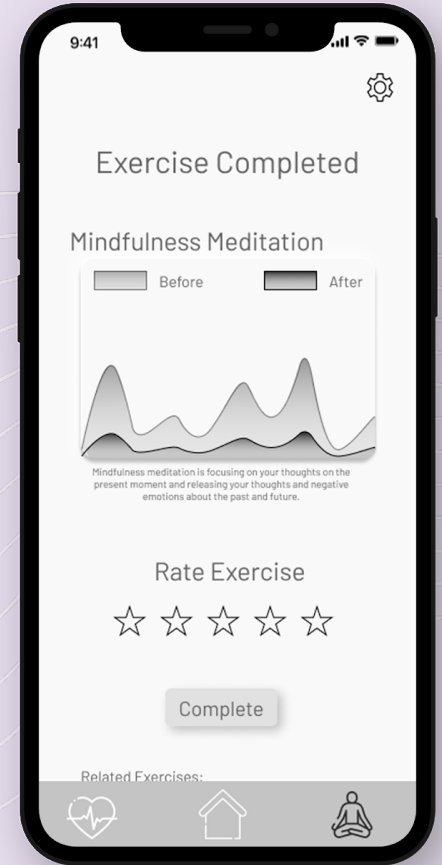
GETTING STARTED



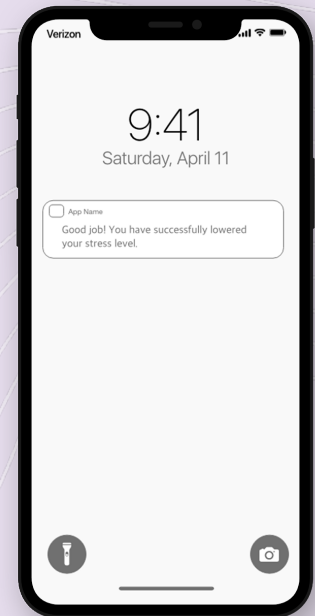
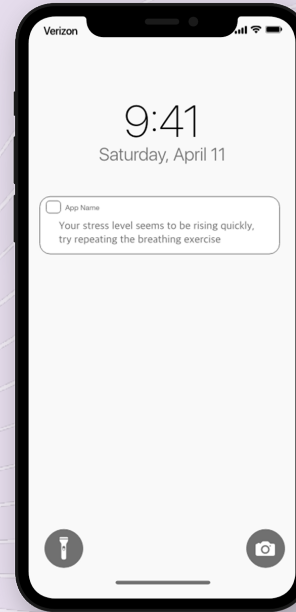
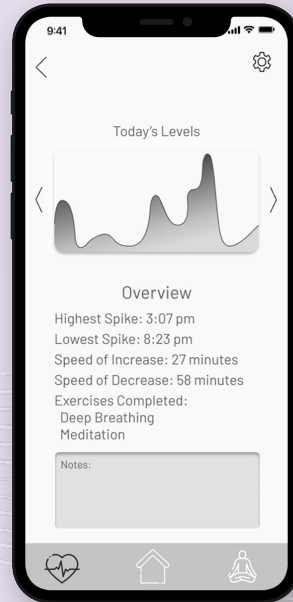
CHOOSING AN EXERCISE



