Digital Keepsake Box: Sharing Items and Memories to Enhance Communications among Remote Persons

Yuichiro Kinoshita and Kento Shirakawa

Department of Computer Science and Media Engineering,
University of Yamanashi, Kofu, Yamanashi 400-8511, Japan
{ykinoshita,g09kg015}@yamanashi.ac.jp

Abstract. This study introduces a digital keepsake box that enhances communications among group users, such as family members and friends, who are living at a distance. It allows users to virtually share items that involve common interests and memories. The box also increases awareness of the existence of other users by slightly opening the cover of the box when other users put items in their box. The results of user studies suggest that the digital keepsake box is useful in enhancing remote communications.

Keywords: communication, sharing, interaction in a group, awareness.

1   Introduction

In a face-to-face conversation, we are able to share the same space with others and to sense connection directly. This kind of sense fulfils an important role in maintaining relationships among people. In contrast, people living apart are forced to communicate through remote communication tools such as telephones, instant messengers and social network services (SNSes). In this case, one person sends voice, text and images to another person, and vice versa. There are no interactions in the same space, and the sense of connection with others tends to be lacking. Users are also required to go through many steps to communicate (e.g. logging in, browsing through pages, typing text etc.). These steps are sometimes bothersome for users and may result in fewer opportunities for communication. This study proposes a digital keepsake box to enhance communications among multiple users living at a distance. The box provides a virtual space for sharing items that involve common interests or memories. It is easy to operate, and provides ample opportunities to communicate.

2   Related Works

Real-world-oriented interfaces have been developed to enhance the sense of connection among people living in remote locations. Digital Family Portrait [1] is a photo-frame interface, which indicates the daily activities of a family member living in a remote place. FamilyPlanter [2] sends information regarding the presence and motion of someone to a family member. Peek-A-Drawer [3] is a drawer-based interface, which virtually transmits the contents of one's drawer to family members at

a distance. Lover's cups [4] are drinking interfaces for a couple in physically different places. These interfaces are designed to be used as a pair. One of the pair sends information to the other, and also receives information from the other. Only the situation of one-to-one interactions is considered, and interactions among three or more users are not supported. The digital keepsake box provides a single space for sharing with multiple users at a distance, and enables one-to-n and n-to-n interactions.

3   Concept of Digital Keepsake Box

The interface proposed in this study adopts the metaphor of a keepsake box which is used to keep favourite items and memories. Every user has his/her own digital keepsake box in which he/she places items for communicating with people living at a distance. The operations of placing items, as well as opening and closing the cover of the box, are simple and familiar. In a traditional keepsake box, the original items placed by a user exist only in his/her box. The digital keepsake box, however, virtually shares those items and presents them as if they are in a single keepsake box, as shown in Fig. 1. This provides a common space for users to interact, and creates opportunities for communication. In addition, the box has a function which implicitly increases the awareness of other users' actions. The covers of all of the boxes in a group open slightly when one of the users puts some items in his/her box. The rest of the users will be aware that somebody else in a group has placed something in his/her box. Figure 2 illustrates the concept of the function.

4   Implementation

Based on the concept of the digital keepsake box, a prototype interface shown in Fig. 3 was implemented. The size of the box is 45 cm × 48 cm × 34 cm. This size allows users to insert large-sized items, such as foods and toys. A 19-inch LCD showing the content inside the box was placed on the bottom of the box. On the back of the cover, a Web camera and a fluorescent lamp were placed for taking pictures. A servomotor that cranks up the cover of the box and microswitches to detect whether the cover is opened or closed were also placed on the edge of the box. The fluorescent lamp, servomotor and microswitches are controlled through a set of Phidgets [5].
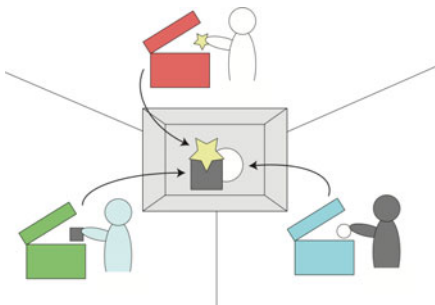

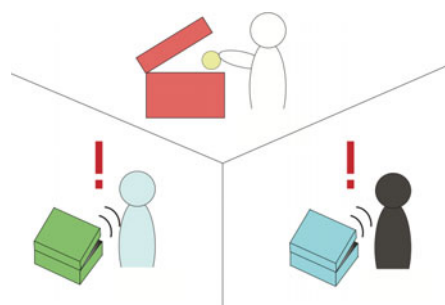**Fig. 1.** Virtual sharing of the contents in the digital keepsake box

Fig. 2. Function that implicitly increases the awareness of other users' actions

When the cover of the box is closed, a picture of the inside of the box is automatically taken by the Web camera. First, it is determined whether the user has placed items in the box by comparing the colour histograms of the picture taken and the background image. If items exist in the box, the region of the items in the picture is detected by background subtraction. The region without the items is set as transparent using an alpha channel. After image processing, the processed picture is sent to other users' keepsake boxes using TCP/IP.

