This collection is essential reading for anyone seeking to understand the relationship between media and the world in the next twenty years. The rich mix of approaches begins to define a field for understanding media that is emerging out of ubiquitous computing.”

— Ulrik Ekman, Digital Cultures Research Centre, University of the West of England


Throughout Art and Culture Emerging with Ubiquitous Computing
edited by Ulrik Ekman | foreword by Matthew Fuller
This chapter presents contextual strategies for staging ambient interfaces in public space. Although in existing literature ambient displays are often considered and evaluated as solitary objects, I argue that the experience of an ambient display is not determined in the first place by its intrinsic qualities, but by the way the display is contextually situated. To that end, I investigate six strategies to show how context can be incorporated into the design of ambient displays. Some of these strategies may seem counterintuitive, for they take advantage of some of the effects that designers usually try to avoid. They are meant to incite further experiments and cross-pollination among the fields of architecture, public art, and interaction design.

Invisibility and context are arguably the two central concepts of ubiquitous computing. According to the famous comment by Mark Weiser (1991), the most profound technologies are those that disappear—computers and interfaces become invisible by blending seamlessly into the everyday environment. Although this notion of invisibility, also described as “calm technology,” is inherently contextual, the vision of ubiquitous computing reaches out farther: technology should not only be embedded into its context, but also become context aware and consequently burden the user only with information and functionalities relevant for a specific situation. Weiser’s vision originally encompassed both the private and public aspects of life; however, most work in ubiquitous computing remains concerned with the personal domain. In the public sphere of urban infrastructure and displays, the ideas of invisibility and context awareness come with a number of conceptual challenges. It can be observed that within the increasingly mediated urban environments, large-scale displays neither blend into their surroundings nor share the contextual qualities found in technology for the personal domain.

This chapter investigates what a contextual public display might look like and, based on existing work, which design strategies can be employed to achieve contextual invisibility. The impact of outdoor displays on public space gains prominence in discussions within the architectural community, but the current debates are based mainly on traditional concepts of the screen as an animated iconographic surface designed
to capture attention. As a result, much of the contemporary discourse resembles the discussions around the “architecture of the billboard” from the 1960s and 1970s (Venturi, Brown, and Izenour 1972). To move beyond the already outdated visions of mediated architecture associated with images of Times Square, Las Vegas, and Shibuya, the traditional notion of the display needs to be reconsidered.

Ambient Displays

Inspired by Mark Weiser and John Seely Brown’s (1996) notion of calm technology, the concept of the ambient display offers one alternative conceptual framework for the contextual integration of information displays into the built environment. Ambient displays are architectural interfaces that are based on the observation that humans can process a large amount of information in the periphery of their attention (Ishii and Wisneski 1998). Their design is unobtrusive, and the expressive range of their possible states deliberately limited—for example, down to a subtle change in color or visual pattern or a slight movement that can be recognized without the effort of explicit attention. Information is implicitly encoded into the physical properties of the display: the colors of the facade, the arrangement of lines in a digital painting, or reflections from a perturbed water surface (Moore 2008). To capture the viewer’s attention, ambient displays rely on a mechanism often referred to as the “Cocktail Party Effect” (Cherry 1966): a mechanism that allows us to carry on conversation in the noisy ambience of a cocktail party but at the same time to become alert when amid the chatter our name is mentioned.

Ambient media systematically investigate design languages that utilize this effect and consider the transition between the viewer’s attentive states—an ability that is especially relevant for environments with multiple simultaneous stimuli such as urban public spaces. Although a considerable body of research has been dedicated to the design of ambient displays, critical evaluation shows that these displays do not always perform well as an effective means to deliver information (Shen, Moore, and Eades 2005).

