Know Your Stress

Taissa Gladkova Independent Study
Advised by Professor Daniel Hannon
Spring 2021 Poster Presentation

The following slides show each section zoomed in

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By Taissa Gladkova, advised by Professor Daniel Hannon
Human Factors Engineering Independent Study, Spring 2021

Tufts UNIVERSITY | School of Engineering
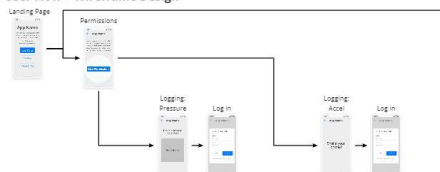
Hannon Psychology PLLC

Background

The body has a physical response to stress. We can use some of the built in sensors on a smart phone to capture information about these physical responses and record them for analysis. Through his work as a Mental Health Counselor, Dr. Hannon became interested in developing a web app he could use in his practice to help patients with anxiety and OCD track their stress throughout the day. This tool has the potential to provide a simple way of using the body's cues to record data, without causing too much interference into the users daily schedule. By incorporating the phone's GPS, the web app can integrate location into the logging to help the user find geospatial patterns about how their stress varies with time and location, ultimaltey helping them manage their mental health.
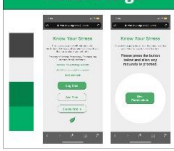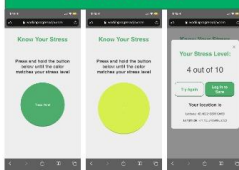
Goals

1. Develop my skills in HTML / CSS / Javascript
2. Develop my skills in User Experience and User Interface Design and supporting tools
3. Design and build a web app that allows the user to
   a. Use their phone's built in sensors to record geospatial data about their stress.
   b. See and analyze their previously recorded stress entries.

HTML CSS JS
Figma
Visual Studio Code

User Flow + Wireframe Design

Landing Page

Permissions

Logging: Pressure

Log in

Logging: Accel

Log in

Seeing Data
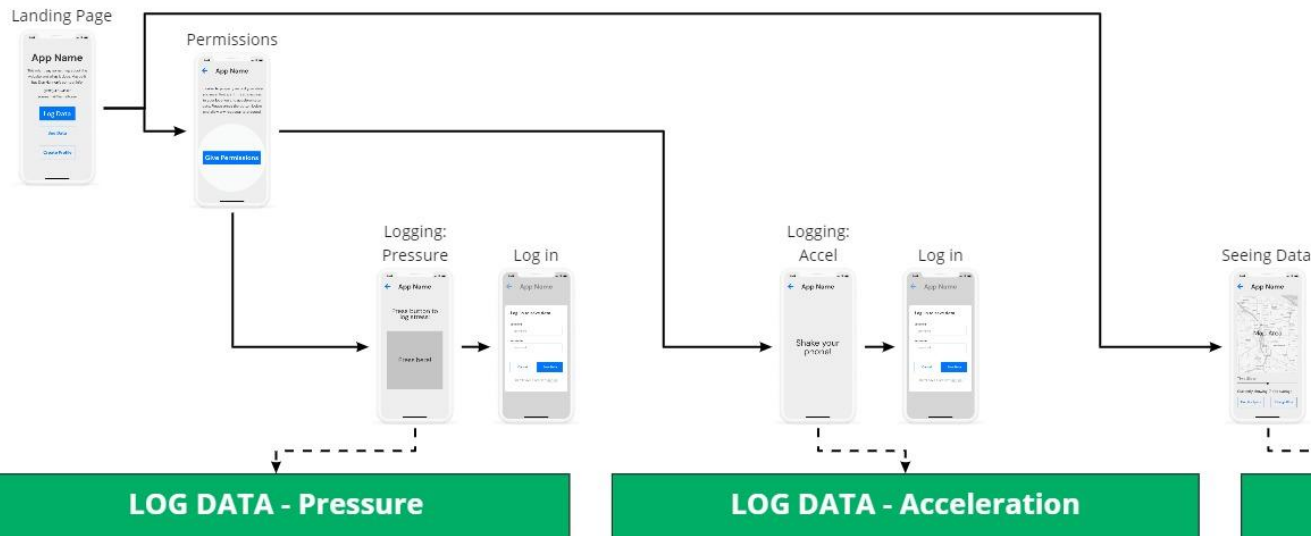
Visual Design

LOG DATA - Pressure

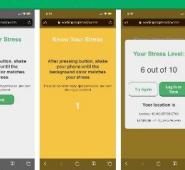**LOG DATA - Acceleration**

SEE DATA
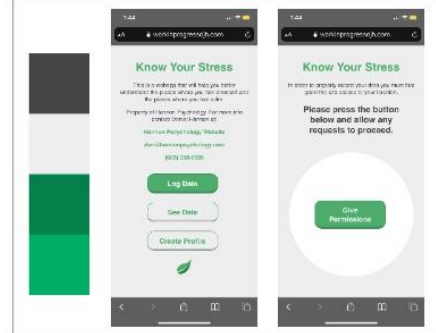
LOG DATA - Pressure

Description
Used Pressure.js JavaScript library for handling touch and pressure sensing (pressurejs.com). As user holds the button, their recorded stress level changes based on how hard they are pressing.

Challenges
The pressure library was only compatible with iPhone 6 and 7 hardware. For other models switched to a back-up time-based sensor: stress increased the longer the user pressed the button. Started to explore other physical cues and methods of logging.

Video
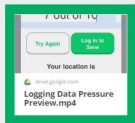
Usability Testing - 6 participants

Presure Based
- As user lifts finger to enter their stress, the pressure must decrease - potentially fixed by having second button for other finger to "lock-in".
- Hard to be reliable; pressure is very sensitive

Time Based
- Too fast
- Didn't know what was going to happen beforehand
- Understood after one try
- Fun, but reliable only within 2 stress levels (out of 10).

