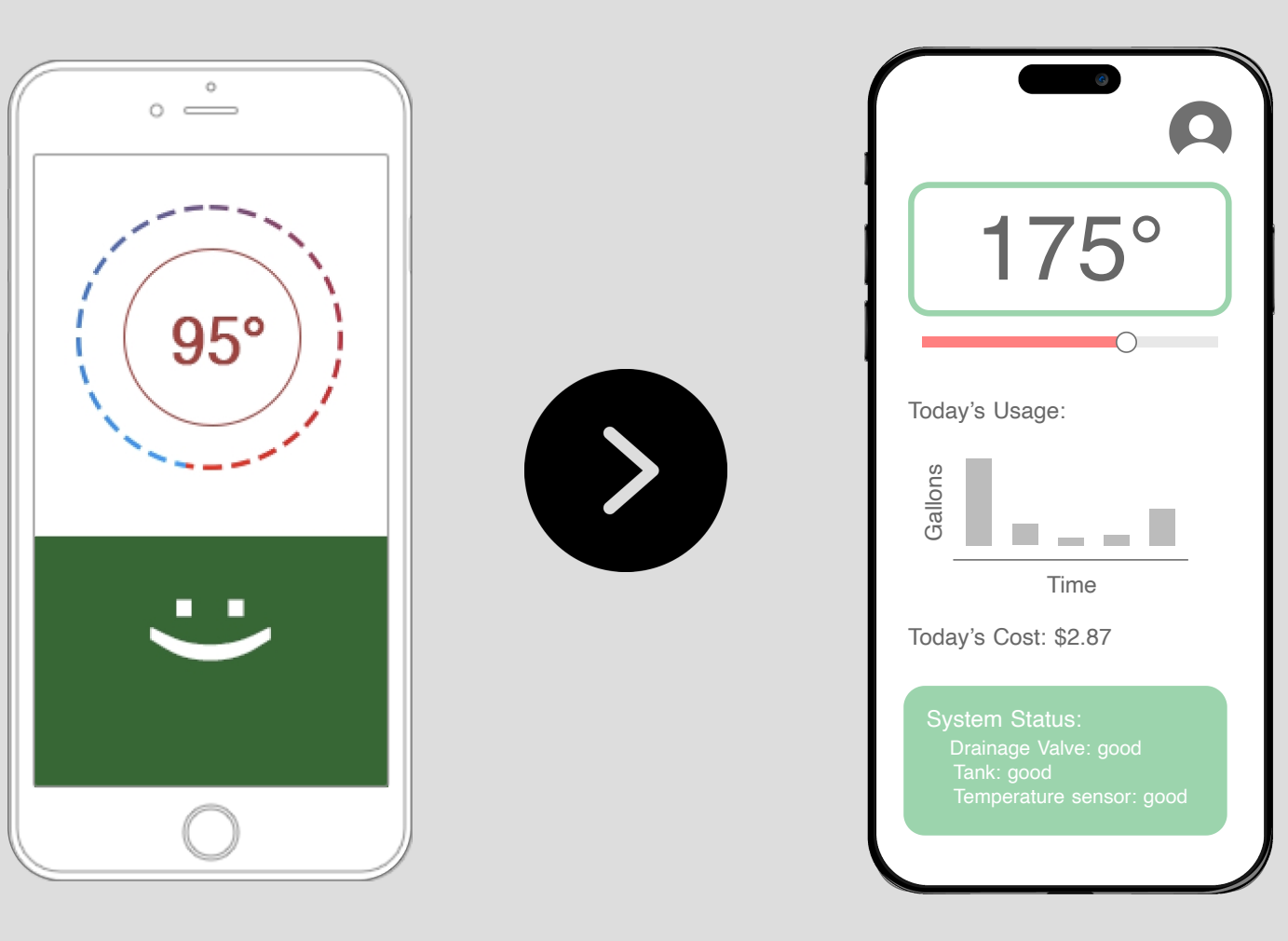
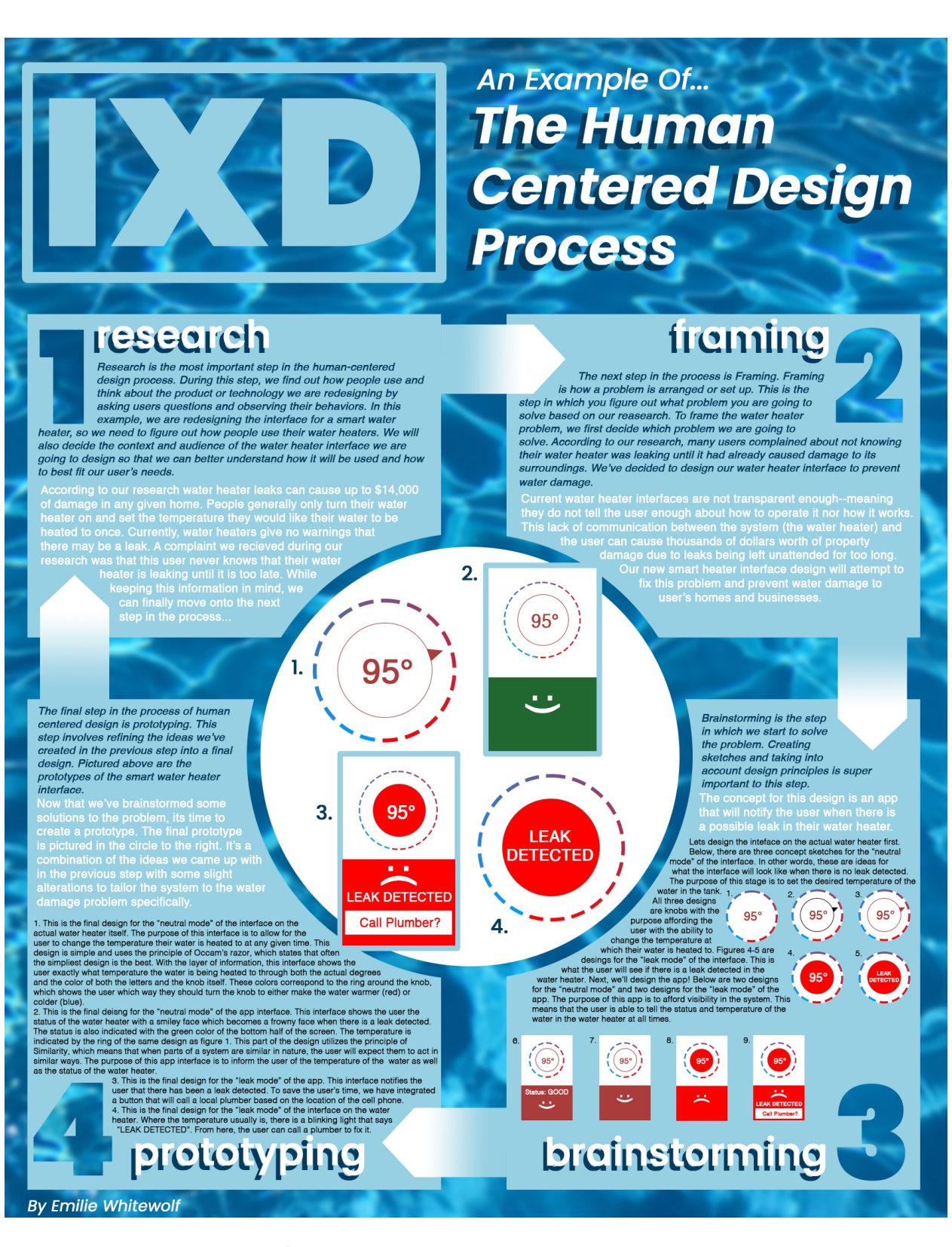
Water Heater Redux