COMPLETING AN EXERCISE



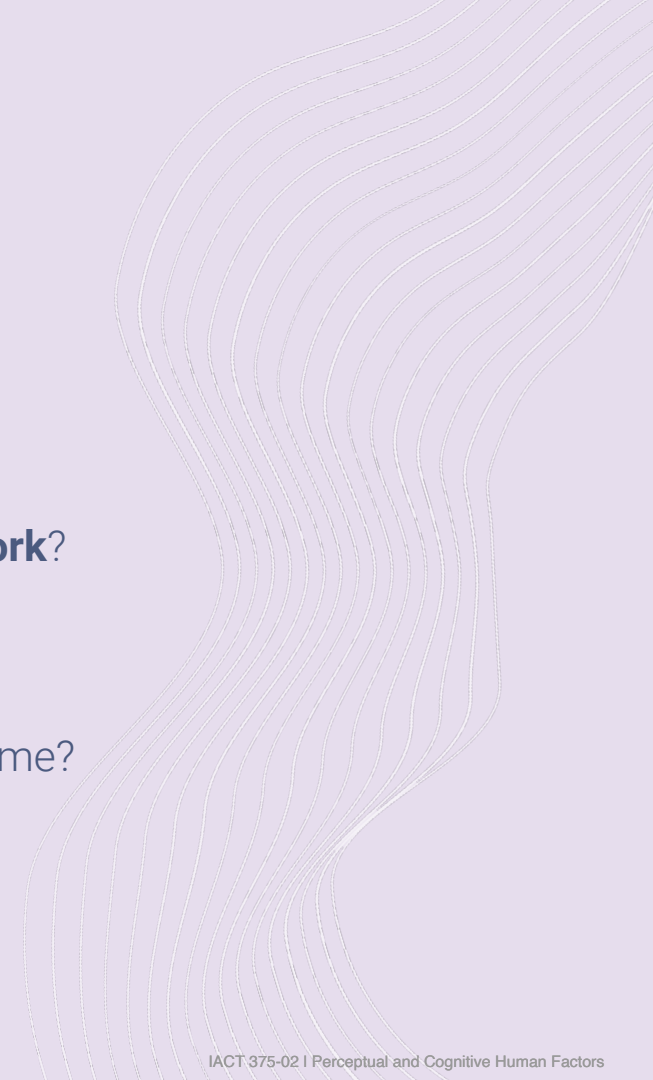
CHECKING YOUR LEVELS



USER TESTING ROUND 1

USER TESTING GOALS (PHYSICAL PRODUCT)

- Is the **size** suitable for portability for them?
- Is it something they think would be **possible to use at work**?
- Is the form **discreet** enough?
- Is it something they can picture for **sustained use** over time?



USER TESTING GOALS (APP)

- Are the **icons** easy to understand?
- Do exercises need to be **visual**, **verbal**, or a **combination** of both?
- Are the exercise **instructions** clear enough?
- Are the **visuals** within the exercises appropriate, understandable, and non-distracting?
- Are the **vitals** easily navigable and helpful?
- Are there any **additional needed features** that were overlooked?

CARD SORTING

- Participants tended to sort cards into **three categories**
- Participants tended to separate **meditation**, **imagery**, and **breathing** from other exercises

**Open
Sorting**

**5
participants**

USER TESTING STATUS

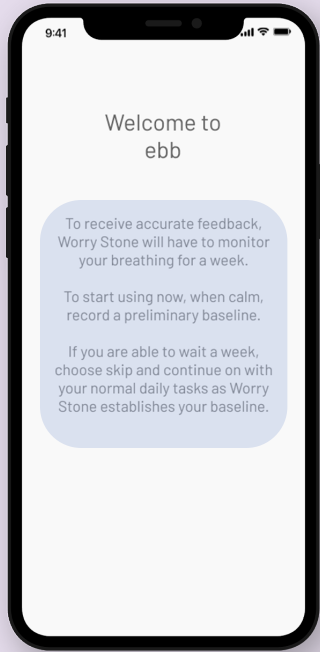
Quasi-empirical and task based
5 user tests | 1 expert test

USER TESTING FINDINGS

PHYSICAL PRODUCT

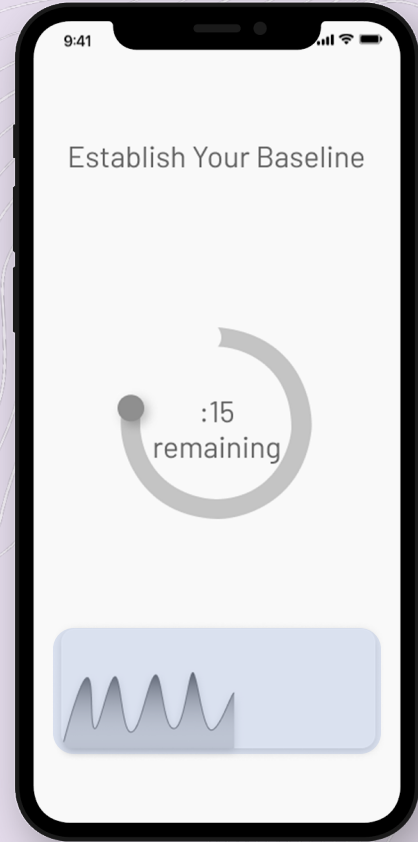
- The shape was generally found to be **aesthetically pleasing**
- Users found the size **portable**
- Concerns were raised about **pairing** and **multiple being used in the same household**