One problem is the metaphorical nature of ambient displays. Most of them require learning the visual language of the display because the way the displayed data are mapped to the display’s visual parameters is not obvious (Wisneski, Ishii, Dahley, et al. 1998). This learning effort might be reasonable in the personal realm but is hardly an option for a display in public space. A common response to this problem is reducing the complexity of the displayed information—often down to a binary value that helps with a specific decision, such as a light-emitting diode (LED) integrated into the handle of an umbrella that lights up when rain is expected (as in AmbientDevices’ Ambient Umbrella [2010]). This might work well for alerting purposes but does not solve the underlying problem of interpretation. Consider, for example, the display of NOX architect’s D-Tower (1998–2004), an illuminated, translucent architectural sculpture signaling the emotional state of a city through red and blue illumination (discussed in Bullivant 2005); its message remains ambiguous despite its binary nature. One might wonder, for example, about what the color red represents—Is it happiness or rage? If the metaphorical reference is not obvious and a common convention is missing, the display remains incomprehensible.

A second problem is that most existing work takes only the relationship between observer and display into account while ignoring the situation in which the display is placed. Focusing on the “calmness” of the display medium is not enough to enable peripheral awareness of the display’s information because the reception of a visual message depends substantially on the situation in which it is presented: the physical environment, the presence of other information in proximity, and finally the observers’ goals and expectations. In this respect, existing heuristics for the evaluation of ambient displays lack an important element because criteria such as the “peripherality of the display” (Mankoff, Dey, Hsieh, et al. 2003) depend largely on context.

The Role of Context

The filmmaker Lev Kuleshov demonstrated in a cinematic experiment that the perceived meaning of what we see is often defined by the context rather than by the content of an image (Mityr and King 2000). He presented a short film showing the blank face of an actor interspersed by footage showing either a bowl of soup, the coffin of a child, or a beautiful woman. Depending on the juxtaposed footage, the audience interpreted the actor’s empty facial expression as showing hunger, sorrow, or desire, when in fact they were seeing the same sequence of the actor’s face. The effect makes clear that context is more than a static description of a situation: it is a quality constructed from the interaction with the observer, “an emergent feature of the interaction, determined in the moment and in the doing” (Dourish 2004, 23).

In the next section, I discuss design strategies that are based on the “Kuleshov effect” and that play with the notion of contextual invisibility in order to make media in built environments more articulated and informative and at the same time less obtrusive. These strategies address ways in which displays can be staged effectively by considering properties of the environment and the observers’ expectations. Some of the strategies are familiar and well established, whereas others might seem counterintuitive and create situations that designers usually try to avoid. They share some similarities with ambient displays: both emphasize the transition between the foreground and background of attention. Unlike ambient displays, however, the presented examples achieve this blending not through the choice of a “calm” display medium, but through a tight relationship with their local context and so establish “invisibility” by taking advantage of habitual blindness.
Invisibility through Mimicry

The urban environment conveys an abundance of information. At the same time, we also have learned to ignore most of such information through habituation; we have become blind to the messages we encounter in the course of our daily routine. This section focuses on examples that take advantage of this habitual blindness.

According to the artist Heath Bunting, "A good piece of art should in fact be invisible, but immediately incorporated and quickly taken for granted" (quoted in Frieling and Daniels 2005, 264). Among his many explorations in public art, he installed fake pedestrian street signs into subway stations and public spaces. Bunting claimed that even though upside down, these signs lasted for months—a result of their official appearance.

Other artists employed similar strategies—for example, by adding personal objects, such as family photos, into the showrooms of furniture stores (Ruppe Koselleck's Ich und IKEA: Parasitäre Publikationen [2007]) or by disclosing controversial information such as an educational institution’s suicide statistics disguised as a bus schedule (Leonardo Bonanni’s Untimely Death Bus Schedule—Information Aesthetics [2010]). Despite their controversial or funny content, these objects perfectly blend into their environment and often go unnoticed (see figure 24.1).

This strategy of mimicry creates what Bill Gaver, Jake Beaver, and Steve Benford (2003) call "ambiguity of context": a situation in which an object offers different meanings depending on the context in which it is observed. As in the example of Marcel Duchamp's fountain (1917), an additional layer of meaning is added to an ordinary object. The design of contextual displays should take these different possible readings into account. An information display might have a different function depending on its state or become invisible to those for whom the message is not relevant.

Embracing Unstable Display Media

A traditional display requires a generic, homogenous, and maximally controllable display medium. All influence from the local environment has to be minimized; the appearance of the display should be the same in every light condition. Developers of outdoor LED displays invest considerable effort to compensate for the influence of ambient light. Nevertheless, the outdoor environment remains a difficult setting for dynamic displays, and independence from the environment is not always possible to achieve.