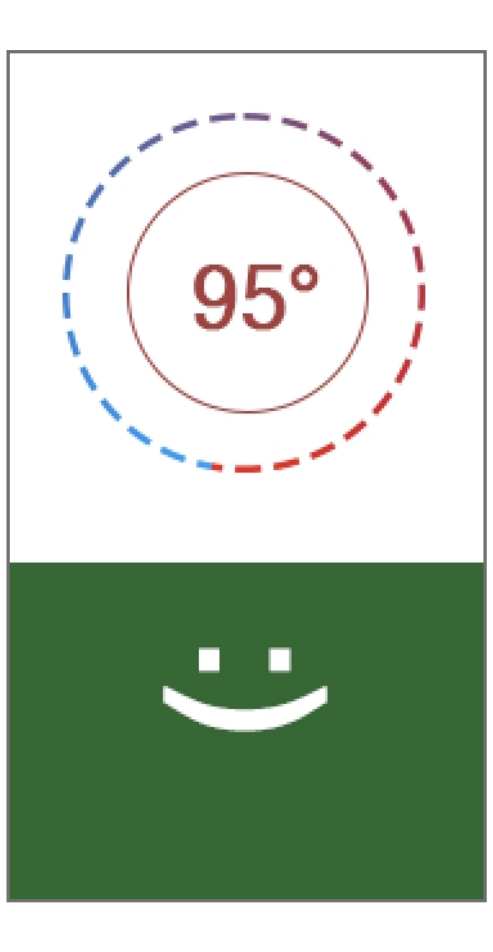


Taking a Look at the Old Design...

For this assignment, I reworked my smart water heater design from the fall of 2021. This time around, I focused on the app and ensuring it was usable, helpful, and cost saving to the user. Before we dive into the new design, let's take a look at the old one first.



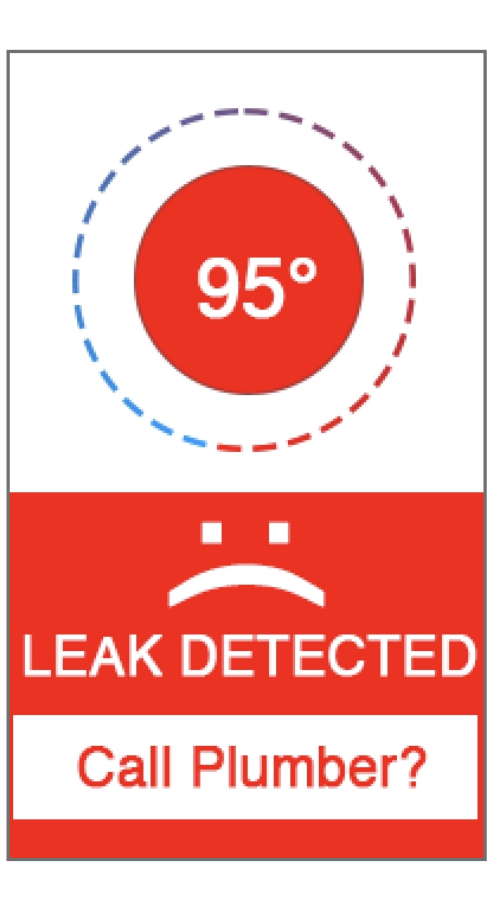
Original Poster



Original Passive State

Pros
- simplistic design
- green means good!
- recognition over recall :)

Cons
- not visible
- how do you change temp?
- very little functionality
- how is it cost effective?



Original Danger State

Pros
- simplistic design
- error made visible
- offers help to fix error

Cons
- very little functionality
- cannot turn off water heater
- give no information about leak
- how else can the app notify the user?

Analyzing with Heuristics...

In addition to a surface level analysis, I have also completed an in-depth analysis of the design using Nielsen and Molich's 10 Heuristics. Below is a comprehensive summary of my findings, a classmate's findings, and a few recommendations for my new design:

Visibility of System Status:

The system effectively communicates temperature settings through intuitive icons on both the interface and the app. Enhance feedback icons to provide more nuanced information about the system's status.

Match Between System and the Real World:

The system utilizes simple language and universally understood symbols, such as the smiley face for safe and the frown face for danger. Ensure clarity in distinguishing between green and red symbols to prevent confusion.

User Control and Freedom:

Users can adjust the temperature in the system, but consider enabling users to turn the heater on and off through the app. Provide additional options in the app for actions such as water shutoff and offering alternatives to calling a plumber.

Consistency and Standards:

The design adheres well to established conventions and maintains consistency in terminology and layout.

Error Prevention:

The system effectively anticipates and prevents errors, particularly in notifying users about leaks and suggesting the immediate calling of a plumber. Consider notifying users about high-risk temperature settings and provide alternative solutions for identified leaks.

Recognition Rather than Recall:

The system minimizes the user's cognitive load by displaying temperature settings on both the interface and the app. Ensure users are promptly notified of status changes, especially in the case of leaks, reducing the need for recall.

Flexibility and Efficiency of Use:

The system is straightforward, but there may be opportunities to explore the inclusion of advanced features for experienced users without compromising simplicity for new users.

Aesthetic and Minimalist Design:

The design is clean, visually pleasing, and limited to essential features.

Help Users Recognize, Diagnose, and Recover from Errors:

The system provides basic error messages, offering clear guidance on solutions, but there's room for improvement in specificity. Expand error recovery options, especially for temperature-related mistakes.

Help and Documentation:

The system is generally user-friendly without the need for documentation, as its current functionality is quite limited. Consider expanding documentation for additional functionalities and features not immediately apparent.

In conclusion, the smart water heater design aligns well with the listed heuristics. However, there are many opportunities for improvement in user feedback, error recovery options, and especially expanded app functionality. I plan to implement these enhancements to create a more user-friendly and robust system.