USER TESTING FINDINGS APP



**Informationally
overwhelming**

**Setting up a
baseline difficult
to understand**

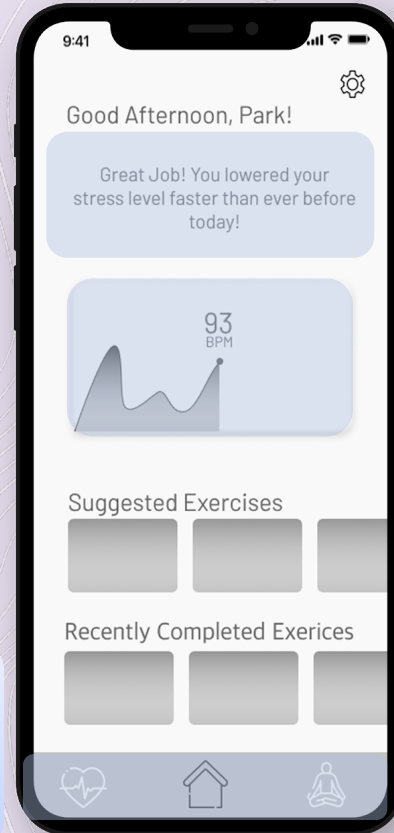


USER TESTING FINDINGS APP

- Tutorials needed

**Main graph is
nice to have but
is currently
superfluous**

**Iconography
needs to be re
evaluated**

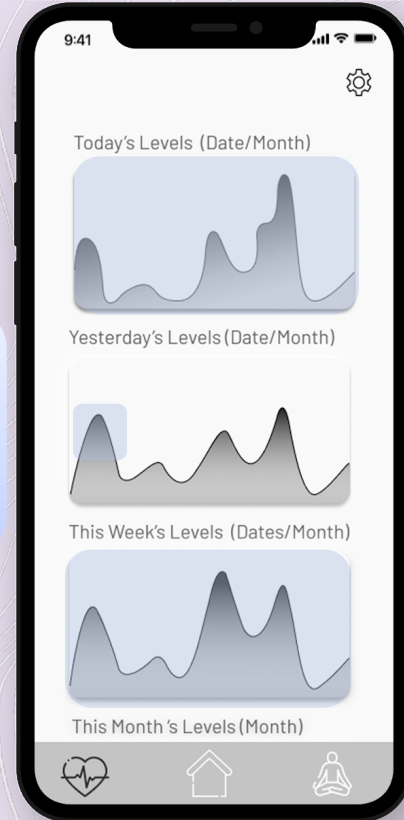


**Motivational
message is nice,
but there needs
to be more**

USER TESTING FINDINGS APP

- Information and data visualizations need to be restructured
- There is no way to tell between periods of rest, physical activity, and biofeedback training.
- There is no way to check vitals at any given time throughout the day

Need way to check spikes throughout day

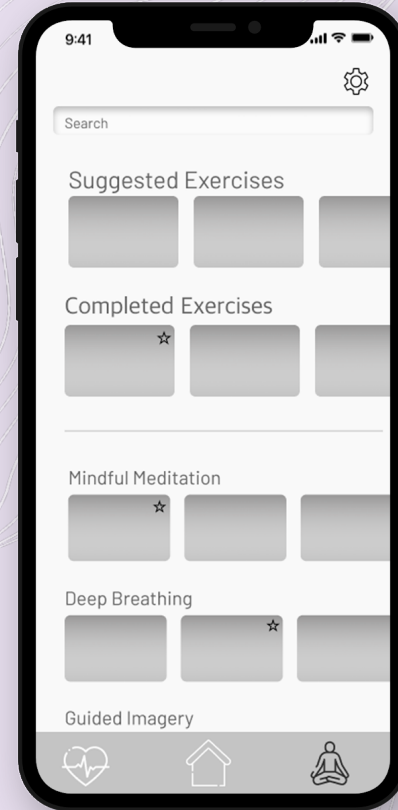


Need clearer metrics

Charts need more of an indicator that they are clickable

USER TESTING FINDINGS APP

- Needs way to exit exercises
- Needs a more clear way of customizing the types of learning
- Lack of motivation
- Needs a restructuring of visuals to best depict complex data in real time
- Needs clearer recommendation system



USER TESTING CORE INSIGHTS

INFORMATIONAL

- Users **need clear and comprehensive labels** for vitals data, because oftentimes they are not familiar with the subject matter.
- Users don't currently understand the need for establishing a **baseline**.
- Users have varying preferences and learning types, and often **need unique combinations of learning methods**.

USER TESTING CORE INSIGHTS

INFORMATIONAL

- Users **need clear and comprehensive labels** for vitals data, because oftentimes they are not familiar with the subject matter.
- Users don't currently understand the need for establishing a **baseline**.
- Users have varying preferences and learning types, and often **need unique combinations of learning methods**.

Planned Changes

- **Metrics labelled** and clearly explained
- Baseline screens informationally reworked
 - Explained more clearly
 - Split up into bite size pieces
- **Addition of auditory AND/OR visual** exercises based on user preferences

USER TESTING CORE INSIGHTS

GENERATIONAL

- Users have **pronounced generational differences in mental model**, leading to differing usability needs.

Planned Changes

- Factor in that **clickability IS NOT ALWAYS** assumed by older generations

USER TESTING CORE INSIGHTS

MOTIVATIONAL

- Users don't see a **reason for continuous use** of stress-reducing products.
- Users feel the **need for frequent motivation** to stay on track with stress reduction goals.