However, unstable and sensitive display media offer an interesting possibility. Architects have learned to work with the aesthetic qualities of materials that age and change their appearance under different environmental conditions, instead of aiming
for pristine and inert surfaces immune to external influences. The same approach can also make sense for urban interfaces—to embrace the spectrum of expression offered by the material under different environmental conditions. One example from contemporary art history is Hans Haacke’s condensation cube (1963; see Fitzsimmons 1969), a minimalist sculpture in the shape of a sealed-off glass cube containing a small quantity of water, which causes a layer of condensation to cover the cube’s walls. Through the continuous cycle of condensation and evaporation, the artwork’s appearance changes constantly influenced by environmental variables such as temperature and light. Inspired by this artwork, Amanda Parkes and I developed the ambient display dewy (2007; see Parkes and Offenhuber 2008), showing a pixilated pattern of condensation. Although the display allows high-level control over the emerging patterns, the actual appearance of the condensation patterns depends a great deal on external humidity, temperature, and light direction.

Numerous other examples and possibilities show the significance of sensitive display media. Plants are a particularly interesting choice for a display medium: they interact with their environment in many ways, while showing many expressive features, such as phototrophic behavior (Holstius, Kemble, Hurst, et al. 2004) or color change depending on available sunlight. No doubt, ephemeral materials as display media are harder to control and therefore offer less variety for displaying information. In addition, the content of the display will never show the data in their pure form but instead in a form blended with environmental influences. However, the properties of the display medium are aligned with the subject of the representation, the medium can contribute an additional dimension of expressivity to the display.

Designing with Physical Wear

Despite being a mechanical problem, physical wear has many interesting features. It is a reliable record of an object’s interaction history: the location of hollows in an old marble staircase tells us about how people have stepped on it; the shiny parts on the patinated surface of a copper door handle reveal how people prefer to operate it. In that sense, physical wear and patina are an ambient information display, the message of which is explicitly or implicitly taken into account when, for example, judging an object’s value and age.

The phenomenon of physical wear also inspired the metaphorical notion of “computational wear” as a representation of a digital object’s interaction history, initially demonstrated with the example of digital documents (Hill, Hollan, Wroblewski, et al. 1992). The authors differentiated between active and passive wear—the latter resulting from passive consumption and aging, but the former indicating an active editing or annotating process. As a physical implementation of computational wear, the “history tablecloth” (Gaver, Bowers, Boucher, et al. 2006) preserves luminous imprints of objects placed onto its surface. Beyond the metaphorical reference, there are also projects that incorporate wear in the literal, physical sense. In Ethan Ham’s Email Erosion project (2006), for example, a physical sculpture is irreversibly consumed based on email activity.

Making physical wear part of the concept is particularly interesting for urban interfaces. In the unprotected outdoor environment, physical wear is a permanent issue, and maintenance is a necessity. Including physical wear in design through choice of appropriate materials can be a way to provide a subtle display of an object’s interaction history.

Animism

Animism is the idea that a living spirit inhabits all objects even if they appear lifeless. Originally an archaic religious concept, the notion is still alive, for example, in the visual language of animated cartoons, where inanimate objects might suddenly come to life and act on their own behalf.

This animistic “awakening” of an apparently static object can be a powerful interface metaphor, and it is often used in a very literal way: for example, a seemingly ordinary emergency exit sign in a hallway suddenly comes to life. A number of existing ambient displays use animistic concepts, such as the “nabaztag” (Peters 2006), a networked rabbit toy announcing events such as incoming emails, or Kazuhiro Hachiyama’s ThanksTail (n.d.), a robotic dog tail for cars enabling drivers to exchange friendly gestures. A more subtle way of showing the hidden life of inanimate objects is by manipulating their shadows—for example, in Motoshi Chikamori and Kyoko Kunoh’s media-art installation Kage (1998), featuring objects with interactive shadows set in a projected spotlight beam, or Andreas Gysin and Sidi Vanetti’s Ombra (2007), a project animating the shadow of a sculpture on a public plaza. Displays and interfaces more often refer, however, to animistic concepts in a less figurative way. Andreas Zingerle’s kinetic display Atemraum (2006) presents a wall with a smooth surface that is subtly bulging and retracting and thus appears to be breathing in sync with the observer’s respiration.

