
The Significant Screwdriver: A Feminist HCI Design Probe

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Abstract

HCI is increasingly recognizing its accountability to stakeholders beyond individual end users. The field now acknowledges that interaction designs participate in social formations, exerting political force whether or not designers intend them to. Inspired by the commitment to social issues common to the arts, architecture, and the humanities, we present the Significant Screwdriver, a research through design project that explicitly seeks to transgress social norms regarding the gendered division of labor in the domestic sphere in hopes of yielding insights or orientations toward improving the quality of domestic life.

Keywords

Gender, interaction design, feminist HCI, research through design

ACM Classification Keywords

H.5 Information interfaces and presentation (e.g. HCI):
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Design

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Introduction

In spite of changes in recent decades, a gendered division of labor still characterizes the Western home. Research has shown that women still do more work in the home overall, while men are disproportionately more likely to do work involving physical labor, technology and utilities, repair, and power tools.

This paper presents a research through design project intended to transgress gendered divisions of labor in the home. We call the design the “Significant Screwdriver” to foreground the ways personal significance of its use. The unit itself is a standard cordless screwdriver/drill unit, costing approximately \$50 USD, that we have adapted with sensors and an Arduino to collect data about its use (Figure 1). This usage data in turn is used to generate aesthetically pleasing and easily shared electronic visualizations of their work as a mechanism for men to express the domestic care they enact, but seldom express, when they are working around the home.

As a research through design project, the Significant Screwdriver is intended to cultivate the design team’s understanding of the everyday experience of domestic labor in the home and also to challenge that experience through design, encouraging reflection on a situation in which men’s domestic labor is seen explicitly as an act of care and love, both by themselves and members of their families. Obviously, such a change by no means will ameliorate gendered inequalities in the domestic sphere! The goal of design transgression is mainly to stimulate reflection and more importantly to orient people towards productive change, change that can be brought about in part through future design.

Background

The creation of tools, artifacts that ease the accomplishment of tasks, is a distinctly human endeavor. By allowing difficult or impossible tasks to be simplified or made possible, these artifacts contribute to the achievement of goals, both societal and individual. The creation of tools cannot just be viewed in terms of task completion. “Humans’ choices, creativity, knowledge, ideologies, assumptions, and values must always be explored along with the objects and machines resulting from their technological activities” [9]. Artifacts reflect the social values of those who have created them; assumptions and agendas ultimately end up in its artifacts. These decisions also create effects that extend beyond surface artifact use. “Consciously or not, deliberately or inadvertently, societies choose structures for technologies that influence how people are going to work, communicate, travel, consume, and so forth over a very long time” [10]. By deciding to popularize or simply implement a tool, the adopting society also adopts the agendas and ideas that went into that artifact’s creation.

By recognizing the social implications of tools and artifacts, it becomes possible to view them through different lenses. “Studying technological development meant studying social change, and it was obvious to us that the field of social studies of technology included the possibilities of studying changes in gender relations” [2]. This relationship between society and the artifacts it produces also corresponds to Bardzell’s quality of feminist interaction: ecology [1]. Analyzing gender as a social construct reified by technological artifacts, we can observe how artifacts contribute to, and not merely reflect, societal views of gender and gender roles. Critiquing the gendered qualities of

Figure 1: The Significant Screwdriver is a cordless electric screwdriver fitted with custom sensors

design can expose ways that some perspectives become marginalized, creating new opportunities for design interventions.

Motivation and Goals

The Significant Screwdriver was designed with an understanding of gender differentials and their interplay with previous design.

Domestic design issues

While domestic work is not inherently gendered [5], how societies divide—and value—that work frequently is. Work done by men is often connected to survival and aptitude with tools. “You were a man not only because you could hunt and fight, but also because you could control nature through the use of tools and machines” [8]. Conversely, the activities that a woman engages in are more tied to the ideas of love and nurturing. Thus, the work done by men and women is often made meaningful against different contexts, survival/tools versus nurture. For some feminists, these contexts yield gendered perspectives: feminist standpoint theorists argue that “women hold and produce different types of knowledge from their male counterparts, and that these different types of knowledge should be recognized and utilized as a resource rather than marginalized” [1]. The goal, then, becomes to find a way to increase awareness of this divide and allow for a traditionally female perspective to be expressed in a positive fashion through an artifact.

“We have all heard that to appeal to the female market we need to make corners rounded and pinkify everything” [4]. While designing tools to be more appealing to a female audience reflects a concern for

gender, it tends to reinforce as much as undermine arbitrary gender stereotypes. Churchill briefly relates how absurd such efforts can be: “Just recently, I bought a male friend of mine a new home gift - a tool set with flowery handles and a pink case. He laughed and gave me a quizzical look; he instinctively knew he was not the intended user demographic, even though the tools themselves were of standard size and perfectly usable” [4].