Planned Changes

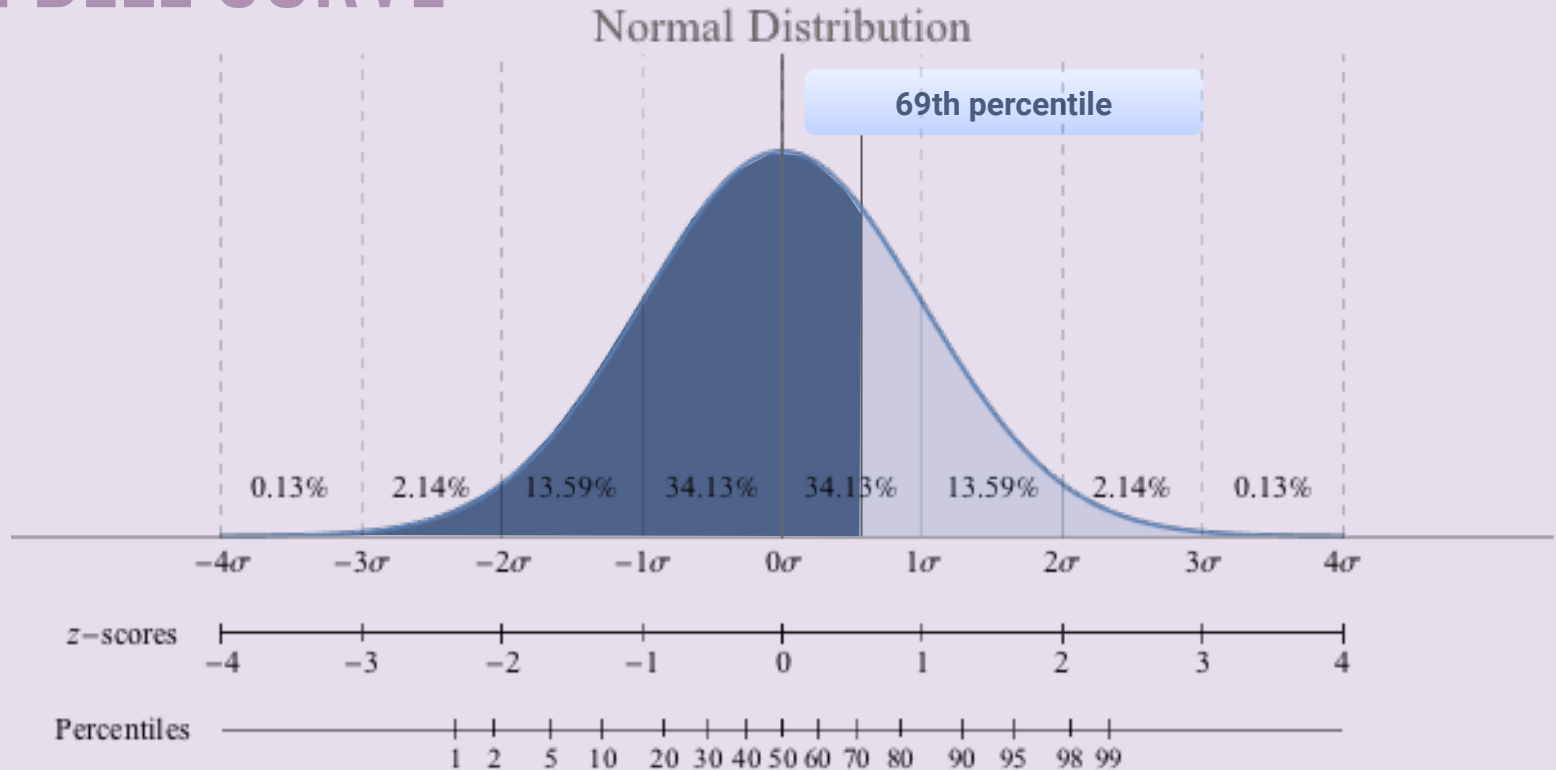
- Drive continued usage
 - Notifications
 - Possible expansion of functionality
- Motivate users
 - Implement goals, either user or app set
 - Add in more motivational messages and graphics
 - Reward users with visuals

Summary of our SUS Test

- Questionnaire has **10 statements**
- Responses are based on **5 point Likert scale**
 - 1 - Strongly disagree
 - 5 - Strongly agree
- Number of responses **(n) = 6**
- Average of score of 6 responses: **73.5**
- Scored in the **69th percentile**

Question	Average Score	Variance
1	3	0.8
2	2.5	1.85
3	2.67	0.662
4	2.83	2.22
5	3.17	0.56
6	3.34	1.64
7	3	0.4
8	3	1.6
9	3.34	0.27
10	2.67	2.66