LOG DATA - Acceleration

Description
Used phone's built in accelerometer to get the acceleration of the user's phone. The maximum acceleration found over the session determines the background color. After 5 seconds the stress is reported.

Challenges
Maximum acceleration across a time-period was chosen as the method for recording, but it was difficult to decide what would be best.

Video

Acceleration
- This is really fun! Seems like a game.
- Many participants thought the timer was counting down until you start shaking rather than time left in shaking.
- One user did not understand it was a timer
- Many said they did not like the countdown until done - want countdown to start and then an I'm done button to appear so they can decide when done.
- Most participants preferred this to the other logging method - "more honest", "more fun".

SEE DATA

Click Here for Interactive Prototype
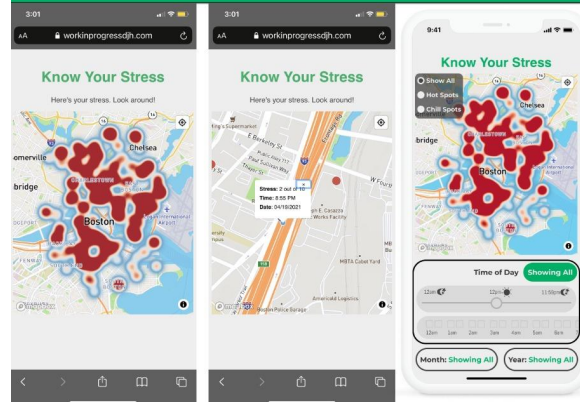
Description
Used MapBox Javascript library to embed an interactive map on the See Data page. Random points were generated to provide some data for the map. Two data layers were used: a heatmap that would fade away as the user zoomed in, transitioning to points that the user can click for a tooltip. Additionally, other UI aspects for map interaction were developed in an interactive Figma prototype to do user testing before implementation.
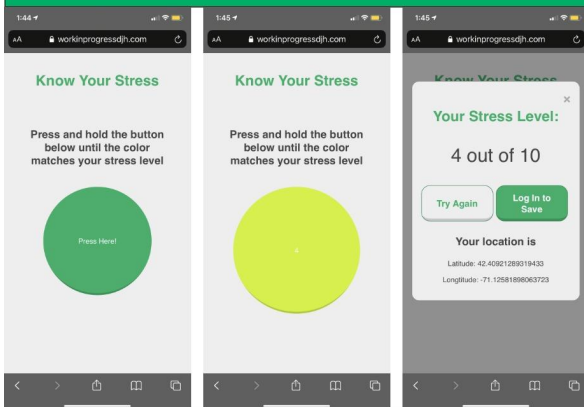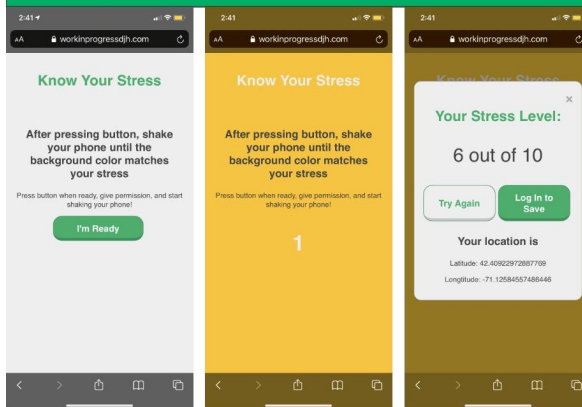
Challenges
Implementing the heatmap was challenging: I tried to change the parameters so the map reflected the data, but there was already doubts about my chosen visualization technique. This is discussed more in the *Future Directions* section.

Visualization
- Users saw all red and thought: "stress everywhere!"
- Users were confused that the color gradient on heat map ranged from blue to red whereas on the logging it ranged from green to red. This needs to be consistent.
- Liked the dots that appeared when zooming in
- Time filters generally nice, but box and slider could be integrated better.
- Want more analytics! Like Google Analytics, so not guess and check.
- Found that current heatmap model does not reflect user's mental model. See more below.

General Results and Future Directions

Logging Data - Things to Think About:

- **Color vs Number:** There was mixed results regarding the preference of the stress being reported as a number vs a color. The number reporting made the user feel pressured to match the number they had in their head as the result. Some users expressed they would like the number to be reported simply as a color, but if there is a number reported, they want to see what the number is as they are pressing or shaking. Need more tests with full color based system. There were similar mixed results with wanteing to see the full color scale on screen before starting recording
- **Mind vs Body:** Related to the previous bullet, users expressed doubt about how well the physical system reflects their actual stress level. Ideally, I would like to do psychological study on the correlation with pressure and shaking to stress level in addition to user tests on reliability in expressing this properly in the app. Users wanted to log what their mind is telling them rather than how their body is reacting. However, they did find value in tracking it this way rather than just entering the number or color on a slider.
- **More features:** many users expressed interest in subjective, free-form comment area.

Redesign of See Data:

Demonstrated Need:

As found during user testing, the heat map visualization is not the best for this application. With the heat map high stress levels (ex. > 7) get added on top of low levels of stress (ex. < 3). This virtually eclipses the low stress data points, making the map appear fully high stress.

Possible Directions:

- Changing heat map bell curve operation from addition to averaging. This does not show modality however
- No consolidated view, just toggle between low and high stress
- Whole new visual system: 3D stacked bar chart? Pie chart? Speckled heat map?

Chosen Next Iteration:

Circles that change in size based on # points aggregated. Gradient from highest stress in center to low on the edges. Speed of gradation reflects variance. Requires reconsideration of time filters and more user testing.

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