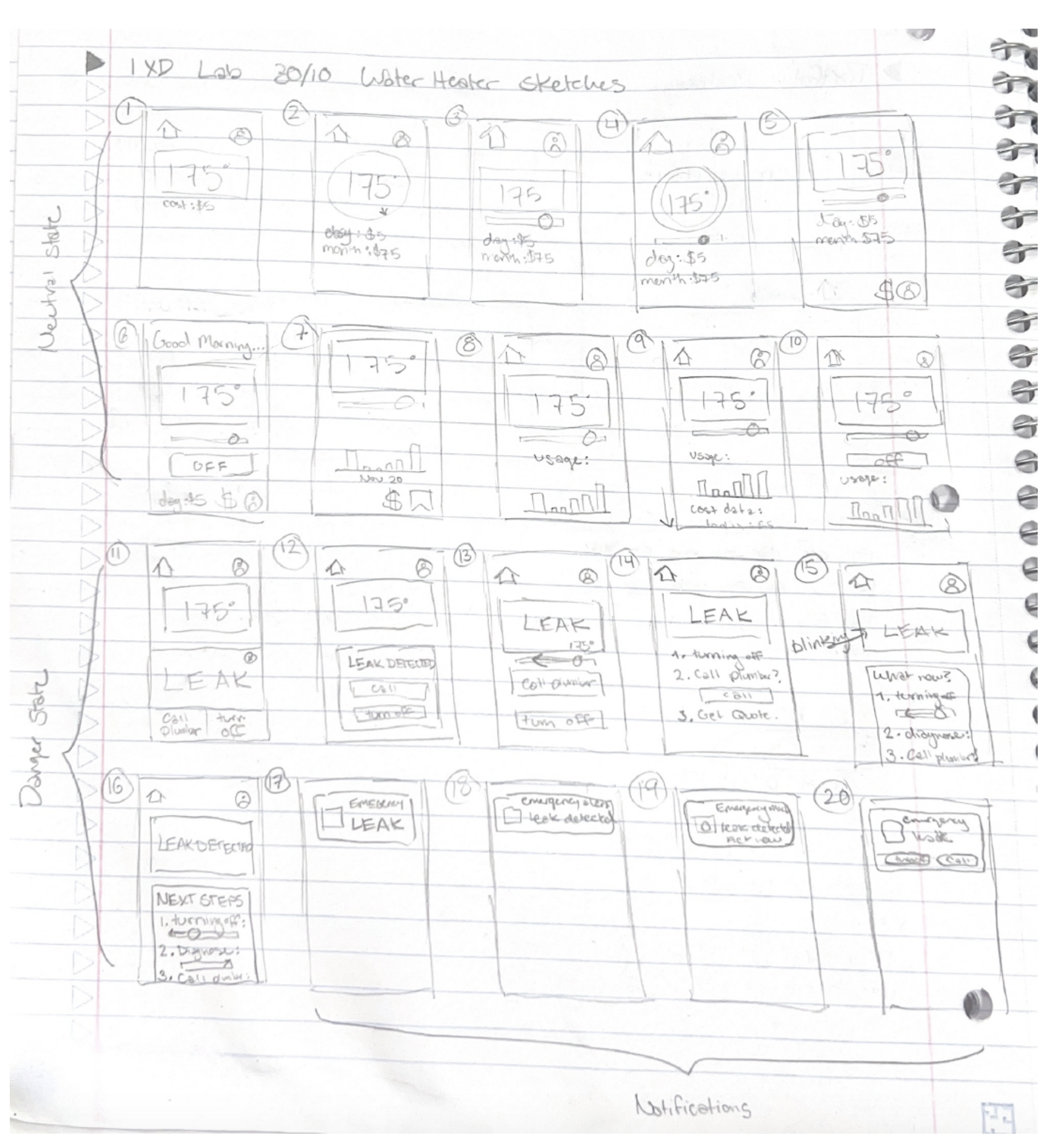
Brainstorming...

Based on the surface level analysis and the heuristics analysis, I started to sketch some more refined ideas.