THE BELL CURVE



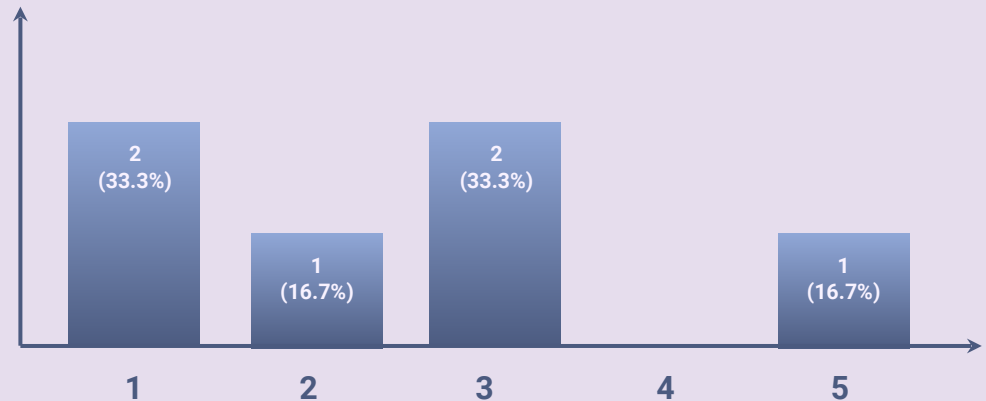
HIGH VARIABILITY SCORES

- Users have different level of ability to understand how the app functions.
- Simplification and clear, concise explanations need to be made a priority

Average:
2.5

Variance:
4

2. I found the system unnecessarily complex.



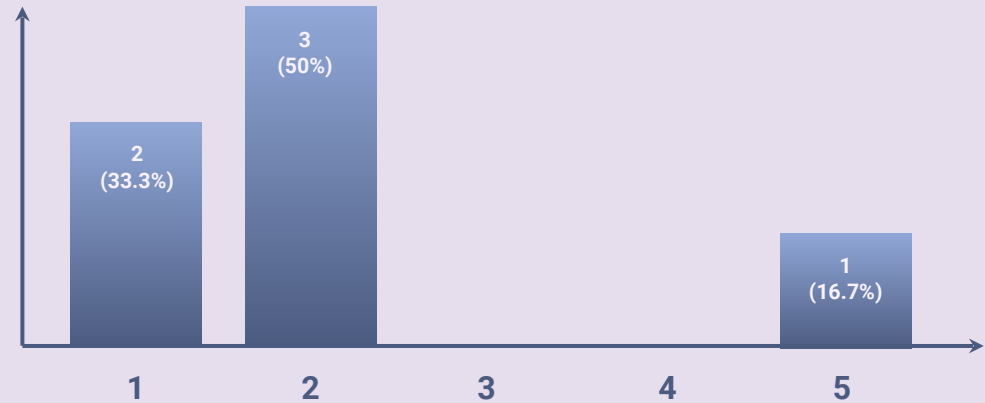
HIGH VARIABILITY SCORES

- Users have different mental model of how to navigate through the app.
- Usability for those in the upper half of target audience needs to be re-evaluated

Average:
2.83

Variance:
4

4. I think that I would need the support of a technical person to use this product.



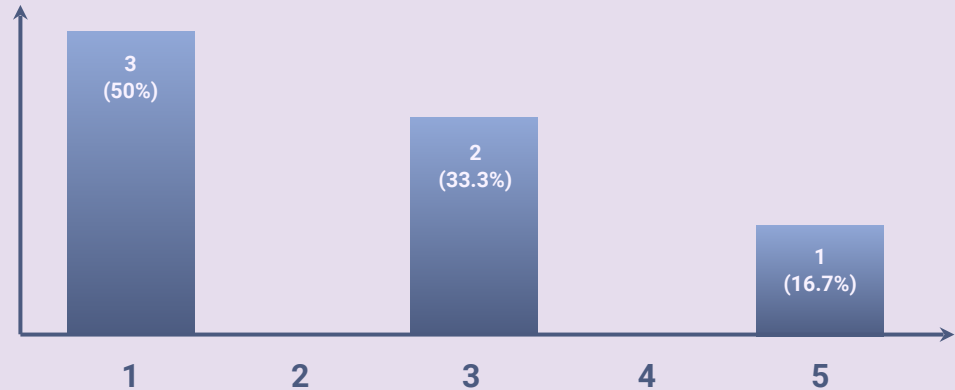
HIGH VARIABILITY SCORES

- Information needs to be readily available for those who need it.
- However, informational content needs to not be overwhelming to the user.

Average:
2.67

Variance:
2.66

**10. I needed to learn a lot of new things before
I could get going with this system.**



FURTHER REFINEMENT

REFINED CONCEPT



- The device transmits wifi signals which can **bounce off the user.**



- These signals can **detect changes in vitals**, such as heart rate and breathing.



- If the device is strong enough, it can detect the **differences between multiple people.**



- Users can be up to **26 feet away** from the device and still receive feedback.



- The signals can even go **through walls.**

REFINED PHYSICAL PROTOTYPE



HI FI



USER TESTING ROUND 2

User Testing

(Round Two)

- Quasi-empirical
- Task based
- Target audience

4

Users

Goals

App:

- Re-evaluate data, visuals, and instructions
- Measure improvement
- Evaluate interactions

USER TESTING RESULTS

(ROUND TWO)

App

- Colors and graphics are pleasing
- Tutorial beneficial
- Even more explanation needed...