In many cases, however, animistic metaphors miss an important point by focusing entirely on the anthropomorphic appearance. More important than a cartoonish look is the choreography of the display: only if the display appears lifeless long enough to be regarded as a static object does the animistic awakening have a powerful effect. A constantly babbling cartoon character lacks that “beat.”

In the case of animism, contextual invisibility means the existence of a latent reality that becomes apparent only in certain situations. The display has two separate roles—one as a carrier of information and another as a physical object. The commonsense
notion of information design demands that these two roles be tightly coupled—the physical object should clearly indicate its function as a dynamic display through its physical and digital affordances (Norman 2002). With the use of animistic metaphors, these affordances are deliberately concealed, and the display assumes a role as a physical object independent from its informational purpose. In terms of ambient media, the moment of transition between these two states is of special interest because the blending between the background and foreground of attention is a crucial function of calm technology (Weiser and Brown 1996). Animistic metaphors can emphasize this shift through a visual language that is almost universally understood.

Indexical Displays

When information is displayed at the scale of the urban environment, the map sometimes becomes the territory. The boundary between object and representation can become blurry when both occupy the same space, and the representation incorporates elements of the visualized phenomenon. On the most basic level, the sky is a perfect example of an ambient display (Wisneski, Ishii, Dahley, et al. 1998). Its sensory appearance conveys an abundance of information that we have learned to decipher by observation. Seen as an ambient display, it is at the same time representation and represented phenomenon, linked by an indexical relationship.

Timm-Oliver Wilks, Thorsten Kiesl, and Harald Moser’s public installation garden of eden (2007) (see figure 24.2) assembles an array of plants in glass boxes that are filled with toxic air generated according to environmental data from different cities around the world. The air quality is not visualized through a symbol or a graph, but only through its effect on the plant. The condition of the plant suggests something about the quality of the air surrounding it—in terms of Charles Peirce’s semiotics, it is an index and as such implies a causal relationship.

An even tighter feedback loop between representation and object can be found in Helen Evans and Heiko Hansen’s urban-scale visualization project Nuage vert (2008). The piece projects a visualization of power consumption in a neighborhood onto the cloud of smoke rising from a power plant that generates the power for this same neighborhood.

This ambiguity is rare in traditional forms of information design, where data and representation are kept strictly separate. Iconic and symbolic types of representation usually prevail: a message is expressed either through visual resemblance or through an abstract symbolic language. In contrast, the two projects described in this section, garden of eden and Nuage vert, belong to a different class of visualizations that have an indexical character. Whereas traditional information design seeks to minimize ambiguity, in these examples ambiguity actually increases the readability of an information display. Furthermore, the strategy can help to highlight causal relationships if their effects can be directly observed.

Removing the Context

Designing information displays for a public audience usually means lowering the cognitive threshold in order to maximize accessibility. The deliberate exclusion of users by making the presented information deliberately hard to understand may sound nonsensical and paradoxical. However, curiosity is a powerful motivator, and with the right cues this strategy can be a way to encourage the user to learn the conventions of an information interface. Many communication processes in public space play with the simultaneous inclusion and exclusion of different groups of users. The visual codes of graffiti or fashion contain elements that are broadly understood as well as elements that are meaningful only for a certain group.

Alternate-reality games, taking place in physical and virtual public spaces, are driven by obscured information. Players collect cues and hints embedded in the urban environment’s complex reality. The central principle is that elements of the game should not be recognizable as such but should perfectly blend with the environment (McGonigal 2003). Equally intertwined with everyday activities and “invisible” in the literal sense is Julius von Bismarck’s Image Fulgurator (2008), a project involving a device for manipulating other people’s photographs at the moment they are taken—by projecting an image into the environment at the right moment for a fraction of a second. Although in these examples outsider knowledge is necessary to understand
what is displayed, it might make sense to offer hints for the viewer without such knowledge. All it takes sometimes is choosing the right viewpoint—as in Felice Varini’s spatial paintings (see Varini, Müller, and López-Durán 2004). Based on the renaissance technique of anamorphosis, the visual elements of Varini’s paintings are distributed in space, and they form a coherent picture from only one single viewpoint.