When a box receives a picture from another user, the plastic bar attached to the servomotor rotates by 90 degrees. It slightly cranks up the cover of the box. The plastic bar returns to the original position when the microswitch detects that the cover has been fully opened by a user.

The LCD on the bottom of the box always shows the contents shared by the users. Figure 4 shows the process of the contents presentation. First, the internal side of the box is drawn in three-dimensional space. The pictures of the items are also placed in the three-dimensional space, such that the oldest picture goes to the back and the newer pictures are layered on the older pictures, similar to a box in the real world. The contents are redrawn when the user puts new items in the box and the box receives a picture from another box.

5   Preliminary User Study

In order to observe how users interact with the digital keepsake box, a preliminary user study was conducted for two groups, each of which consisted of three participants. All of the participants in a group knew each other and had frequently used an SNS. The study consisted of two phases. In Phase I, the participants communicated only with the community pages of Mixi [6], which is one of the popular SNSes in Japan, for six consecutive days. In Phase II, a digital keepsake box was delivered to each participant, and they communicated using the box as well as the SNS community pages. Phase II was also conducted for six consecutive days.
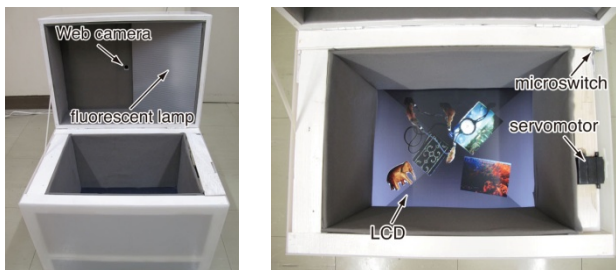

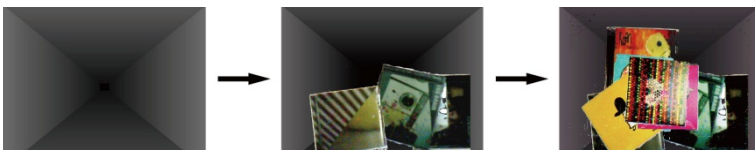**Fig. 3.** Appearance of the digital keepsake box prototype

Fig. 4. Presentation of the contents inside the digital keepsake box

The participants in Group A used the boxes to converse in the SNS. The average number of daily comments posted on the community pages was 4.6 comments per parson in Phase I, while the average was 9.3 comments in Phase II. Among all the comments in Phase II, nearly half of the comments concerned the items placed in the boxes. In the interview, some participants commented, 'I placed something to see how other people react.' and 'I tried to start conversations by putting items in the box.' These results demonstrated that the digital keepsake boxes were used concurrently with the community pages and created opportunities for communications.

Because the three participants in Group B were commonly interested in music, they used the box to share information about their interests (e.g. putting their own favourite CDs in the boxes). In this group, the average numbers of daily comments on the community pages were 1.8 and 1.4 comments per parson in Phases I and II, respectively. No significant difference was observed in terms of the number of comments. One of the participants said, 'We did not use the community pages so often.' In addition, only 7% of the comments in Phase II concerned the items in the box. The participants in this group, however, frequently placed items in the box (7.3 items per day) and checked the contents in the box (4.8 times per day per person). The results indicated that Group B communicated simply using the digital keepsake boxes themselves, instead of using them together with the SNS community pages.

6   Conclusion

This paper described a digital keepsake box to enhance communications among group users, such as family members and friends, who are living at a distance. The box provided a virtual space for sharing items involving common interests or memories. A preliminary user study was conducted for two groups to observe how the users interacted with the box. Although the usage of the digital keepsake boxes was different between the groups, the results of the study demonstrated that the boxes were useful for improving communication through an SNS. As future work, the authors will conduct a detailed user study and will also implement functions to maintain the contents inside the box (e.g. taking out some items, and changing the position of items in the box).

References

1. Rowan, J., Mynatt, E.D.: Digital Family Portrait Field Trial: Support for Aging in Place. In: Proc. CHI 2005, pp. 521–530 (2005)
2. Itoh, Y., Miyajima, A., Watanabe, T.: Tsunagari Communication: Fostering a Feeling of Connection between Family Members. In: Ext. Abstracts CHI 2002, pp. 810–811 (2002)
3. Siio, I., Rowan, J., Mynatt, E.: Peek-a-drawer: Communication by Furniture. In: Ext. Abstracts CHI 2002, pp. 582–583 (2002)
4. Chung, H., Lee, C.H.J., Selker, T.: Lover's Cups: Drinking Interfaces as New Communication Channels. In: Ext. Abstracts CHI 2006, pp. 375–380 (2006)
5. Phidgets, http://www.phidgets.com/
6. Mixi, http://mixi.jp/