Passive State Sketches

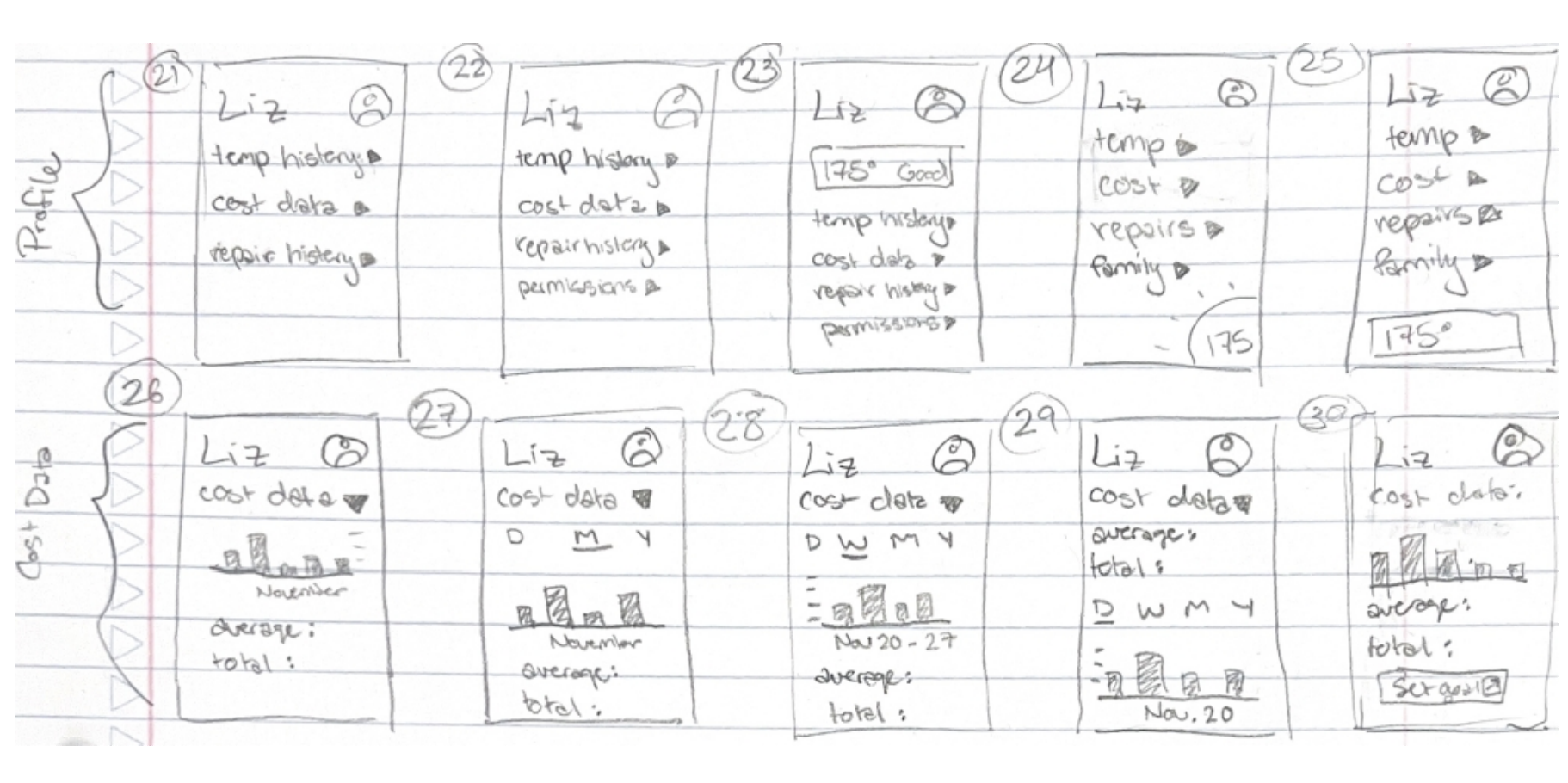
Danger State Sketches

Notification Sketches

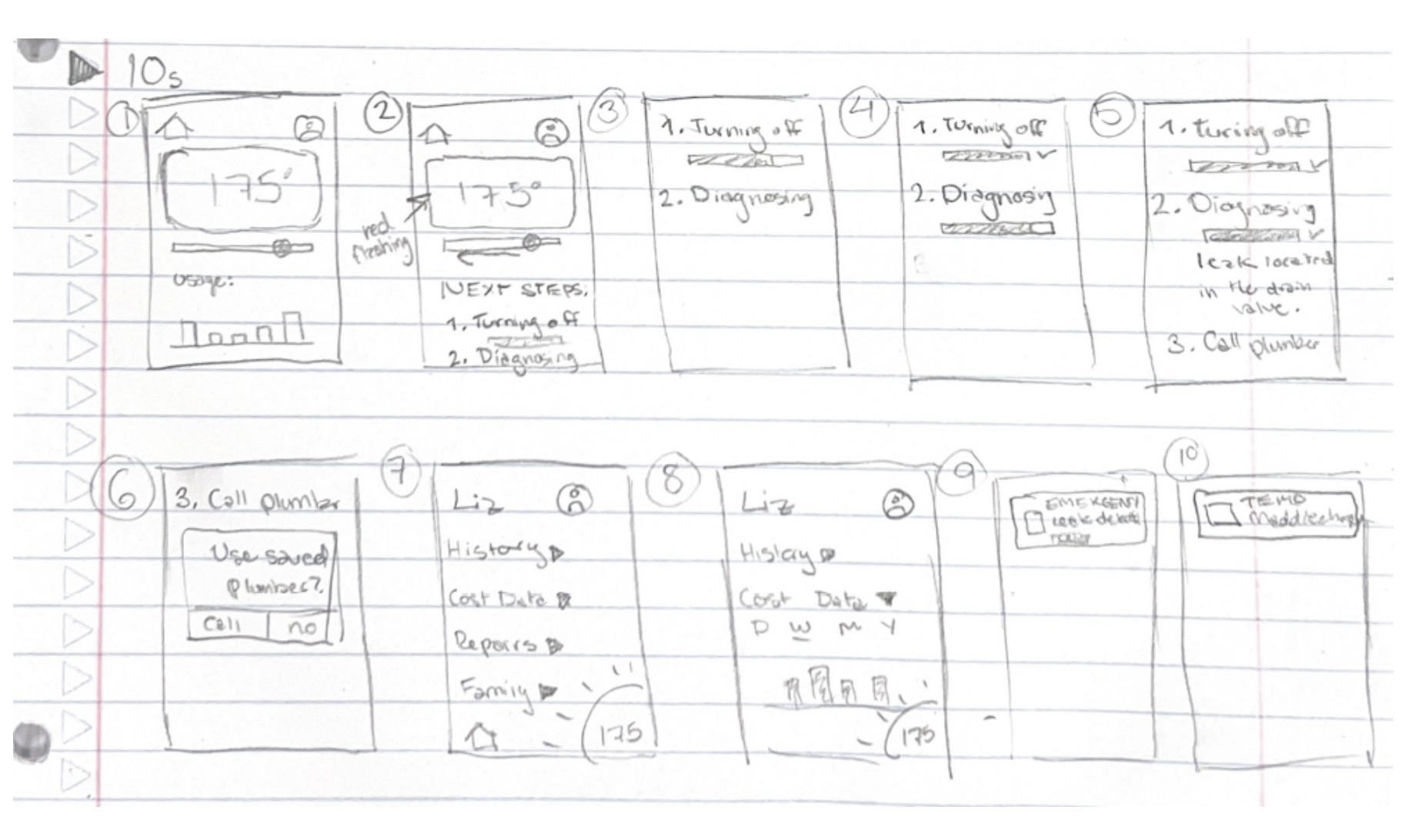


Profile Sketches

Cost Data Display Sketches

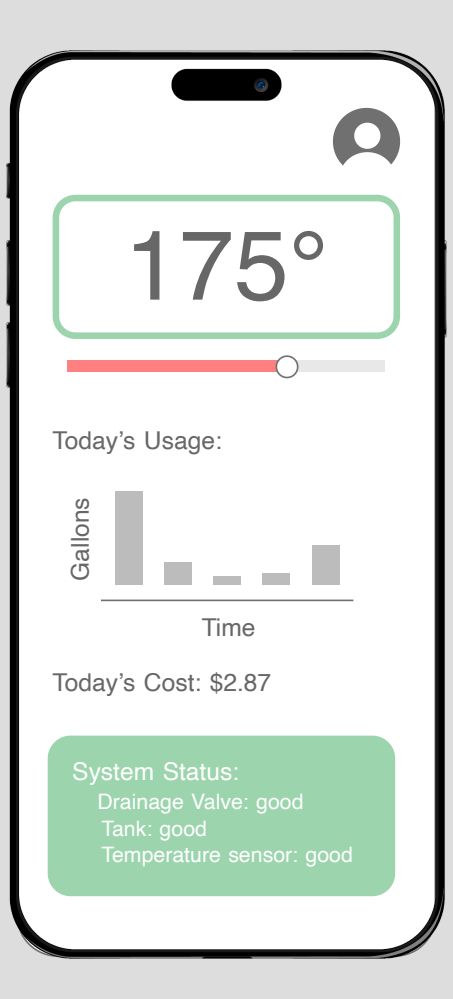


Refined App Interaction Sketches



The Final App Design...

Using my refined sketches and my old poster for reference, I came up with the final design. It includes more app functionality and affords more user control as well as expanded error resolution.

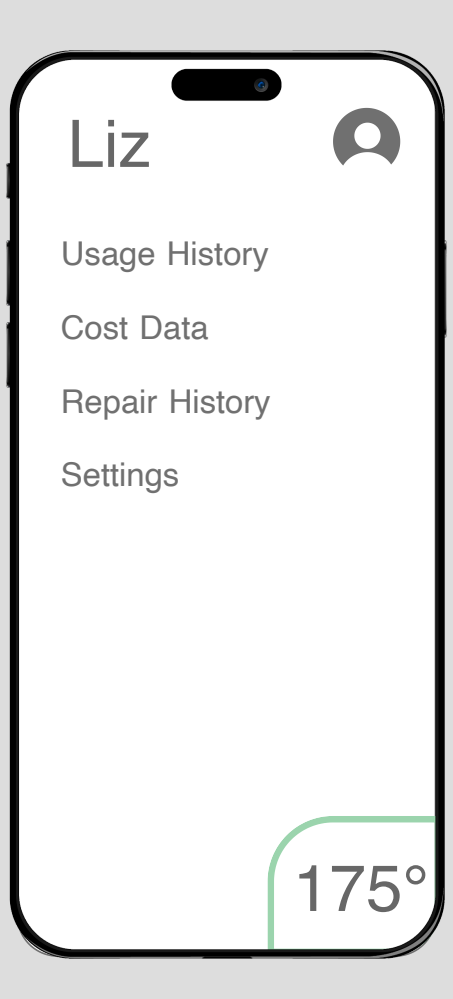

175°

Today's Usage:

Today's Cost: $2.87

System Status:
Drainage Valve: good
Tank: good
Temperature sensor: good

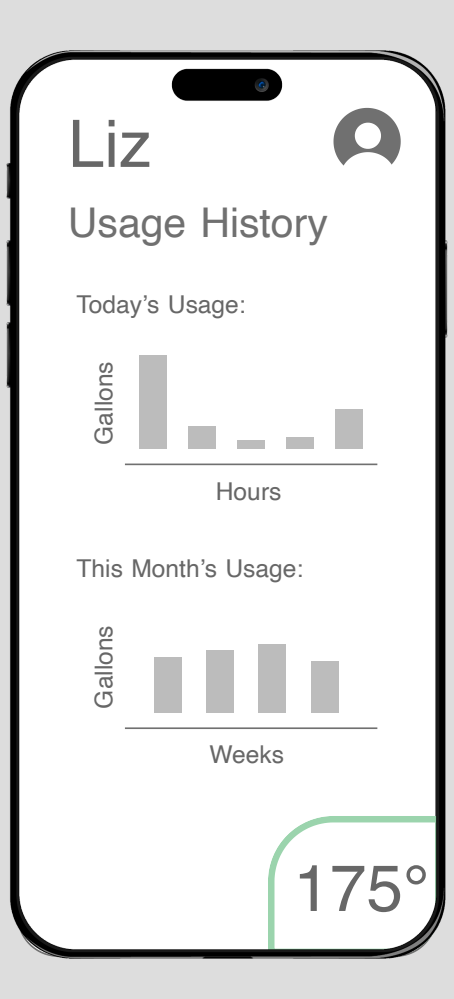
1.