The application of this strategy requires a balancing of accessibility and concealment. In the first place, presence of meaningful information has to be clearly communicated (Skog, Ljungblad, and Holmquist 2003). The power of the strategy is that the task of communication happens on different levels that can be aimed at different groups. For outsiders, the interface might still offer decodable cues and fulfill purposes of alerting or guiding. For the knowing user, without the constraint of general accessibility, the system might offer a higher information density.

Conclusion

The strategies described in the previous sections illustrate different ways to establish an interactive relationship between a display and its context. The presented principles place special emphasis on the moment of transition between background and foreground of attention—the moment when a display is noticed by an observer or fades from her awareness. Depending on the direction of this transition, these strategies fall into two groups. The first group presents strategies for decreasing the contrast between a display and its background: it includes mimicry, the strategic use of unstable display media and physical wear. The display accomplishes mimicry by anticipating the observer’s expectations and attentive state. By using an unstable display medium and allowing for physical wear, the display blends with its physical environment. The second group combines strategies that can help to increase the contrast between a display and its background. It includes design strategies that utilize animism, indexical representations, and, to some extent, the deliberate exclusion of the user by removing the context. Animistic qualities can emphasize display agency by creating a surprising transition between its static and animate states. Indexical representations can help to draw attention to the phenomenon and highlight its causal relationships. The removal of context by withholding essential information makes the display stand out by creating a moment of irritation. Some of the presented strategies can go in both directions, either catching attention or blending with the environment—for example, animistic displays or the removal of context. The presented strategies are an invitation to designers to reach beyond the current practices of information and interaction design so as to explore strategies that might seem counterintuitive. They can add a subversive, irritating aspect to public media and can help us see our daily environment with different eyes.

Notes

This chapter is based on a workshop paper presented under the title “The Invisible Display—Design Strategies for Ambient Media in the Urban Context” at UbIComp 2008, Seoul, Korea, 21 September 2008.

1. For information on Email Erosion, see http://hizome.org.

2. For ThanksFail, see http://www.networks.co.jp/~hachiya/works/ThanksFail.html.

References


25 Inscribing the Ambient Commons

Malcolm McCullough

The act of tagging, made popular by Web-based media, has also long existed in a different, more vigorous form in street culture as graffiti. As information media become ambient, what might interaction designers learn from this contrast? This essay examines the relationship between the tagger and the ambient through the notion of a commons. In urban computing, it finds a new middle ground of inscriptions. It finds merit in lower-tech genres of adhesive art and echoes widespread cautions about data-surveillance aspects of higher-tech tagging. It mainly asks for a curatorial role on urban markup and points out a need for an environmental history of information.

Tagging

At this writing, the most eminent visual artist in the United States is a tagger. There may be an Obey Giant sticker near you, and by some estimates there are half a million worldwide (figure 25.1). But although already ubiquitous, the work of Shepard Fairey was made much more famous by his Barack Obama campaign poster. Thus, for example, the Giant recently appeared at the Institute for Contemporary Art in Boston on one of those big banners that museums hang over their portals.

On the street, a tagger is someone who signs in aerosol. To tag is to spray-paint your name. An information professional, to whom tagging would mean much else, might call this practice a reputation system. Anyone who can sign all over town without getting caught in the act must be a badass. At some animal level, tagging just marks territory and has no civic aspirations. But then it becomes social—defiantly in its choices of site, competitively in which tags are respected and not soon written over by rivals, and culturally in how some signs become noticed by the general populace and even appreciated by critics. Why else would so many art museum gift shops offer coffee-table books of photographs of graffiti?

Citywide, rampant graffiti indicate distress. The sense of neglect that graffiti create tends to invite other troubles. Although such atmosphere has become more widespread in many cities, around Paris in particular, anyone who remembers New York