De-commodifying the Device:
A Materialist Design Approach for Communication With and Through Connected Objects

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Abstract

Current design approaches tend to mask the way technologies function, especially with 'smart' connected objects, which tacitly learn and respond to patterns of use. Philosophical approaches argue that this also masks the socio-cultural context in which technologies are situated. It is argued that as a result, the main form of engagement with devices is consumption. We understand this to be a form of commodification, and suggest a materialist design approach that repositions technology in its socio-cultural context by helping people understand how the technology is used in practice and its impact on our lives. This alternative design approach communicates traces of use via the material form of the object itself. We illustrate this approach with a 'connected sink' concept that enables mutual learning between the human and the technology both materially and computationally. In the long term, this form of de-commodification may facilitate a more ethical relationship with technologies by promoting reciprocity rather than consumption.

Author Keywords

Traces of use; material engagement; interaction design; connected objects; STS; device paradigm
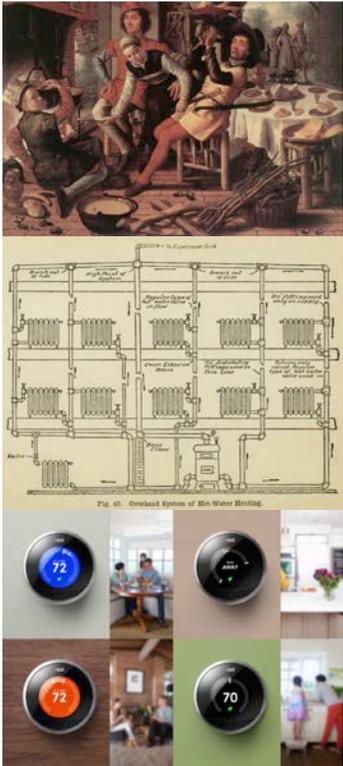
Figure 1. Different technological approaches to heating. Top: Pieter Aertsen's 1556 painting *Peasants by the Hearth* illustrates how the fire organized people socially. Middle: a schematic for a radiator system, a relatively effortless method to distribute heat. Bottom: An advertisement for the learning Nest thermostat, which requires little to no user input.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

User-centered approaches to information technology have facilitated simple and accessible designs. Composing written documents on word processing software requires very little effort on behalf of the author, from undo to automatic spell check. This is quite different from the typewriter. Corrections and updates have to be made manually by the author, and to the hard document or device itself in what tends to be a messy and complicated process.

The sleek design of contemporary devices is not without consequence. Philosopher of technology Albert Borgmann outlines these ramifications as the "device paradigm" [1]. In this paradigm, he claims that technology becomes a "device" when the way that it functions is masked and obscured from its user, thus rendering the only mode for the user's engagement as consumption. We further add that in this scenario, the technology becomes a commodity that is ambiguous and replaceable; its impact and role in the life of the user is not easily understood by him/herself.

However, we argue that there are ways of doing and design approaches that can disrupt this paradigm. We believe that engaging with the material form of a device in a way that communicates traces of use can transform this paradigm. Specifically, the material bodies of these objects should facilitate opportunities for people to manipulate and physically change these surfaces through their use. These traces should be visible, accumulative, and persistent. We suggest that materials that reflect and record traces of use are an important medium to critically engage individuals in disrupting the device paradigm. We suggest that a design approach that utilizes traces of use will situate the technology back into its socio-cultural context, a process we believe contributes to de-commodifying the technology.

Situating Technology in Practice

Borgmann makes the argument that technologies are no longer designed to be "focal things and practices" [1]. For technologies to meet this requirement, their usage must orient people towards the socio-cultural context that the people and the technology are physically both situated in; and that this needs to be bolstered by practices: "focal things require a practice to prosper within" [1 p. 196]. Consider the technology of heating for example. The fireplace is a technology that requires physical skills to build and maintain, and organizes a group of people socially, from constructing it to utilizing its heat. This is not the case with central heating systems that require little to no physical engagement (from turning a dial to "smart" thermostats that learn and don't need to be set), and which distributes heat in a manner that no longer organizes people socially (Figure 1). Central heating is an advanced technology that masks its complexity with interfaces that anyone can use without ever needing to understand how it works. Thus, the general user relates to this technology only by consuming it. While there are clear benefits such as ease of use and comfort, the technology becomes a commodity that deprives us of an awareness of the socio-cultural world we inhabit and the technology's role within that world.

