

Re-Designing a Water Heater Interface: Through the Human-Centered Design Process

Briley Cox
Principles of Information Design

The Human-Centered Design Process enables designers to go through a step-by-step process to create a design that serves its purpose and allows the users to achieve their goals. The process has 4 steps: Research, Framing, Brainstorming, and Prototyping. If the designer goes through the whole process and the Prototyping shows that the new design does not solve the problems they want it to, they can start the process from the beginning and start the Research again. The cycle that the process has allows designers to reach a new design that is effective by thinking through each step and making sure they are solving all of their problems and making the goals of the user attainable.

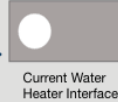
1 Research

Research: According to the Energy Experts, there are four main problems that happen to water heaters in the course of their life. The four common issues deal with water temperature, leaks, discolored water, and odd noises coming from the machine itself. Although it is a machine used in homes, almost all of these issues require professional help from either plumbers or electricians depending on the issue. The main controller on a water heater is the temperature dial that allows the users to control the temperature of the water. There is also a temperature and pressure relief valve that is important to check on the water pressure as well as overall operation of the tank.



About this Step in the Process: This vital part of the process is the first step. Researching allows the designers to gain information to help identify the problems that need to be solved. It enables the designer to find the pain points in the design that may cause errors during the process and latent needs that the users would like to receive from the design or system. This step can be performed through interviews, observations, and research.

2 Framing



Current Water Heater Interface

Listed Problems:

- Small Interface
- Contains Dial, only for Temperature
- Does not contain any information about other parts of the Water Heater
- No Information about possible part damage within Water Heater
- No signals to indicate possible problems

Framed Problem: The current interface of a Water Heater does not efficiently give information to the user to prevent error. Information regarding the well-being of the water heater is not given, not allowing the user to know if any problems are occurring. The issues regarding a water heater only become visible when it is too late.

About this Step in the Process: The part of the process after Researching about the problem is to Frame the problem you are striving to solve. This portion considers all of the needs of the users and what the system is expected to do. This step is very important in order to create a new design that solves the problems mentioned in this step. It is a guide to help lead to effective, possible solutions. The framed problem is the written form of the problems you have researched or observed and plan to solve in the new design.

3 Brainstorming

Input:

- Require a system check and evaluation each week, User must initiate the test
- Electric sensors that will scan system for errors, can turn sensors on and off

Output:

- System turns itself off when it is leaking/about to burst/error
- Makes a sound, similar to fire alarm, when not working properly (speakers)
- Interface blinks red when not working properly

Interface Ideas:

- Visible Touch Screen Showing Conditions
- Lists each working part on Water Heater and says if it is working properly by a green light or check mark
- Touch Screen to Adjust Temperature Easier + Digital Thermostat to confirm temperature
- Warning Screen Indicating Errors that Need Repairs, explain what parts are not working, or if Water Heater is leaking
- If system signals an error, a button for calling a professional pops up

About this Step in the Process: The third step in the process is Brainstorming the possible solutions to the problem(s) that were identified in the previous step. This step, also known as ideation, is important in order to generate a large number of different ideas that could solve the problems as well as prevent errors from the system and/or user. It is best to pour a large amount of ideas in the Brainstorming step, even ideas that may not be the first choice of action to solve the problem. Having a variety of ideas is best when designing in case an idea does not work in the future.

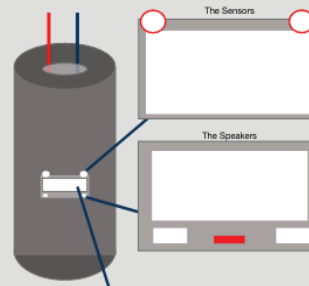
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4 Prototyping



The most influential part of this new design are the sensors located at the top of the interface. Proximity is accommodated since the sensors are so close to the interface. It gives a sense of relationship between the sensors and the screen since the sensors give the screen all the information it needs to display to the users. These sensors continuously monitor the water heater machine. It is constantly evaluating the parts and checking areas for leakage. The continuous run of the sensors has Forgiveness in mind, not letting an error in the machine go without detection. The sensors prevent error and give information to the speakers and touch screen in order to let the user know there is a problem with the Water Heater if one is detected.

The speakers are a part of the new design that is connected to the sensors. The sensors give the speakers information about possible problems within the Water Heater. The speakers let out a high pitch noise, similar to a smoke detector. This sound will cause the users within the house to be able to hear it and sense there is a problem with the Water Heater. It will draw the users' attention to the water heater to check the touch screen and realize what is wrong. The speakers and sound that comes out of them is so important, letting the user know there is something wrong to determine if they should call a professional before the problem gets worse. Priority is accommodated through this part of the design because the high pitch sound will trigger a stimulus in the users. It will enable them to act fast because they will want to turn it off. As soon as the user is aware of the issue, they can press the red button to stop the alarm.

The last part of the new design is the screen that displays all of the information received from the sensors. On the left side is the option to increase or decrease the water temperature. It is a touch screen, so the user simply hits the arrow up or down to adjust the temperature. There is also a little screen that shows the number value that is selected at the moment. On the right side is the information that is gathered by the sensors. If the light is green, then that condition is fine and the Water Heater is working properly. If the condition has a red light, then that is an area where your Water Heater is lacking. The touch screen is close to the sensors for the information to transfer and be displayed to the viewers. This shows Visibility to users by letting them know the exact conditions of their water heater when they look at the screen. Color is also shown indicating that when a condition is green, there are no errors, and when it is red, there is an error. The colors of the conditions also give the user Feedback. Feedback is present on the touch-screen allowing the user to know if their Water Heater is working properly.

If the sensor finds an extreme error with leaking or signs that it is about to burst, the alarm will come out from the speakers and the "Error Found!!" Warning will pop up on the screen instead of normal Home Screen pictured above. This screen will let the user know where and what the major problem is in order to combat the problem. The phone number of the local plumber will also be located on this screen for a fast call to the plumber to fix the problem in a shorter amount of time. Not only is this screen Feedback as to what the problem is, but it is also a sense of Forgiveness by letting the user know right away before anything gets too severe. Having the number of the professional is also there to speed the process up of fixing the part or getting a new Water Heater before it starts to get more serious.

Overall: The new interface complete with a touchscreen, sensors, and alarm speakers is designed to catch any possible system errors going on in the Water Heater the second they start to occur. The interface fully displays to the users the conditions of their Water Heater as the sensor monitors the well-being of it constantly. The new design efficiently solves the lack of communication about the state of the Water Heater. This design will allow any users to know if any problems arise before they get too serious and dangerous. The state of the Water Heater is continuously visible to the user on the screen, limiting errors of problem recognition.

About this Step in the Process: The last step in the process is Prototyping to test the ideas thought of in the previous step. Models of the design are created to see if the Framed Problem from the second step is solved. The goal of prototyping is to see if the new design is able to achieve the purpose of the system and be able to perform and complete the user's goals. If the new design does not meet those requirements, it will go back through the process again. Since the new design did not work, research will start again to figure why it did not work. Then, a new problem would be framed and new ideas would be thought of to solve the new problem.