Rather than seeking an answer, that is, a design that actually incorporated a just or ideal state of affairs with regard to tools and labor, instead we sought to create a design that would question the present state of tools, labor, and gender in the home. Creating a power tool that not only could do the work needed of a power tool, but also added a degree of intimate expression seemed to transgress traditional boundaries, hopefully prompting reflection and perhaps even contributing to health and well being [6].

Bridging the gender gap

Since the 1960s, the division of labor within the home has still skewed the role of men toward the more physical chores. Between 1965 and 1995, the household chores of the male role still only involved performing around 50% of the amount of work as the female role, but 70% of all repairs within the home [3]. “By avoiding ‘feminine’ tasks such as cooking, cleaning, and laundry men lay claim to a masculine self and invoke masculine privilege. Thus, women’s and men’s performance of different tasks helps to define their interpersonal relations and constructs the gender order” [5]. Yet gender differentiation and its significance is easy to overlook. “The relevance of

gender does not spring to one's eyes unless gender is actively used as an analytical tool" [2].

With gender as a lens, we have design the Significant Screwdriver to embody a form of intimate self-expression. We hope that participants in this study will utilize the visualizations created based on their unique use of the tool as a means of expression. This study incorporates a part of the feminist perspective in a way that is transferable to other devices and can translate into methods of use. Testing and observation of the use of the Significant Screwdriver and its produced visualizations should provide insights into how and if this idea of incorporated expression can be used in new ways.

Development

The Significant Screwdriver consists of an electric screwdriver and an accompanying Arduino system utilizing a range of sensors which track and record use of the tool. Each attached sensor captures a different variable of each use session of the screwdriver. The collected data can then be manipulated to display visibly the use of the tool in a manner that would otherwise not be available, hopefully prompting reflection and a more meaningful interaction, allowing the user to visibly express and re-experience each use.

The Arduino sensors attached to the device include an accelerometer, a thermistor, a force sensor, and an electret microphone, each of which is attached externally and records data to an attached micro-SD card reader. Data from the sensors are not recorded until the force sensor, placed on the palm area of the grip, reads pressure input. The accelerometer is used to measure positioning and orientation of the screwdriver

to identify different uses. The microphone is placed on the back of the screwdriver and was originally intended to determine the on/off state and voice volume during use. During development testing, however, we determined that it could only realistically be used to determine the on/off state of the device, but could additionally register whether the screwdriver was dropped or the user yelled. Palm temperature is measured by the thermistor to try to determine physical exertion in combination with the force sensor.

Different use sessions of the screwdriver should yield different results. For example, assembling a desk may require repeated use over time and longer similar uses, which can be indicated by higher recorded hand temperature and pressure on the palm. Similarly, drilling requires regular, longer, vertical use which would provide different results than removing a towel rack. Visually, it is obvious that there are sensors attached to the screwdriver, which might help defamiliarize the tool and encourage some of the reflection we hope to bring about.

Visualizations

We intend for this screwdriver to be used on a regular basis and for data from each use session to be transferred from the SD card to a computer. We have programmed the data collection application so that it, too, can distinguish between sessions, in case users do not transfer data after each session. The visualization application is Processing (www.processing.org), a free and open source language and environment that excels with graphical representations. To date, we have emphasized functionality over aesthetics, as shown in Figure 4. A fundamental goal is to ensure that different screwdriver work sessions, as well as different types of

these sessions, have distinct visualizations, so they do not all look the same. We have programmed the visualization so that each physical variable recorded by the Arduino sensors can be mapped to a specific visual variable of the visualization. This not only gives us considerable latitude in exploring visualization styles, but more importantly it will allow end users, in a custom visual application, to interactively design visualizations based on their own use data, adding another dimension of expressivity and aesthetic control to users who want it.

Conclusion

As research through design gains traction in the HCI community, we might ask what kind of re-search design is positioned to facilitate. Empirical social science is often directed at what-is, typically seeking to represent the present or near-past. Yet design is interventional, that is, more oriented toward changing aspects of our lifeworlds than it is toward representing them. It seems that research through design, then, likewise might favour intervening upon, rather than representing, reality. To a certain extent research through design is a natural ally to transgressive ways of thinking, as much of the arts and humanities are likewise committed to social change through transgression. The change likely to be effected by the Significant Screwdriver surely will not be a transformation of domestic labour, but rather contributing towards a thoughtful and hopefully productive orientation towards such a transformation, which might, for example, help interaction designers be more accountable to design stakeholders in the broadest and deepest senses of the term.

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