FRIDGE: exploring intuitive interaction styles for home information appliances

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ABSTRACT

This paper describes FRIDGE, an experimental prototype of a simple home messaging appliance, which combines a graspable user interface and pen input. FRIDGE is designed to be used without explanation and to enable basic e-mail and announcement-board facilities between family members. We describe the concept, the rationale for its design, the interaction with the prototype system and early results from its evaluation.

Keywords

Graspable user interface, tangible user interface, pen input, information appliance, mixed reality.

INTRODUCTION

This paper describes FRIDGE, an experimental prototype of a mixed-reality messaging appliance for use at home. FRIDGE supports asynchronous communication within a family or, more generally, a household, in the form of free-form written messages, drawings or pictures.

In many households, people like to use surfaces such as fridge-doors, or pin-boards, or even doors, to post bills, leaflets, photographs, postcards, etc., to maintain shopping lists, to leave messages to each other, or reminders for themselves. We aspire to extend this paper-based activity, at its preferred location, with posting and sending of electronic notes. In doing so we wish to let people maintain current habits and the desirable characteristics of paper and printed matter, but also provide easy access to the advantages of the electronic medium.

The design of this prototype is part of a longer term research effort to investigate applications and interaction techniques that blend into every day home-life rather than overwhelm it. To attain this aim, the driving design principles are the simplicity of the application and of the intuitiveness of the interaction. Our ambition in designing FRIDGE has been that users should be able to 'just use it' with no directions or explanation.

THE FRIDGE PROTOTYPE

Input in FRIDGE is supported through a combination of a graspable user interface [2] with Mimio, a commercial pen input device by Virtual Ink. Standard marker pens can be attached to the Mimio stylus to combine real and virtual ink.

The graspable user interface is implemented with VIP [3, 6] a development of the BUILD-IT system [4]. VIP supports interaction through computer vision techniques: it turns inch-sized infrared-reflecting patches into physical handles for interactive virtual objects. These patches can be attached to small bricks as in the BUILD-IT system, or magnets to put on a fridge, or pins to put on a pin-board, etc. Currently researchers at IPO are experimenting with VIP as an input device for picture and photo browsing applications [3] and for architectural design.

The computer output can be projected on any white surface, e.g., a cupboard, or a table-top, or a fridge door (hence the name of the demonstrator). The computer output is superimposed on any physical paper or other objects that are on the surface. Mixing paper and electronic media can be traced back at least to the DigitalDesk system [1]. Compared to systems of that ilk, which have mostly been concerned with supporting work, we are concerned with developing information appliances for the home. Thus we need to enforce a 'bare-bones' simplicity and ease of use which are necessary, though not sufficient, to turn an information appliance into a part of our every-day life.

INTERACTING WITH FRIDGE

Figure 1 shows a snapshot of FRIDGE in action. Apart from the paper notes and picture prints which are affixed on the display, the user sees a collection of projected portraits of family members and a note-book icon. The user of FRIDGE can:

- Grab notes by putting a handle on them and release them by hiding the handle from VIP. (Most users start by pulling the handle sharply off the note, and slowly develop a strategy of tilting it to the side, to hide the infrared reflecting surface from the camera).

- Create, rearrange and delete notes.
- Write and draw on notes using the Mimio stylus.
- Mail a note to one of the family members whose portrait is decorated with an envelope icon. Received mail is simply posted on the display.

Having two input techniques helps avoid overloading a single device, so it is easier to guess and to remember how to use the system: the pen is not seen as a general-purpose pointing device, but is used only for writing or drawing.

Notes are not windows: they are not resizable, scrollable, etc., but they can be tilted (rotated) to facilitate hand-writing (which in real life is almost never done on a vertically aligned piece of paper). Unlike files on a desktop, notes are not grouped in folders, backed-up and recycled.

The mail facility is not meant to replace e-mail applications. The design aim has been to make e-mail and message posting easily accessible in situations where, normally, it would not be: e.g., replying to a mail that arrives while cooking, or a enabling a child, too young to read and write, to send a drawing to its parents at work.

CURRENT STATE AND FUTURE DEVELOPMENT

User tests with the first prototype of FRIDGE were performed with eight volunteer subjects with previous computer and e-mail experience, and with five subjects with no computer or e-mail experience. These first tests confirmed some of our hopes but, also, exposed some of the limitations of FRIDGE.

Experimental users found the prototype interesting and fun. The most immediate concerns are to make it more sufficiently robust for field testing inside people's homes (e.g., VIP is very sensitive to variations in lighting), to improve some elements of interaction (e.g., animations are required for feedback), and to support the configuration of the mail facility.

Experimental users were very happy with the VIP input device for non-dominant hand input, although given its experimental state we expected them to complain about it. Our explanation was that its novelty made it more fun to use, but also the tasks for the non-dominant hand were not demanding in precision and dexterity. On the contrary experimental users were much more demanding for the pen input (although that was quite robust). Being accustomed to physical pens, they expected resolution, speed and accuracy to match those of a standard pen.

An interesting contrast emerged between the two groups of subjects. Those with computer expertise missed extra mailing functionality, the ability to leave speech messages, and even the speed of a keyboard. The second group were very pleased with the functionality provided. Although they were more apprehensive about participating in a user trial, they quickly figured out how to use the system. The only

Figure 1: Moving notes with bricks and writing with the MIMIO stylus

hint provided to subjects was that they should use the bricks for notes and the pen for writing. They all were comfortable with using FRIDGE in less than five minutes, and most liked mixing paper and electronic media.

CONCLUSION

In paving the way towards a future home, where a plethora of purpose-specific information appliances surround the residents, one of the challenges for interaction design is to make it possible that people can discover, and remember, how to use such appliances without any manual or explanation.

This 'just use it' requirement has been the main benchmark for the design of FRIDGE, which to a great extent has been met, thanks to a combination of graspable and pen input techniques. The prototype is still raw, but a promising start, which we plan to pursue further. With the planned improvements we intend to test its use in context, by installing it in the residence of our subjects, and testing its uptake as part of their daily life over some prolonged period.

ACKNOWLEDGMENTS

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