Chapter 3.13
TeleTables and Window Seat:
Bilocative Furniture Interfaces

Yeonjoo Oh
Carnegie Mellon University, USA

Ken Camarata
KDF Architecture, USA

Michael Philetus Weller
Carnegie Mellon University, USA

Mark D. Gross
Carnegie Mellon University, USA

Ellen Yi-Luen Do
Georgia Institute of Technology, USA

ABSTRACT

People can use computationally-enhanced furniture to interact with distant friends and places without cumbersome menus or widgets. We describe computing embedded in a pair of tables and a chair that enables people to experience remote events in two ways: The TeleTables are ambient tabletop displays that connect two places by projecting shadows cast on one surface to the other. The Window Seat rocking chair through its motion controls a remote camera tied to a live video feed. Both explore using the physical space of a room and its furniture to create "bilocative" interfaces.

INTRODUCTION

Over a decade ago, Weiser predicted a shift in the dominant human computer interaction paradigm from mouse and keyboard based graphical user interface (GUI) to ubiquitous tangible computational artifacts embedded in our environment (Weiser, 1991). Traditional GUIs require a high level of attention, while ubiquitous computing promises to provide the power of computation in everyday settings without the overhead of having to focus on operating a computer. Furniture presents a familiar and promising platform for such investigation. During the course of several years,

we have explored a variety of furniture interface projects. Our goal for these projects has been to develop interaction techniques appropriate to traditional pieces of furniture that enable people to leverage additional computational resources.

"Bilocative" interfaces leverage the intimate connection between furniture and place to create an intuitive physical interface to facilitate the navigation and transmission of information between remote places. A bilocative furniture interface is a piece of furniture that is computationally enhanced so that it can usefully be understood to be in two places at once. Instead of providing a screen-based interface that must be navigated to find information about different remote places, each bilocative furniture piece in a room represents a connection to a particular distant place, and that information stream can be engaged just by approaching the piece of furniture and using it in the traditional manner. To explore this idea, we built two computationally enhanced furniture pieces, the TeleTables and Window Seat. These projects represent quite different approaches to connecting people with a distant place. The TeleTables attempt to generate an ambient interpersonal awareness between households by relaying information about cast shadows between the two tables. The Window Seat provides a much more direct connection, but through a familiar interaction. It projects a live video feed from a distant camera that is controlled by rocking the chair. Both projects allow a distant place to be engaged without a traditional interface such as a GUI or keypad.

The TeleTables project explores the potential of ambient interpersonal communication devices. TeleTables are composed of a pair of tables that enable people in two distant locations to see shadows cast on the opposite table. The surface of each TeleTable contains an array of photo sensors and display pixels and when someone sits down at one table, for example to have breakfast, areas of the table that are shaded by the breakfast activities light up in one color on both tables. If someone else sits down at the other table to have breakfast at the same time, the shaded areas of the table light up in a different color on both tables, so that both people having breakfast see that there are similar breakfast activities taking place in the other location. The interaction is different than a phone call or a chat, as it does not require the explicit intention to communicate with the other person; casting shadows on our kitchen tables is a side effect of various common activities. This mode of communication allows people to develop an ambient awareness of events at another location with a low fidelity data stream that intrudes only minimally, and symmetrically, on the privacy of both participants.

Through our Window Seat project, we have investigated how a rocking chair can be tied to a view into a particular distant place. Rather than requiring the navigation of a Web interface to find a particular Web cam and adjust where it is looking, we lower the barrier to entry for using Web cam technology: it is accessed just by sitting in the rocking chair tied to a particular place and rocking to adjust the view. This interface brings information navigation out of the computer screen and into the physical space of a room and its furniture. We posit that the conceptual mapping of a chair to a view of a particular place will be accessible to people at any level of technological literacy.

The remainder of this chapter first describes related work and then each project with a use scenario, system overview, and demonstration. We also discuss future research directions and reflect on the implications for furniture interface design.

RELATED WORK

Many researchers have sought to leverage the familiarity of the interface afforded by furniture to create ubiquitous computational interfaces. We classify these computationally enhanced furniture