Pervasive Interaction

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Our relationship with devices and information is rapidly evolving as we begin to realize the hardware-agnostic dream of ubiquitous computing. It matters less and less what device we use or carry: as everything becomes highly networked and information pours to and from the cloud and among devices, we'll be able to access and control information from essentially any proximate appliance or interface. We witnessed the beginning of this with the transformation of computing endpoints from desktop to laptop to handheld, and the evolution continues with the nexus of information exchange becoming distributed in the cloud rather than stored locally on your own computers.

Agnostic Hardware

The coming era will offer a hardware-agnostic ecology in which information flows to and from any device in the user's vicinity in the most appropriate fashion. Perhaps we'll take a cue from the earliest pre-mobile-phone days of ubicomp, when office phones rang for people who were there, not just for who owned the phone.

However, the exploding proliferation of networked devices in our vicinity has resulted in a world that's increasingly fragmented and rife with connection- and configuration-oriented difficulties. To realize the ubicomp vision, these dynamic environments will need dynamic interfaces. The articles in this special issue explore this challenge from several different perspectives.

In this Issue

As the common interface to the ubiquitous digital world evolves into every device and seeps into generic holistic environments, proxemics will play a major role in how the interface and its attendant information manifests. Accordingly, we open this issue with Nicolai Marquardt and Saul Greenburg's tutorial, "Informing the Design of Proxemic Interactions," which broadly surveys the role of proxemics in user interaction.

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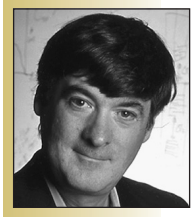
The subsequent articles drill down into specific interface technologies and implementations relevant for pervasive interaction. "Ultrasonic Doppler Sensing in HCI," by Bhiksha Raj, Kaustubh Kalgaonkar, Chris Harrison, and Paul Dietz, exploits a simple implementation of ultrasonic Doppler processing to realize an inexpensive motion sensor, illustrated in a variety of proximate UI applications. Furthermore, unlike common computer-vision applications, the ultrasound system doesn't come with privacy implications.

"Personal Projectors for Pervasive Computing," by Enrico Rukzio, Paul Holleis, and Hans Gellerson, shifts the focus to output devices. The authors survey many applications for personal projectors in pervasive interaction. Microprojectors are steadily becoming smaller and more easily integrated into cameras in various mobile or wearable platforms, enabling interactive applications that hint at a bold future for dynamic, gesture-tracking displays.

The next two pieces—the final theme article and a Spotlight department—focus on specific applications for pervasive interaction. In "Chamber of Mirrors: A Socially Activated Game Exploits Pervasive Technology," Mat Laibowitz, Vids Samanta, Syed Reza Ali, and Ronald Azuma explore a socially engaging game played across diverse platforms. Players use interactive tables, mobile phones, smart badges, and a system of interactive floor-mounted "portals," all of which form a distributed pervasive interface whose components work in concert to deliver the game experience.

The Spotlight department, by Michail Bletsas, describes an environment termed the Glass Infrastructure. This interactive information system runs on large displays distributed throughout the MIT Media Lab, where user proximity—gauged via RFID badges—dynamically brokers presented information and invited interaction.

the AUTHORS



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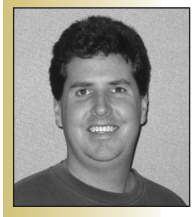

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The exploding proliferation of networked devices in our vicinity has resulted in a world that's increasingly fragmented and rife with connection- and configuration-oriented difficulties.

As the devices in our environment become increasingly sensor rich and deeply networked, user engagement will drift away from individual platforms. We'll no longer focus on any one appliance in our entourage, as is the case in our current phone-dominated hegemony. User interaction will be dynamically brokered across multiple hardware incarnations.

Just as the Web rapidly grew to dominate our dialog with computers, dynamic pervasive interaction will sprout and thrive once appropriate and accepted standards are in place to let us freely share information and easily author and access applications across proximate devices. Only then will we see a glimpse of the long-promised true realm of ubicomp and start to appreciate its full potential.