Liz

Usage History
Cost Data
Repair History
Settings

175°

2.


Liz

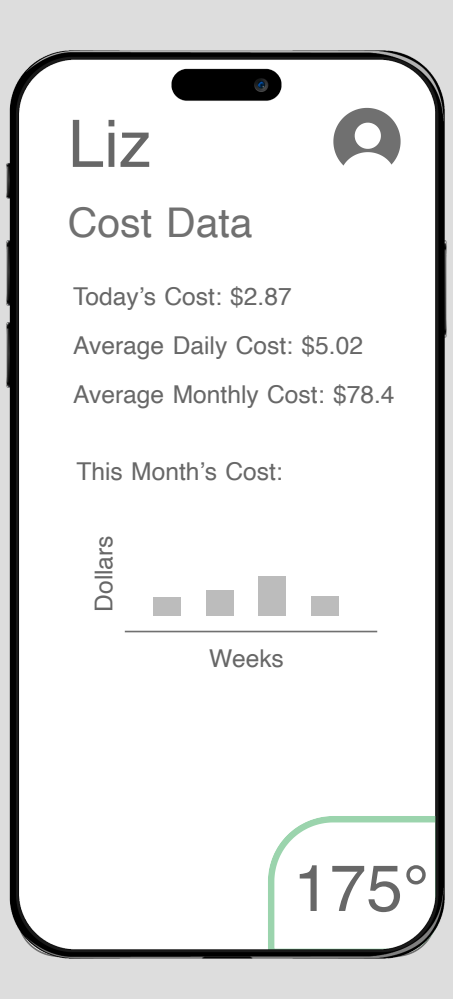
Usage History

Today's Usage:

This Month's Usage:

175°

3.


Liz

Cost Data

Today's Cost: $2.87
Average Daily Cost: $5.02
Average Monthly Cost: $78.4

This Month's Cost:

175°

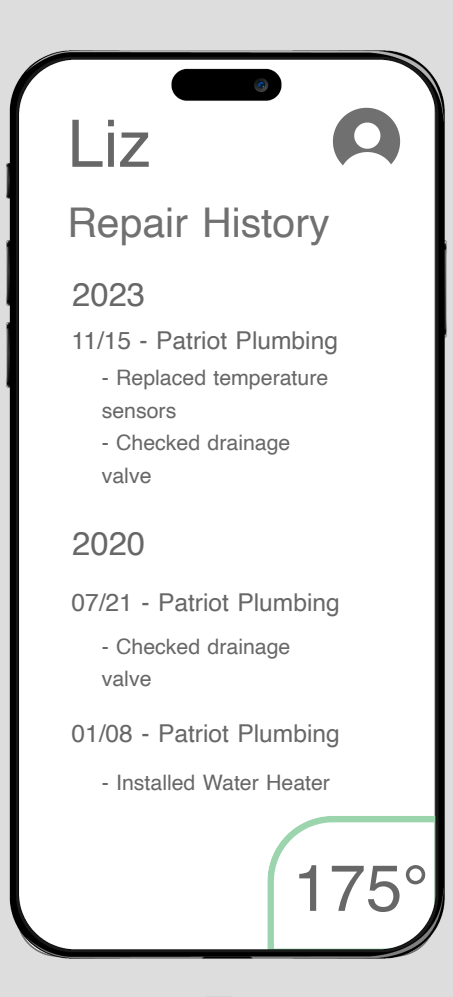
4.

1. Passive State: Home Page. This page of the app displays the temperature at the top, affords the user the ability to change the temperature using the slider below, displays the usage and cost data for the current day, and displays a simplified over view of the water heater's status. When the user clicks the profile icon in the top right corner, the app will take them to the profile page.

2. Passive State: Profile. This page of the app displays the temperature in the bottom right corner to ensure the user always knows what temperature their system is set at. This page afford the user the ability to look more closely at the usage history, the cost data, repair history, and app/system settings. If the user clicks one of these buttons, the app will take them to the corresponding page. If the user clicks the temperature icon in the bottom right corner, the app will take them back to the home page.

3. Passive State: Usage History. This page of the app displays the water usage history in a variety of contexts including daily, monthly, and yearly (can be seen when the user scrolls down on the page). If the user clicks the profile button in the top right corner, the app will take them back to the profile page.

4. Passive State: Cost Data. This page of the app displays the cost data in a variety of ways including daily, average daily, average monthly, and average yearly cost as well as graphical representations of each of these numbers.


Liz

Repair History

2023

11/15 - Patriot Plumbing
- Replaced temperature sensors
- Checked drainage valve

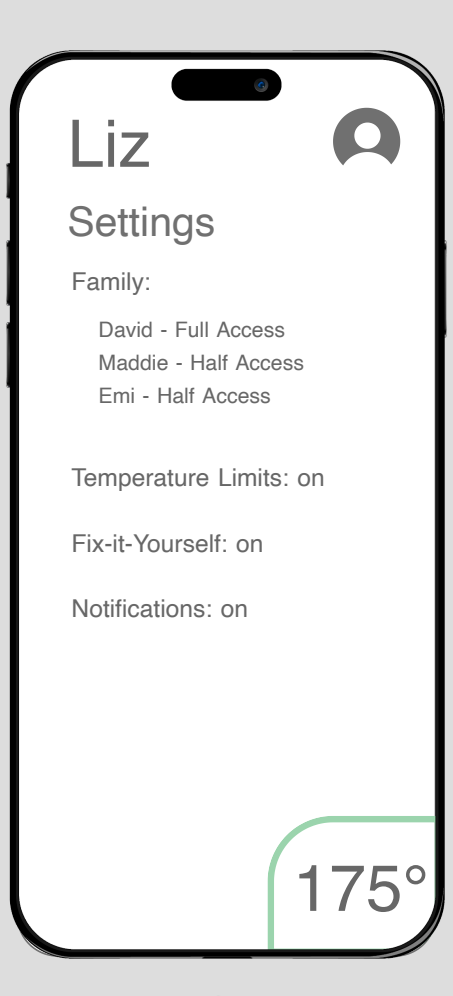
2020

07/21 - Patriot Plumbing
- Checked drainage valve

01/08 - Patriot Plumbing
- Installed Water Heater

175°

5.


