Using Virtual Shadows to Represent User Proximity in Mobile Information Technology Environments

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Since 1999, we have worked together with ABB Corporate Research—the R&D division of one of the world's largest industrial engineering companies—in the area of interaction design for large-scale multiuser displays and personal mobile devices. A series of prototypes have come out of this collaboration; all researched, designed, and implemented to be used by service technicians and operators in various kinds of highly automated industries (see Fallman et al., 2002; 2003; 2005; 2010). These systems have not been ideated, designed, and implemented as individual, one-off systems, but rather to become part of an existing ecosystem, what we call 'Mobile Information Technology Environments'. The vision has been that mobile devices and applications should be primarily designed to work together with—rather than replace—stationary information technology.

A particular strand of our research has concerned the design of interactions between users equipped with personal mobile devices (such as a smart-phones or table computers) and shared, stationary screens and panels used primarily for monitoring (which are typically found in control rooms). We have been looking in depth at the question of how operators and service technicians in these control rooms as seamlessly as possible can bring information from these large screens with them on their mobile devices out into the factory or process industry, and that they should be able to compose, adapt, and customize their mobile views in real time to suit the particular task being carried out. With ABB, we have designed a fully functional prototype implementation of a system where a large, stationary display in a control room can be controlled by touch input (Figure 3). A distinctive feature of this system is that all the various kinds of information seen on this screen can be selected and 'dropped' onto the users' mobile devices. This allows users to quickly compose their own views on their mobile device, depending on what tasks they are carrying out.

Our poster will detail a specific interaction design technique used in this prototype installation—i.e. using *virtual shadows* to represent user proximity—that we have ideated, designed, implemented, and thoroughly tested in situ with real industrial workers at two different sites.

The specific interaction design problem the technique addresses concerns the problems of providing a smooth and seamless user experience in allowing users to select various kinds of information on large, shared screens and to bring this information on to their own, personal mobile devices.

This technique lets the user touch and drag any object on the large touch screen, such as a sensory reading of the temperature of a paper mill. When an object is touched and dragged (Figure 1), a semi-transparent virtual shadow of the user appears on the lower half of the screen as a representation of the user. By dragging the object onto the virtual shadow and dropping it there, an animation on the screen shows that the object is being 'pulled' from the screen onto the mobile device. On the mobile device, an animation shows that it 'receives' the object from the screen (Figure 2).

We speculate that the smooth and workable user experience created by representing the user through a virtual shadow may have wider applicability than that of this specific prototype, and the poster format should make an excellent venue for discussion.

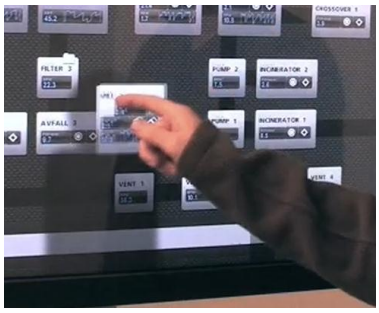

Figure 1.

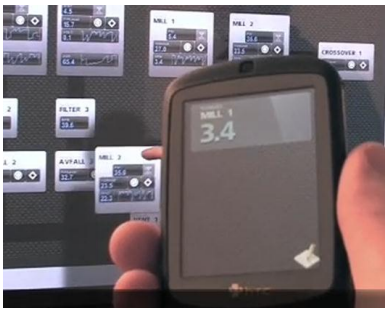

Figure 2.

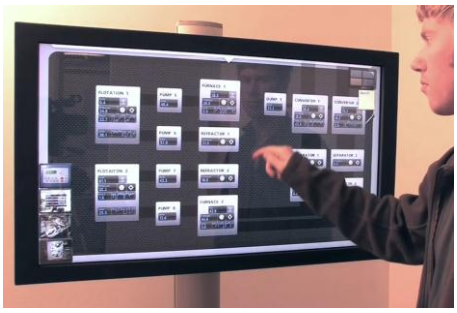

Figure 3.

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