

Ubiquitous Computing @ Home

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1 Introduction

In the near future, we will be using many single purpose information appliances equipped with ubiquitous, invisible computers [3]. The computerization target is shifting from office to home, as ubiquitous computing becomes the mainstream. Everyday things such as kitchen counters, furnishings and furniture will be augmented by inexpensive small computers. In this paper, I will introduce our activities to augment everyday things in home environment, i.e. to enhance kitchen counters and furniture by using computers.

2 Kitchen of the Future

A kitchen is not just a place of labor. Throughout history, the activity of preparing food has been accompanied social interaction and the development of social bonds. Our contribution is to demonstrate how a “Kitchen of the Future” [1] can use technology to re-introduce such social interactions, and also enable entirely novel forms of communication mediated by computer.

The Kitchen of the Future is a computer-augmented kitchen environment that embeds various computing elements into a standard kitchen unit, as shown in Fig. 1. Our kitchen has four work areas comprising a sink, cooking stoves, and two preparation spaces. In each work area, we have installed a liquid crystal display (LCD), a camera, a microphone, and a foot switch, and have connected them to a computer system and the Internet.

We are using our kitchen to investigate the new form of interaction and communication facilitated by this environment. We are developing following



Figure 1: Kitchen of The Future. Each work area has an LCD, a camera (the hemispheres under the cupboards), a microphone, and a foot switch (the wooden panels).

applications using Kitchen of the Future environment:

- creating web-ready recipes semi-automatically during cooking,
- aiding with cooking task scheduling and sub-task instruction using the multi LCDs,
- online discussion of recipes or cooking techniques between family members or friends at a distance, and

3 Digital Decor

Digital Decor is furniture, appliances, and other small objects commonly found in homes and offices that have been augmented with computational power to extend usefulness [2]. We have investigated two possible functionalities for Digital Decor: everyday objects that keep track of their own contents (this can be called “smart stor-



Figure 2: The Strata Drawer has a digital camera (*upper center*) and a laser diode (*upper right*) that is used to measure the height of the contents.

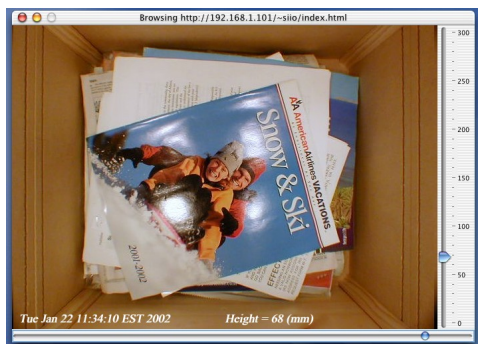


Figure 3: The Strata Drawer has time and height sliders to browse through the stack of objects that are in the drawer.

age”), and everyday objects that support informal, lightweight communication.

Strata Drawer, seen in Fig. 2 is our prototype of a camera-enhanced cabinet used for smart storage. When a user places an object in the drawer and closes it, a photograph is automatically taken. A user can browse pictures of strata in the drawer’s contents as shown in Fig. 3. This function will help people to find an item in the drawer.

To support communication between extended families, we have made a pair of the Peek-A-Drawer prototypes (Fig. 4). They are equipped by digital cameras and LCDs and connected via the Internet. When a user closes the upper drawer, a picture inside the drawer is taken, and is displayed on the LCD in the lower drawer in the distance.

A pair of Peek-A-Drawers was installed in a couple of families for 6 months: in a home of a granddaughter who was 11 years old, and of a grand-



Figure 4: Overview of the Peek-A-Drawer. The photograph of the upper drawer in one cabinet is displayed in the lower drawer in the other cabinet.

mother who was 72 years old and living alone in a different city about 300 km distant. During the test period, 200 pictures were transmitted between the two families.

4 Summary

We have described Kitchen of the Future and Digital Decor, computer augmented everyday things, which will be in the mainstream of ubiquitous computing. We have focused on several application areas, communication in the kitchen, smart storage and informal lightweight communication by furniture. Finding killer applications in everyday home environment and design their user experiences will be key issues for human interface researchers in ubiquitous computing age.

References

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