



The "Faucet Friend" Water Temperature Indicator

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Abstract

The "Faucet Friend" is a slip-on water temperature indicating device for kitchen and bath faucets that I conceived and developed in "Design II", a product design and development class in the Design and Industry Department at San Francisco State University. The instructor was Brian Donnelly. The class focuses on "the design approaches that take into account considerations prevalent in the principles of Universal Design and Design for the Environment. These design considerations look at issues of accessibility, diversity and sustainability in product design, development and implementation."

Significance

This was my first introduction to Universal Design principles. With these concepts in mind, I moved through a typical day in my life attempting to locate any activities that a person with reduced vision / motor skills or cognitive skills might have difficulty doing safely and / or conveniently. I chose a task that I have occasionally had difficulty completing without experiencing discomfort -washing dishes by hand. In the process of doing dishes, it is important to use water at the hottest temperature that you can endure so that the dishes will be clean. While washing, and especially immediately after starting to wash, the water temperature may not have stabilized. It's possible to soap a wet dish and return to the water to find that the water is much too hot to tolerate or use safely. Occasionally, I have nearly burned myself.

This led to the following problem statement:

With every use, faucets in residential kitchen and bathroom settings present the risk of injury from scalding - especially for young children and frail elders. Achieving a certain temperature setting is an exercise in trial and error. Without any facility for pre-selecting the desired temperature, the user must guess at the correct setting, wait for the temperature to rise, and then readjust to the correct temperature. This trial and error process by its very nature may result in water temperature that is significantly higher than that which may cause severe burns to the skin.

Methodology

The initial design focus and intent was to develop a temperature-regulated faucet that

would eliminate the danger of scalding. Initial research and ideation was directed toward this goal. I looked at hundreds of faucets for all purposes. The only temperature-regulated faucets on the market are for home and hotel showers, and laboratory or photographic darkroom sinks. I performed competitive product analysis on several of the most appropriate designs. I also began ideation on a faucet design. In conversations and critiques with class members and the instructor, the problem of Perceptible Information (# 4, Principles of Universal Design, "The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities." Center for Universal Design 1997), was discussed as one of the critical issues to be resolved.

A temperature-regulated faucet that also clearly informs the user of the temperature of the water is a logical solution. Research into the different ways to detect and display temperature led to an indicator on the end of the faucet spout. The spout-tip configuration eliminates the question of whether or not an indicator can be applied to an existing faucet. An inexpensive indicator that fits all standard faucets and alerts the user to high and possibly scalding temperatures would be more useful to more people than a replacement fixture- especially, in light of the fact that replacing a faucet would necessitate the additional expense of hiring a plumber. For many people, this would be impractical. However, an inexpensive, easy to install indicator would help them protect themselves, their elderly or frail parents, and their children.

Outcomes or Results

The "Faucet Friend" Water Temperature Indicator is an attempt to provide an appropriate, innovative solution to the problem of avoiding burns from scalding water at the kitchen or bathroom faucet by giving the user an inexpensive, portable, and dependable way to ascertain, at a glance, key temperature ranges of the water that is exiting the faucet spout. It connects to the faucet by slipping over the aerator, and then is kept there through friction. As the temperature rises, the display portion of the "Faucet Friend" changes color. The color changes can be configured to occur at different temperatures. Different display configurations are also possible. These different display configurations are useful in encouraging the user to interact with the device. A version of the design intended to appeal to children could utilize a popular, licensed character, such as Spongebob Squarepants or Mickey Mouse, who would change in some obvious way to indicate the temperature change.

The "Faucet Friend" changes color through the use of a thermochromic material on the body of the indicator, making use of the property of heat conduction to transmit the temperature change from the body of the faucet to the display on the "Faucet Friend". The actual product can utilize different configurations of thermochromic material to indicate a range of temperatures. It allows the user to see at a glance that the water is safe to use without ever touching the water.

The "Faucet Friend" connects to the faucet by slipping over the aerator, and then is kept there through friction. It requires very little effort to install and once installed, it requires no further effort or maintenance. The "Faucet Friend" fits all standard faucets and has a very low purchase price.

There are few products on the market that perform a similar function. Many faucet fixture manufacturers produce thermostatically-regulated faucets for the shower, but not for the

manufacturers produce thermostatically regulated faucets for the shower, but not for the kitchen or bathroom sink. Also, these fixtures do not provide visual feedback of the actual water temperature (if at all), as well as the "Faucet Friend". Hallcrest Inc. produces a paper card that can be swished through the bath water to determine if the water temperature is suitable for bathing an infant. It operates on a similar principle, but is not practical for use at the kitchen or bathroom sinks. Additionally, it requires the user to make the extra effort to locate and place the card in the water. My product is always "on", always in place, and always working to protect the user.

The advantage for the user is greater safety and protection from burns. -Parents of small children can have greater piece of mind that their children will not burn themselves when washing hands or dishes, or even getting a drink of water.

- Children of elderly parents (and the elderly themselves) can easily install the temperature indicator to provide an additional safety measure to ensure that they or their parents will not inadvertently burn themselves when performing common kitchen tasks.
- Guardians of the developmentally disabled can use this device to help clients be safe when using hot water.
- Those users who have little or no nerve sensation in their hands can visually check to be certain that the water is safe to use.
- Tenants of large apartment buildings have no control over the temperature of their water supply, as it is set, hopefully safely, by the buildings management. Consequently, they currently have no way to protect themselves or their children. The "Faucet Friend" at least alerts these users to the presence and danger of high water temperatures.