As aforementioned, Borgmann labels this predicament where devices are purely committed to functionality, thus deprived of their social and ecological context, as the "device paradigm" [1]. We can see this paradigm at play, for example, when we turn the dial of the thermostat up in the morning to warm up a home, while we're getting ready to leave home for work, but then in the rush out the door, forget that we had left it on in an empty house; the result being a significant energy bill.

It is critical that we live outside of this paradigm. As we continue to develop technologies that proliferate into our social and personal worlds, especially connected objects that harvest massive amounts of personal information, it becomes vital that we have a sense of awareness of the impact that they play in our lives. We need to be able to have opportunities to see how these technologies work, and have room for signification of these practices and objects. Without a sense of the way that these technologies work, or how we work with them, the troves of personal data that connected objects collect also become even more difficult for the user to conceptualize and own. Ultimately we argue that a relationship with a technology that is defined by this form of invisibility and obfuscation is a fundamentally unethical one. A relationship that obstructs spaces and means for communication, consensus, and mutual awareness of the parties of interest lacks the foundational aspects to healthy and reciprocal relationships: mutuality, dialogue, and consent.

Traces of Use in Material Engagement

In light of this analysis, we propose a design approach that makes engagement and performances with technologies visible through material traces. This is achieved by communicating the daily legacy that we have with these objects through and with its material surfaces [4]. Physically engaging with the materials of the technology itself, by making traces, provides occasions to circumvent the device paradigm and create opportunities for the technology to be appropriately placed as a focal thing and practice. It offers a material expression of the role that the technology plays in our lives. Making engagement visible in the context of digital materials has already been identified as a critical space for investigation [7], and urges designers to consider how to implement these in the physical form of connected objects. The formative dynamic that materials, people, and practices play is also considered as critical in the design of connected objects [2]. Other research has explored how being physically involved in the process of making objects shapes and transforms our understanding and relationship to them [3,5].

Instead of sleek and invisible interactions, we should instead have users participate in making seams that revel how the object functions, and the role it plays in our lives. We suggest that space for interactions should be enabled in the material form of the object itself. Materials should be responsive to use and retain the traces of that use. Traces should serve as a layer of communication enabled by designers to help people place objects in their lives. It is not just an altercation to the surface of the technology [6], but it is the practice that situates the person and the object within the social and ecological context of that object.

Figure 2. Illustration of concept sink. The sink is controlled by gestures along the edge of the basin. The materials of the sink are designed to ware demonstrating traces of use.

De-Commodifying the Device: A Design Case

We have begun to apply this approach in a design inquiry with our Industrial Design master's students at TU Delft. The students developed a connected sink (Figure 2) that illustrates how traces of use can disrupt the device paradigm. It offers an interaction that uniquely draws on the notion of materials experience [2], a framework that discusses how materials come to shape ways of doing and ultimately, social practice. Gestures that are metaphorically related to the tasks the sink performs (as opposed to turning a faucet) are used to unmask the technology's machinery. Hot water is procured by rubbing a portion of the basin rapidly, similar to how one would warm his own hands. The force of the stream is made stronger with a long stroke that travels the length of the basin, almost as if to beckon more water from the sink. These interactions are made possible by sensors and smart materials along the basin. These materials also respond to these gestures by wearing in ways that reveal traces of how the sink has been used. As a connected object, the sink would communicate with the water heater, so that not only the appliances learn the patterns of use, but so does the person using it via material traces.

This concept illustrates a design approach that employs engagement, materials, and traces as a means to transform the device into a focal thing and practice. The design of this sink no longer masks how the technology works, and instead situates itself into our social world thereby revealing how it is used and consumed. With it, we are exploring a means by which traces of use de-commodify the connected object through positioning it socially. These traces are accumulative and expressive and speak to our individual experiences as well as our relationship with the technology itself building a mutual, communicative, and thus ethical relationship in their ability to foster mutual learning (for the human, not just for the technology).

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