

UNICAST and GROUPCAST: An Exploration of Personal and Shared Peripheral Displays

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Introduction

We often hear predictions of a technology-rich future in which our environments will be filled with artifacts that can sense and respond to us in new ways – a world filled with cameras, microphones, visual displays and audio speakers, to name but a few. Although such a world may seem threatening or menacing in some depictions, it may be possible that such developments will lead to more accommodating environments, encouraging more frequent and beneficial interactions among the inhabitants of such spaces.

A physical space that can sense people in the vicinity, and has knowledge of their interests, can use this information to create new informal interaction opportunities for these people. For example, a shared public display in a workplace, combined with a tracking system, can display information of mutual interest to the people passing by the display. People may choose to take advantage of this information to initiate a conversation with someone about whom they may know very little, leading to an increased sense of community in the workplace.

We have built two applications to explore the use and effects of peripheral displays in two different workplace contexts: UNICAST, a personal display within an individual's office; and GROUPCAST, a shared display in an open area of an office building. These will each be described briefly below.

UNICAST

UNICAST is an application that allows users to specify content they would like to see on a peripheral display located within their primary workspace. In some respects, UNICAST is an extension of PointCast™, which allows people to specify news topics and stock symbols about which they would like to stay informed while their desktop computer is in screensaver mode. UNICAST is different in two key aspects: it allows broader content and runs all the time on a peripheral display.

The content for UNICAST does include headlines and stock information, but it includes many other types of content as well. The current implementation includes user-configurable modules for each of the following types of content:

- Web pages
- Headlines
- Stocks
- Factoids
- Weather
- Horoscope
- Flashcards
- Announcements
- Reminders
- Artwork
- Pictures
- Webcams

Users first select a module to install, then configure the module according to the type of content it is associated with. For example, for the web page module, any number of URLs can be specified, for headlines, there is a form with checkboxes for each topic, and for weather, the user enters one or more U.S. zip codes. At present, users can not create their own new modules (unless they want to write Java code), but we are hoping to create module templates that users can use to create their own modules in the future.

Each user's content configuration is specified in his or her UNICAST Profile, which can be modified at any time. The current implementation of UNICAST randomly cycles through a user's profile, displaying each page for fixed time period (default is 15 seconds) before moving on to the next. We are considering allowing a finer level of customization, so that different content can be displayed for different periods of time. However, want to balance this desire for finer customization against the need to maintain a simple, intuitive interface for specifying content.

Although UNICAST can be configured to run as a screensaver, we have installed a number of flat-panel displays in individual offices throughout our workplace environment, so that in each office, peripheral content can be displayed all the time on a device other than the user's primary workstation. UNICAST was recently released to ten people within our lab, and we hope to do a study of people's experiences with the system after a longer period of use.

Our model of interaction is of an ambient display [Weiser & Brown, 1997] rather than the primary workstation display used for supporting a user's primary work tasks. UNICAST was designed to explore what kinds of content people would be interested in seeing on a peripheral display. The hypothesis is that this content would be interesting, but not terribly important or urgent, since important or urgent information is (or could be) sought out directly on the primary workstation. For example, the first author uses UNICAST to cycle through his favorite on-line comics, which help to brighten his day, but are rather peripheral to his work, and which he therefore rarely seeks out on his primary workstation.

GROUPCAST

The goal of GROUPCAST is to explore what kinds of content would create opportunities for informal interactions in open areas in the workplace. By using our ArialView awareness system – a network of infrared badges and sensors throughout the workplace – we know who is near a large, shared display, and can use information about those people to display content that may provide opportunities for those people to start a conversation.

For example, Joe and Teresa do not know each other very well; however, the “Wine of the Day” web site pops up as they both pass by a large, shared display, leading to a spontaneous and serendipitous discussion about the merits of old-vine zinfandels. After the discussion, they both go away, knowing a little more about each other, and are more likely to have conversations in the future.

One of the stumbling blocks we encountered in the initial design of GROUPCAST was how to acquire content that would be of mutual interest. We considered a large profile containing content that people could rate with respect to their interest level. When people passed each other in front of the GROUPCAST display, content in the intersection of their interests would be displayed.

However, we soon discovered we had conflicting goals: having a profile that would be broad enough to include content of potential interest to a large number of people, and yet still be small enough so that we could reasonably expect people to specify that content, e.g., by filling out a form. By the time we had amassed enough potential content in our profile form, we were fairly confident that no one (besides those working on the project) would take the time to fill it out.

After we launched UNICAST, we had an insight: instead of using the intersection of known interests of both (or all) people near the display, just display content that one of the people had already specified in his or her UNICAST profile. Although that content might not match the profile of the other people, it is still of

interest to at least one person passing by, and may still generate the desired conversation between the passersby. Using the UNICAST profile, we can rely on people's own self-interest in customizing content that they will see regularly (in their office), rather than struggling with the somewhat less rewarding task of specifying content that only is available when they are in a public area.

Eventually, we'd like to investigate other ways of using the profiles, such as using an intersection of the profiles (returning to the original design) or the set difference between profiles (since that would ensure novelty on at least one person's part). We also look forward to investigating the contrast, if any, between what kind of content people want to see in their own workspace and what they want to see (and share) in a public area.

We'd like to design an interface that allows people to pick up content from other people's profiles, based on serendipitous encounters at the GROUPCAST display; perhaps we could use a speaker identification system, triggered on the keyword "Cool!" A speech recognition capability might allow us to not only create conversations but also facilitate their continuation by eavesdropping on conversations and bring up new content related to words spotted in those conversations.

Background and Motivation

Most environments are *passive* – deaf, dumb and blind, unaware of their inhabitants and unable to assist or engage them in a meaningful way. However, with the advent of ubiquitous computing – ever smaller, cheaper and faster computational devices embedded in a growing variety of "smart" objects (beyond desktop computers) – it is becoming increasingly possible to create *active* environments: physical spaces that can sense and respond appropriately to the people and activities taking place within them. Most of the early UbiComp applications focus on how *individuals* interact with their environments as they work on *foreground* tasks. In contrast, I am interested on how *groups* of people affect and are affected by *background* aspects of their environments.

The Active Environments research group at Accenture's Center for Strategic Technology Research (CSTaR) has developed a number of applications that create examples of active environments. Our first application, MusicFX [McCarthy & Anagnost, CSCW98, CSCW2000], is an example of an active environment that senses who is present in a fitness center, knows the musical preferences of all its members, and chooses music that is best suited to the current set of inhabitants. We have subsequently explored new techniques for group preference arbitration [Nagendra Prasad & McCarthy, IAAI99] and other potential environmental contexts for adaptive music, such as retail stores and restaurants.

We are also developing new applications that focus on the workplace (rather than the workout place). One such application, ActiveMap [McCarthy & Meidel, HUC99], is a visualization tool that enables people to gain greater awareness of the location and activities of coworkers, creating opportunities for seeking out colleagues for informal, face-to-face interactions. Another application, EventManager [McCarthy & Anagnost, HUC 2000], is an asynchronous awareness tool, enabling people to specify events of interest involving people and locations (e.g., "Tell me when Ted returns to his office"), so that users can find opportunities to find (ambush?) people with whom they would like to initiate face-to-face conversations.

Technology can have an isolating effect on people, as people spend more time with electronic gadgets and less time with other people. Our larger goal is to explore how technology can create, enhance and take advantage of group activities and relationships in the real world. We would welcome an opportunity to meet with other members of the CSCW community to discuss any/all of these issues at the workshop on Shared Environments.

If this paper is accepted, the first author would attend the workshop.

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