SUS ROUND 1 VS 2

- **Round 1**

- Average score of 6 responses: **73.5**
- Scored in the **69th percentile**

- **Round 2**

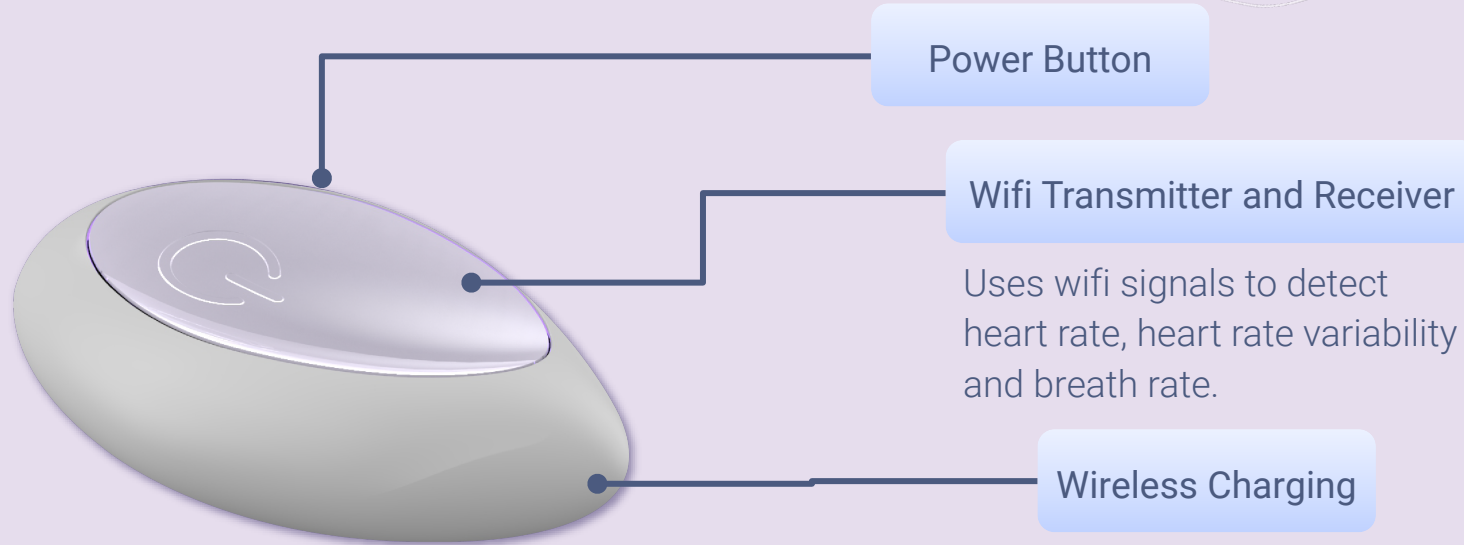
- Average score of 3 responses: **76.875**
- Scored in the **78th percentile**