Liz

Settings

Family:
David - Full Access
Maddie - Half Access
Emi - Half Access

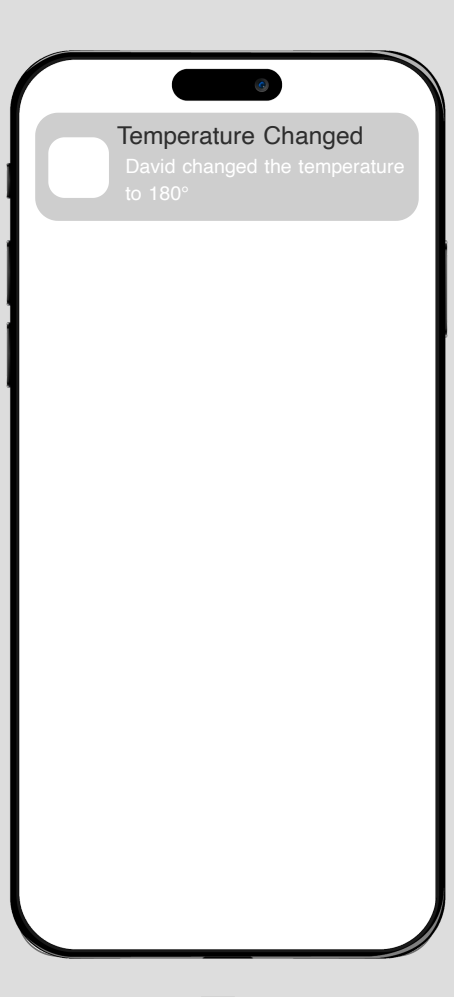
Temperature Limits: on

Fix-it-Yourself: on

Notifications: on

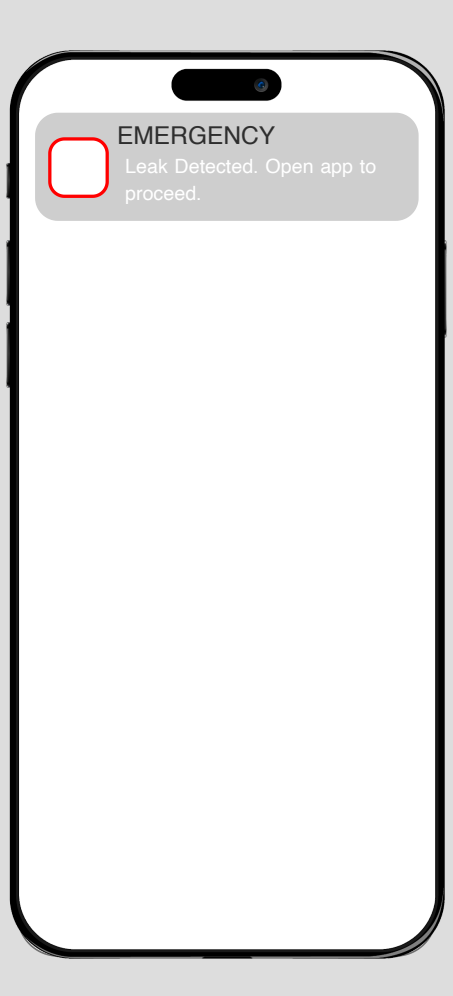
175°

6.


Temperature Changed

David changed the temperature to 180°

7.


EMERGENCY

Leak Detected. Open app to proceed.

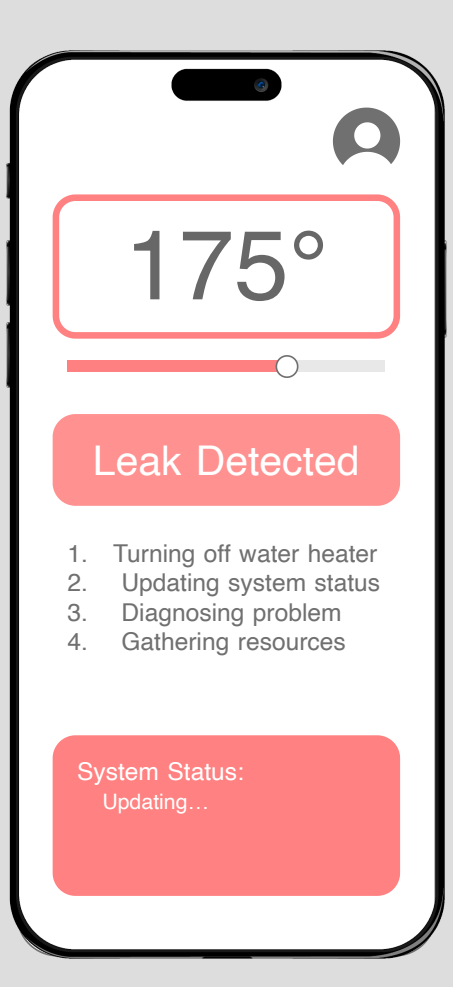
8.

5. Passive State: Repair History. This page of the app displays the system's repairs history including the date of the repair, who completed each repair, and what was repaired/replaced/checked. The repairs are sorted by date, from newest to oldest. This list is updated through a form not available to the user by the plumbers who interact with the system.

6. Passive State: Settings. This page of the app displays the settings of the app, including who can access the water heater, temperature limits, fix-it-yourself, and notifications. Temperature limits, fix-it-yourself, and notifications are all toggleable. Full access means that the family member can change the temperature, while half-access means that the family member can look at the temperature, but not change it.

7. Temperature Change Notification. This notification appears outside of the app when another family member or user changes the temperature of the water heater. When this notification is clicked, it takes the user to the app.

8. Emergency Notification. This notification appears outside of the app when a leak or other error is detected. When this notification is clicked, it takes the user to the app.

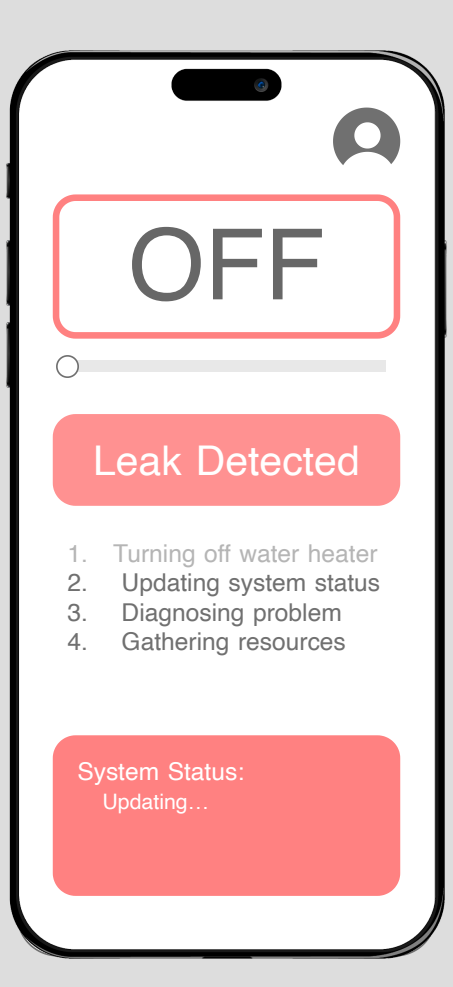

175°

Leak Detected

1. Turning off water heater
2. Updating system status
3. Diagnosing problem
4. Gathering resources

System Status:
Updating...

9.

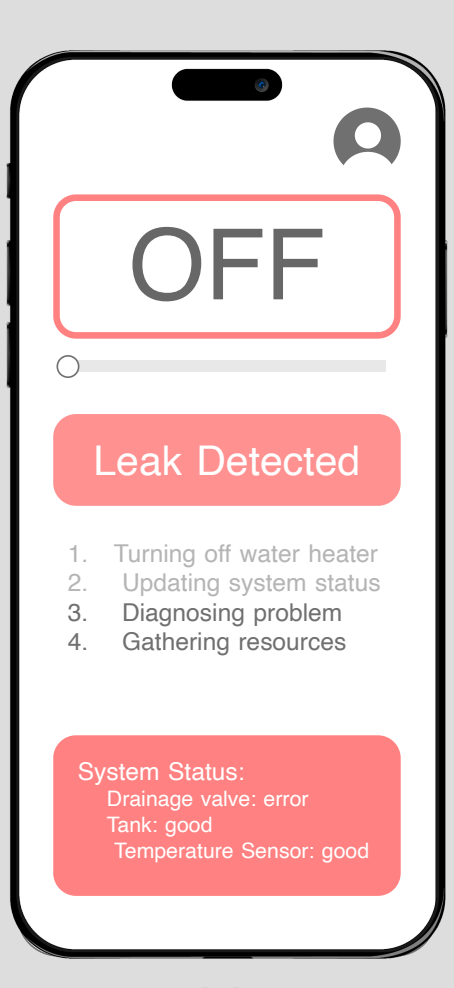

OFF

Leak Detected

1. Turning off water heater
2. Updating system status
3. Diagnosing problem
4. Gathering resources

System Status:
Updating...