The "Faucet Friend" requires only that the user be capable of detecting a change in color from blue to red. Variations on the design could eliminate the need to detect color change by having the thermochromic ink fade to a clear state to reveal a warning sign such as "HOT" which could be printed beneath the temperature sensitive material. Multiple words or colors may be used to communicate a range of temperatures.

The simple motive behind the design of this product is to enable users to easily avoid scalds. There are already signs that appear obvious to most users that the tap water is hot, this product makes it more evident to users that might have trouble reading the signs that most people take for granted. These users include the elderly, the disabled and young children who are easily distracted.

Production cost would be inexpensive, tooling would be very simple. There are no moving parts. Several products could be drawn or stamped at each cycle in a "gang die". Subsequent processing would consist of printing the color and/or designs with the thermochromic inks. A variety of metals could be used. Although copper has the highest thermal conductivity index of all the appropriate materials, recycled aluminum also has high thermal conductivity and may be a more economical yet still effective solution.

The product could easily be blister packaged and sold on j-hooks at retail, such as hardware stores, supermarkets, and toy stores (marketed to children as well as parents). It could also be sold through catalog or internet outlets.

Figure 1:The "Faucet Friend" is a simple water temperature safety device that changes color and is attached to the end of a faucet.

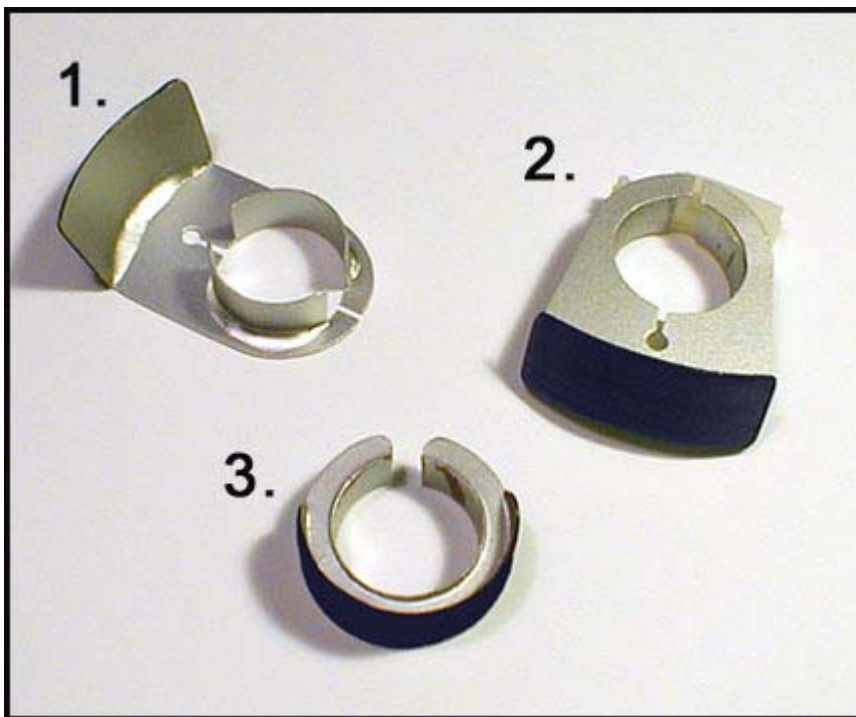
Credit: Charles Floyd - Winner 2003 IDEA Student Award



Description: The color image was created as a 3D computer model. The image consists of two parts. The primary image is a top down view of a curved chrome plated water faucet. At the end of the faucet is an approximately half inch wide blue colored band, fitting around the entire circumference of the end of the faucet. The ring represents one version of the "Faucet Friend". It is attached to the faucet as a friction slip-on fit. A small inset image of the same part is shown in the bottom center of the larger image. This smaller image shows that the ring has turned red indicating that the water has turned hot. The color change occurs as a result of using a special thermochromic paint that changes color with variations in temperature.

Figure 2: 3 prototypes of the "Faucet Friend" showing consecutive iterations of the design.

Credit: Charles Floyd - Winner 2003 IDEA Student Award



Description: This is a color photograph of a top down view of three "Faucet Friend" prototypes. The prototypes are photographed against a plain white background and numbered 1, 2, and 3. The numbers indicate progressive changes made to the basic shape of the design. The first prototype is shown upside down to illustrate the construction of the hollow round form that goes around the faucet. The second is right side up and is two inches deep. The third prototype looks like a large flat finger ring, about one and one-half inches deep. Each of the three prototypes shows a vertical slot about one

sixteenth of an inch wide in the circular form. This part of the "Faucet Friend" fits snugly around the end of a faucet, and is slightly flexible due to the vertical slot. On the second and third prototypes, opposite the vertical slit, there is a band of color changing material that has been applied at an angle so it can be seen when the user is at the faucet. <

Image #2: floyd_image2.jpg

Reference Citation

The Center for Universal Design (1997). The Principles of Universal Design (Version 2.0).

Raleigh, NC: NC State University, The Center for Universal Design

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