FINAL CONCEPT

INTERACTION MODEL



PHYSICAL PROTOTYPE



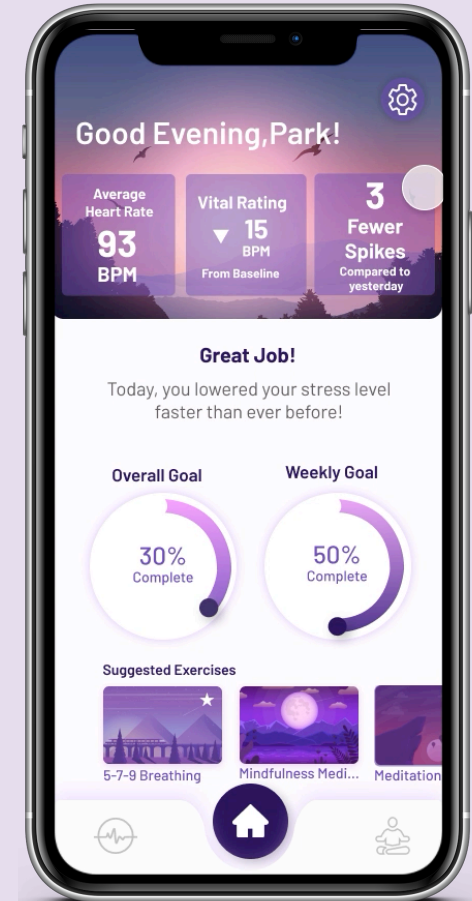
ONBOARDING

- Pairing a device
- Establishing a baseline
- Goal setting
- Tutorial



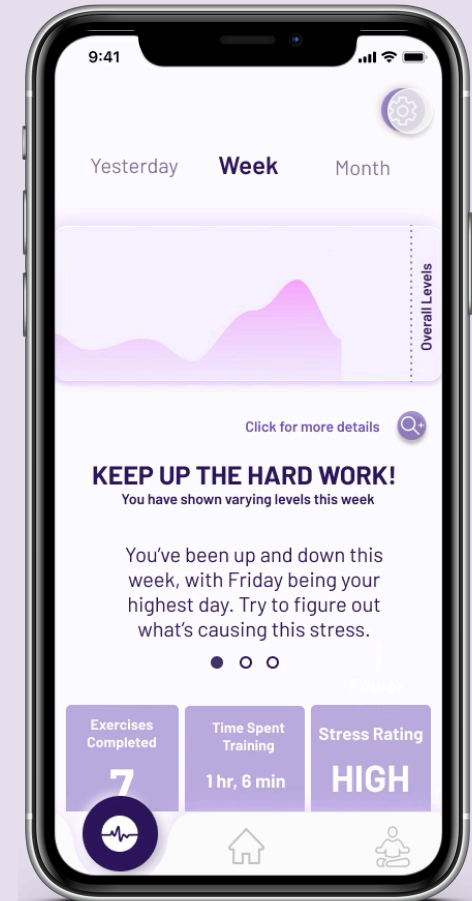
STATS

- Data about levels
 - General and specific
- Implications on stress



EXERCISES

- Library of exercises
- Audio and visual learning
- Real-time vitals feedback
- Summary, rating, and recommendation system



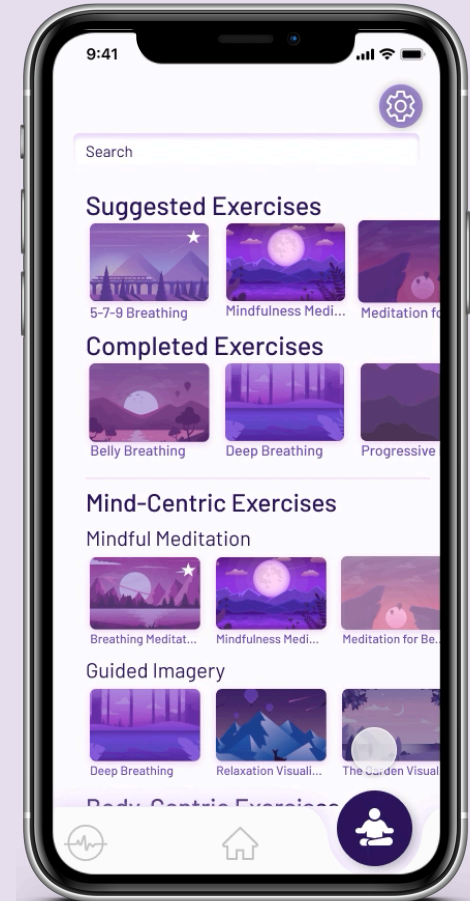
HOME & SETTINGS

Home

- General vitals information
- Motivation
- Goal progress and editing
- Quick access to key exercises

Settings

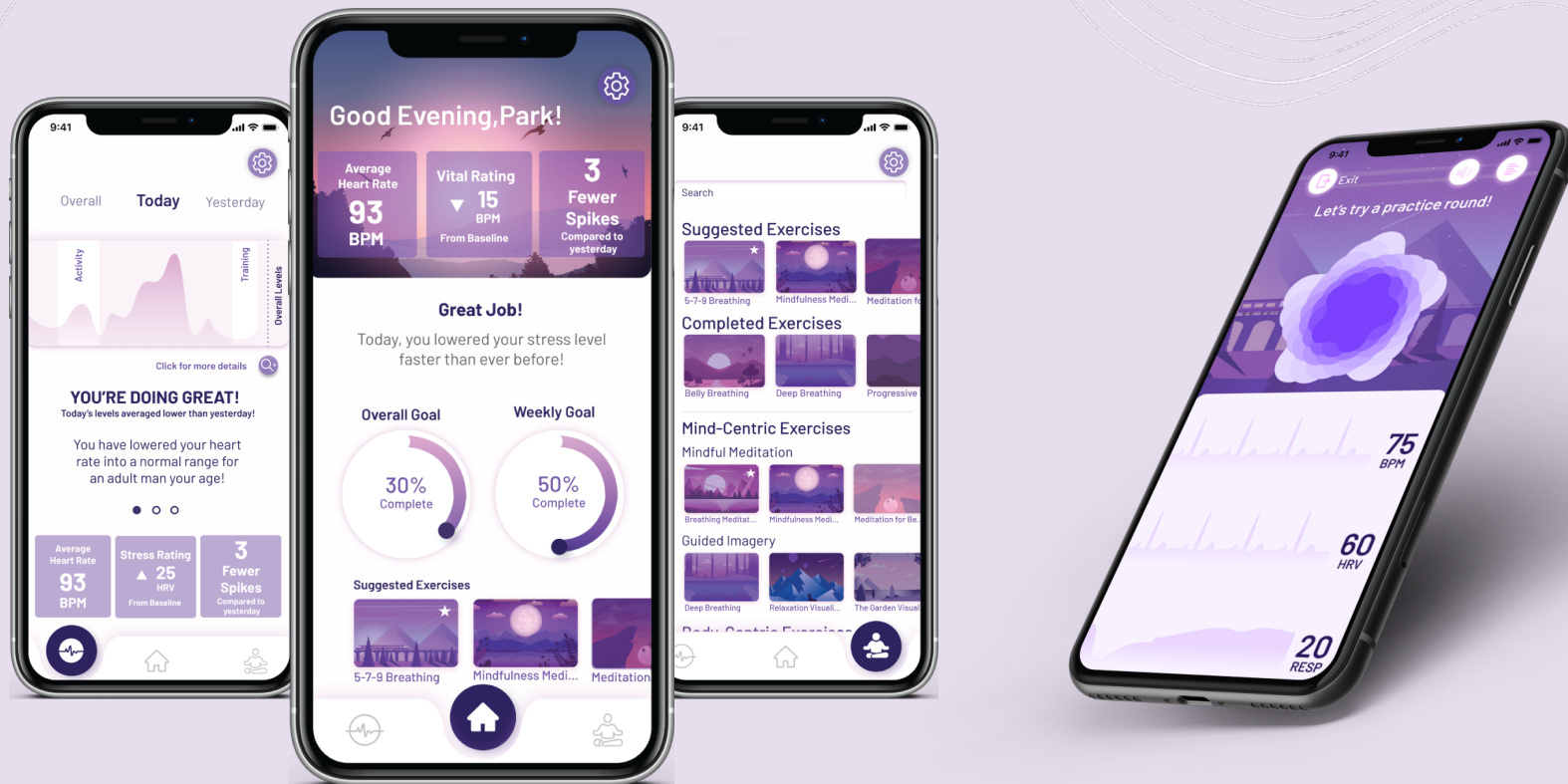
- Changing login information
- Customizable notifications
- Troubleshooting
- Log out