10.

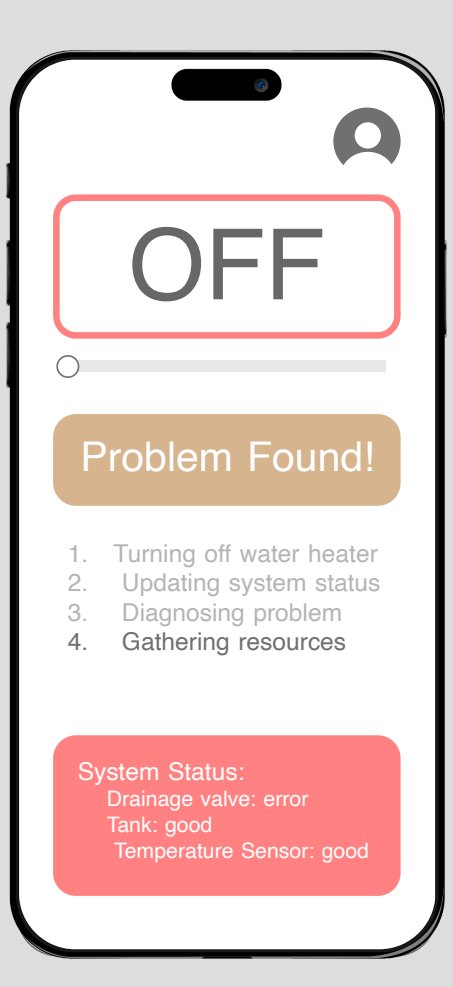

OFF

Leak Detected

1. Turning off water heater
2. Updating system status
3. Diagnosing problem
4. Gathering resources

System Status:
Drainage valve: error
Tank: good
Temperature Sensor: good

11.


OFF

Problem Found!

1. Turning off water heater
2. Updating system status
3. Diagnosing problem
4. Gathering resources

System Status:
Drainage valve: error
Tank: good
Temperature Sensor: good

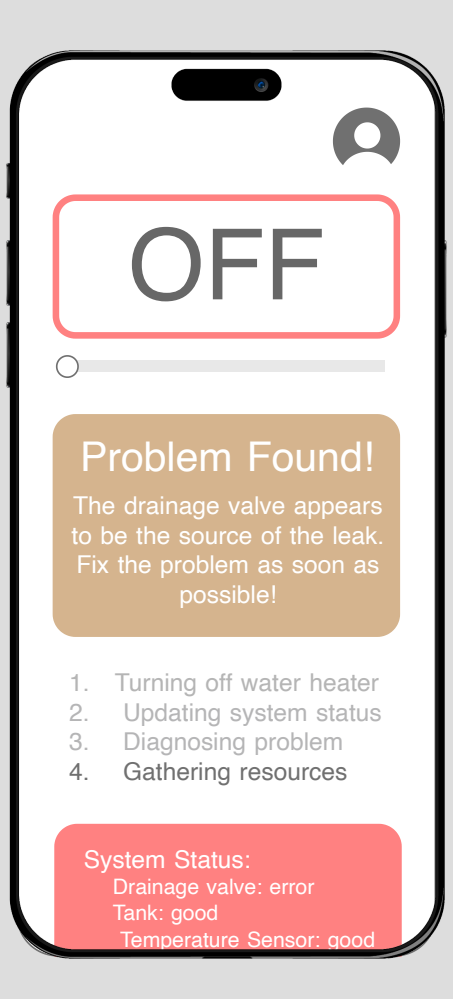
12.

9. Danger State: Home Page. This is the home page of the app when there is a leak or other error detected. The app displays the "next steps" in the process to solving the error and automatically begins the check list.

10. Danger State: Step 1. When the app has completed step one—turning off the water heater—it grays out the step and begins step 2.

11. Danger State: Step 2. When the app has completed step two—updating system status based on sensor results within the water heater— it grays out the step and begins step 3.

12. Danger State: Step 3. When the app has successfully updated the system status, it alerts the user that the problem has been found and works on getting more specifics about the problem.


OFF

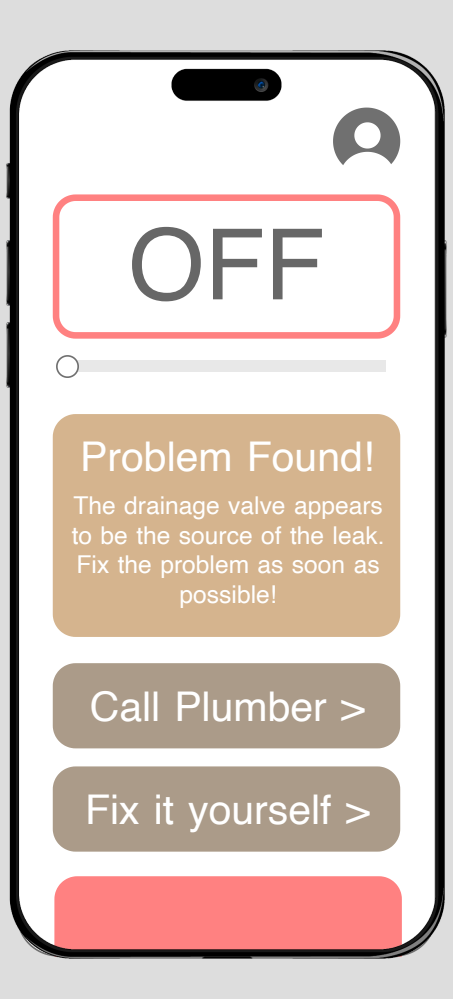
Problem Found!

The drainage valve appears to be the source of the leak. Fix the problem as soon as possible!

1. Turning off water heater
2. Updating system status
3. Diagnosing problem
4. Gathering resources

System Status:
Drainage valve: error
Tank: good
Temperature Sensor: good

13.


OFF

Problem Found!

The drainage valve appears to be the source of the leak. Fix the problem as soon as possible!

