

# Reflecting on Domestic Displays for Photo Viewing and Sharing

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## ABSTRACT

Digital displays, both large and small, are increasingly being used within the home. These displays have the potential to dramatically change the way people experience the sharing and display of their digital photographs. Yet if photo display and sharing is to be socially natural, we must first understand how domestic photo displays should be designed to fit within the everyday practices of families. In this position paper, I reflect on several existing projects on domestic displays to shed light on design properties that I feel will enhance the digital photo routines of families.

## Author Keywords

Photo sharing, domestic displays, families, friends.

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

We are now on the verge of seeing a large proliferation of displays and computational devices in the home, both large and small. To some extent this has already occurred with the ever-increasing use of mobile phones, digital cameras, and large-format televisions. Families often even have computational devices connected to large displays in the form of gaming consoles and media centers. These trends will continue and we will soon see the adoption and use of other fixed or mobile displays in the home, including digital photo frames, tablet PCs, tabletop displays, and other imaging displays and devices. I am particularly interested in understanding how these displays should be designed and integrated to create a more natural photo display and sharing experience for families.

Researchers have already begun to investigate this area by studying existing domestic photo routines (e.g., 1,2,7,14) and system designs (e.g., 8,15). I build on this knowledge by reflecting on three domestic display projects with which I have been involved, where each has a photo display component. These include: the LINC family calendar [10],

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[http://research.microsoft.com/~ast/chi/photo\\_workshop/](http://research.microsoft.com/~ast/chi/photo_workshop/)



Figure 1. The LINC digital family calendar in a kitchen.

a location-based message system called StickySpots [4], and Souvenirs, a system for collocated photo sharing [14]. Using this reflection, I outline three ideas that I think are important for the design of photo display technology: combining photo displays with other tools, allowing photos to easily move between displays, and incorporating the physical world.

## COMBINING PHOTO DISPLAYS WITH OTHER TOOLS

LINC is a digital family calendar that I designed along with A.J. Brush at Microsoft Research. LINC's design was heavily influenced by contextual interviews with 44 families about their existing paper calendar routines, performed by myself, A.J. Brush [9], and Saul Greenberg [12].

Based on these interviews, LINC was designed as an awareness appliance for the home (prototyped using a Tablet PC) that models the way people use paper calendars (Figure 1, larger images available in Appendix). This means it can be placed in a public location of the home that allows family members to easily glance at the calendar's contents or add events to it. Family members add new events by writing on sticky notes using a stylus. They can also view the calendar on multiple home displays (wherever computers are placed), while mobile (on Smartphones), or at work (on the web or a desktop PC) [13]. A video showing LINC's interaction is available in [11].

Related to photos, LINC is also able to act as one type of photo display: LINC's background picture can be changed to any image file selected by the user. For example, the



**Figure 2. StickySpots: a distributed message board.**

Appendix shows LINC with a background photo of a maple leaf, but any family photo could appear here. Family members can also display a different photo in each of LINC’s locations. In this way, LINC combines multiple applications into one domestic display and could easily enable an interconnected set of displays that combine family coordination with family photo viewing.

Findings from field trials of LINC with four families [12] hinted at this idea. We had originally designed LINC to be an always-on calendar, yet several family members wanted the Tablet PC running LINC to be multipurpose. That is, they wanted to use the calendar, plus other calendar-related applications like email and web browsing (for maps, event information pages, etc). We did not specifically ask if they also wanted to use the device for photo management and display, yet this could be a natural extension. We think there are situations where *combining photo display systems with other applications for domestic displays* would be beneficial. Displays could provide information overlaid atop digital photos (like LINC), or could allow users to easily move between the display of photos and the use of other applications. In this way, everyday family activities can be combined with the pleasing act of viewing photos.