PHYSICAL PROTOTYPE



APP



VALUE

- By providing a **wearable-free method**, ebb allows users to monitor their vitals without changing anything about their daily work routine.
- Biofeedback allows users who can't access mental healthcare to reduce their stress in a **more physical manner**.

IMPACT

Over time and with practice, the user learns how to **self-soothe**, making them better able to **function** in a **stressful workplace**.

ebb



Problem

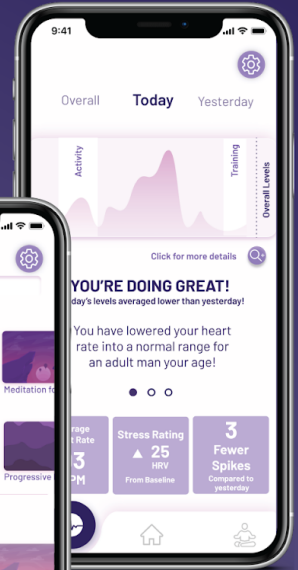
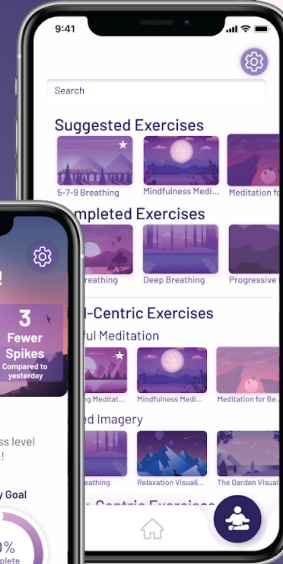
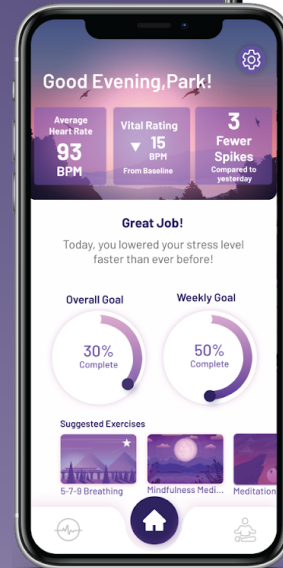
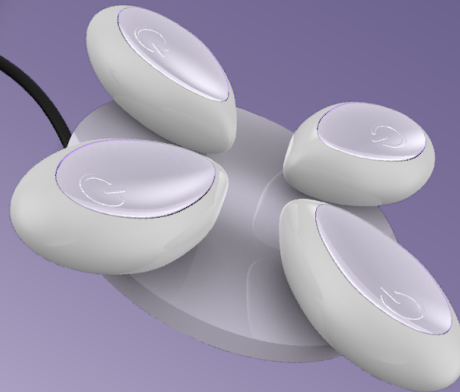
With prolonged stress increasing the chances for everything from the common cold to cardiovascular disease, stress is a major health risk.

Solution

The Worry Stone, a small, affordable smart home device. It uses disturbances in WiFi signals to measure breathing, heart rate, and heart rate variability and determine your stress level. It is paired with an app, Ebb, where you can see your stress level and do biofeedback exercises to lower your stress.

Target Audience

Approximately ages 18 to 49, with fast-paced work environments and tight deadlines, such as people-heavy or heavily collaborative jobs.



THANK YOU