Call Plumber >

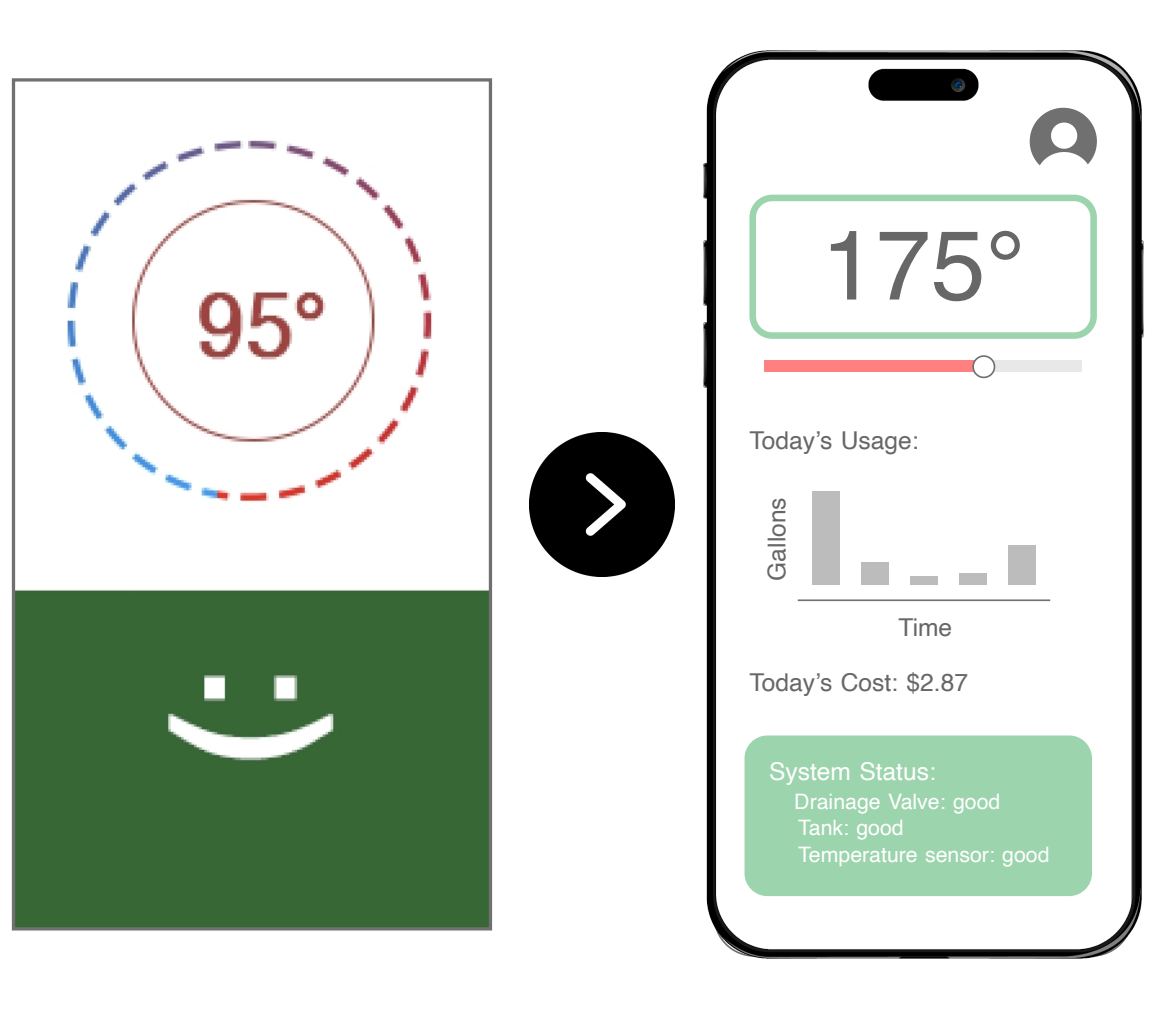
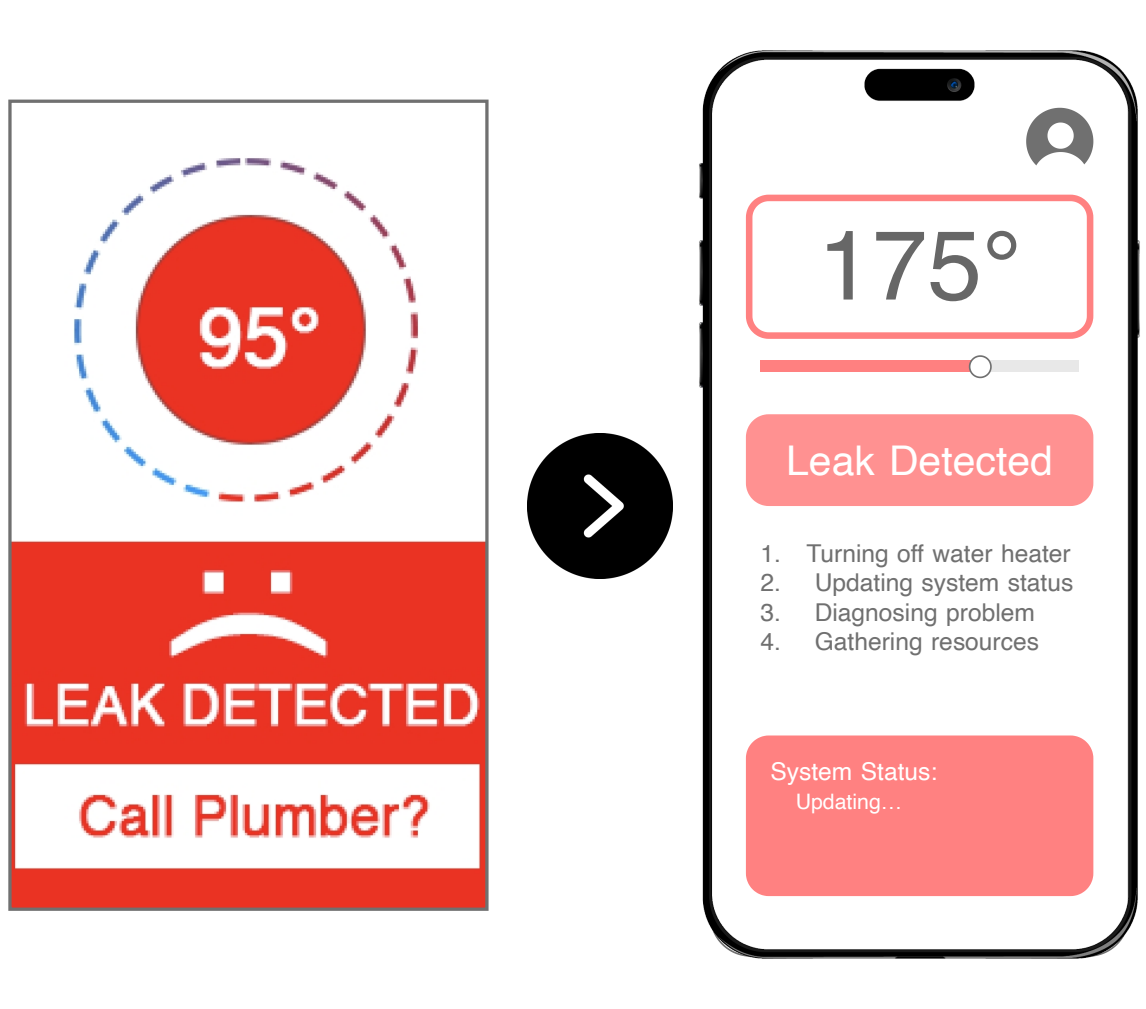
Fix it yourself >

14.

13. Danger State: Step 4. Once the app has found the specifics of the problem, it displays this information to the user and begins to gather the correct resources to help the user solve the problem.

14. Danger State: Fixing the Problem. When the app has successfully found possible resources for the user, it displays them. Generally it will offer the user the ability to call a previously used plumber, or the ability to fix the problem themselves using an internet article about that problem. If the problem must be fixed by a plumber, the app does not display the "Fix-it-Yourself" option.

The Old and the New...

When looking at the old design beside the new, I can tell that my design skills have greatly improved within the past two year. The new design affords more functionality and more cumulative error resolution. It also give more information to the user while still maintaining a simplistic and easy-to-read approach.