

What's invisible technology? No, really.

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Abstract: The assumption that the goal of ubicomp is to make technology disappear stems from a Modernist ideal of purely utilitarian design that creates social invisibility. In fact, everyday design is anything from invisible, as can be seen in how furniture and cars are designed and from the hotrod and casemod cultures that modify everyday technological objects. Ubicomp design can learn to understand the design of situated technology from industrial design and from the study of technology modification cultures.

Introduction

"Everywhere, [industrial design] condemns the standards of taste by which we formerly chose our furnishings and our 'ornaments.'" [1]

Discussion of Weiser's statements about technology's existence in everyday lives often assumes the Modernist ideal of industrial design (as illustrated in the quotation above). In this "form follows function" vision—as formulated in the first half of the 20th century epitomized by the Bauhaus—design is the process of creating objects that exist in a utilitarian world free of distracting decoration. However, the fact that our environments are not utopias of practicality (our buildings are not the "machines for living" [3] that Le Corbusier imagined) shows that austere vision to be impractical. It does not represent how people actually choose or use products. Our values for the objects in our lives are not that logical or pragmatic [5][6], and few of the things we can point to and name in our environment are genuinely invisible, and our relationship to them is rarely ambivalent [9]. Infrastructures, such as structural building materials and the electrical grid, *are* largely invisible, but once something takes on a specific function, it becomes an object and people rarely let it stay generic.

"Design is the art that is hidden in plain sight." [2]

Situational existence is not necessarily situational invisibility. Before we uncritically reinvent the Modernist vision in ubicomp, it may be instructive to examine several classes of common ubiquitous—but non-computational—technological artifacts for qualities that may inform ubicomp object design,

Furniture

Furniture is ambient, pervasive and ubiquitous, in the literal sense of the words. Contemporary furniture is an everyday object of advanced technology (in this case, manufacturing technology). It's also distinctly *not* created to exist purely in the background. Furniture design involves structural mechanics, certainly, but it's also fashion. It's in the foreground of our environment; it lets us know how to use it and defines the character of the spaces we inhabit. In the design of furniture we can see a set of rules that define its utility and its relationship to the situations it's found in. For example, we can use furniture design to understand how context shapes form. Tables used in cafés, hospitals, offices, parks and homes have different characteristics that make them suited to their environment. Sometimes a small shift in contextual cues can change the whole experience. Furniture designers work to identify the design cues [4] that will give the ideal *ambient* experience.

Cars

The design of cars is an example of an evolved relationship between a situated technology and people's use of it. Car use shows that automobiles are anything but invisible. They exist as much to communicate a set of values about the driver as to provide a set of functional affordances [7]. The design of automobiles takes into account [8] the fact that although people *use* cars, they also live in the environment that the car creates for them (a car is like a room on wheels). Merely living in that environment constitutes a kind of use that needs to be considered and designed for.

Hotrods and Casemods

Genuinely unremarkable objects are rare. People use the objects of their lives to project images of themselves onto the world [9] or to decorate their world in their image [5]. From colored paperclips to mansions, the objects that are most functional in people's lives are usually also the ones that are most decorative and—importantly for ubicomp design—most personalized. Personalization is the process of adjusting the generic elements of the environment to the idiosyncratic needs of the user or the situation. Anything that's seen as too neutral usually gets personalized (think of cubicle decorations and laptop stickers). Observing how people personalize their environment: what they choose to personalize is a direct link to how to create situational appropriateness for an object: whether that's in terms of how the object looks, where it is or how it behaves.



Figures 1, 2: Customized 1935 Ford Coupe [10], 2001 Chrysler PT Cruiser [11]

Extreme modification often holds within it the elements of the next generation of expected features (see Figures 1, 2). The expected is often what makes something socially unremarkable or effectively invisible. Looking at the extremes of design can give hints to what people find interesting and valuable in how they perceive the everyday objects in their lives.

Ubiquity > invisibility

When considering the design of situated ubiquitous computing, it's valuable to understand what people consider socially appropriate relationships to the technology in their environment. The goal should not be to make technology socially or physically disappear, but to make it unremarkable in just the right ways, and only when that's the desired result. Studying how people and industrial designers relate to existing technological objects gives us insights into what these ways are.

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