### EASY MOVEMENT OF PHOTOS

StickySpots is a location-based message board for the home, designed by Kathryn Elliot, myself, and Saul Greenberg [5] (Figure 2, larger images in Appendix). Its design is largely based on contextual interviews and observations with 10 households aimed at understanding how and where people leave messages for each other in the home [3]. The main finding was that people associate important meanings with particular home locations and utilize this when they place information in the home. For example, notes for Mom will be placed in a location that Mom typically looks at or notices. Videos that need to be returned to the video store will be placed near the door so they can be easily seen as one exits the house [3].

StickySpots builds on this idea: it is designed to run on an integrated set of displays in the home (e.g., a Tablet PC in the kitchen, a large display in the living room, etc) where handwritten notes can be created and sent to particular home locations/displays. StickySpots is similar to a system



**Figure 3. Souvenirs: link physical items to photos.**

called HomeNote [16], except that it works between multiple home locations. A video showing StickySpots’ interaction is available in [4]. Related to photos, StickySpots allows users to post small photo thumbnails and send them to any of the household’s displays. Double clicking a photo opens it up for full-size viewing.

While photo sharing was not the main purpose behind StickySpots’ design, the incorporation of it highlights a key design property that should be considered for digital photo displays in general. Photo displays will likely be located in a variety of locations within the home where each location will have a particular social significance associated with it. Meanings may change over time, just as photos may need to migrate between displays. Thus, we think there are situations where it would be beneficial to *allow the easy movement of photos between displays in the home*. For example, a particular bookcase shelf may be used to display recent family photos, while another is used for past photos of people. Photo systems could allow users to easily move photos from a PC to the “recent” photo displays, and from there to the “past” photo displays.

### INCORPORATING THE PHYSICAL WORLD

Souvenirs is a system for collocated photo sharing within the home, designed by Michael Nunes and Saul Greenberg [14] (Figure 3, larger images in Appendix). In Souvenirs, family members associate physical memorabilia with digital photo collections. This involves linking an RFID tag to a set of photos, and then placing the tag on a souvenir/memento. Photos can be displayed by “swiping” the physical souvenir over an RFID reader attached to a large display. For example, when the rock in Figure 3 is placed over the RFID reader (left), the photos are displayed on the large display (right). Friends can then easily find and discuss photo collections around the large display (right).

To reflect on Souvenirs’ design, Michael Nunes, Saul Greenberg, and myself conducted interviews with 20 families in their homes [14]. These involved asking families to show and explain to us how they managed their print and digital photo collections and what memorabilia/souvenirs they collected and displayed in the home. We also showed families a demonstrative video of the Souvenirs system to gather feedback about the concept. Our findings replicated many existing studies on photo management [1,2,7,9] and also expanded on this subject to highlight the ways in which

physical artifacts are collected and how they trigger memories of past activities. Overall, families felt the Souvenirs system would permit a more natural way to browse and find photos.

Souvenirs' design highlights the value that can be found in *integrating digital photo viewing with physical artifacts*. In reflection, we can also now see ways in which Souvenirs should be extended to more naturally permit domestic photo display. We have already seen the value of having multiple interconnected displays from the reflections on LINC and StickySpots. Souvenirs could be extended in a similar fashion to use physical artifacts as a means to move photo collections between domestic displays. For example, one could "pick up" a collection of photos with a physical artifact, and then "drop" it at another display. One could also imagine Souvenirs supporting distributed photo sharing where "swiping" printed photos of family or friends could cause digital photos to be automatically sent to them. This may move distributed photo sharing beyond simple online sites such as Flickr [6].

## CONCLUSION

I have briefly reflected on three applications for domestic displays: the LINC digital family calendar, the StickySpots home message system, and the Souvenirs photo sharing system. These systems have pointed to the need to combine photo displays with other tools, permit easy movement of photos between displays, and incorporate the physical world in photo display applications. I have purposely not gone into great length to explain how one may realize each of these within a particular design. I think these are still open research areas and look forward to discussing them among the HCI research community.

## ACKNOWLEDGMENTS

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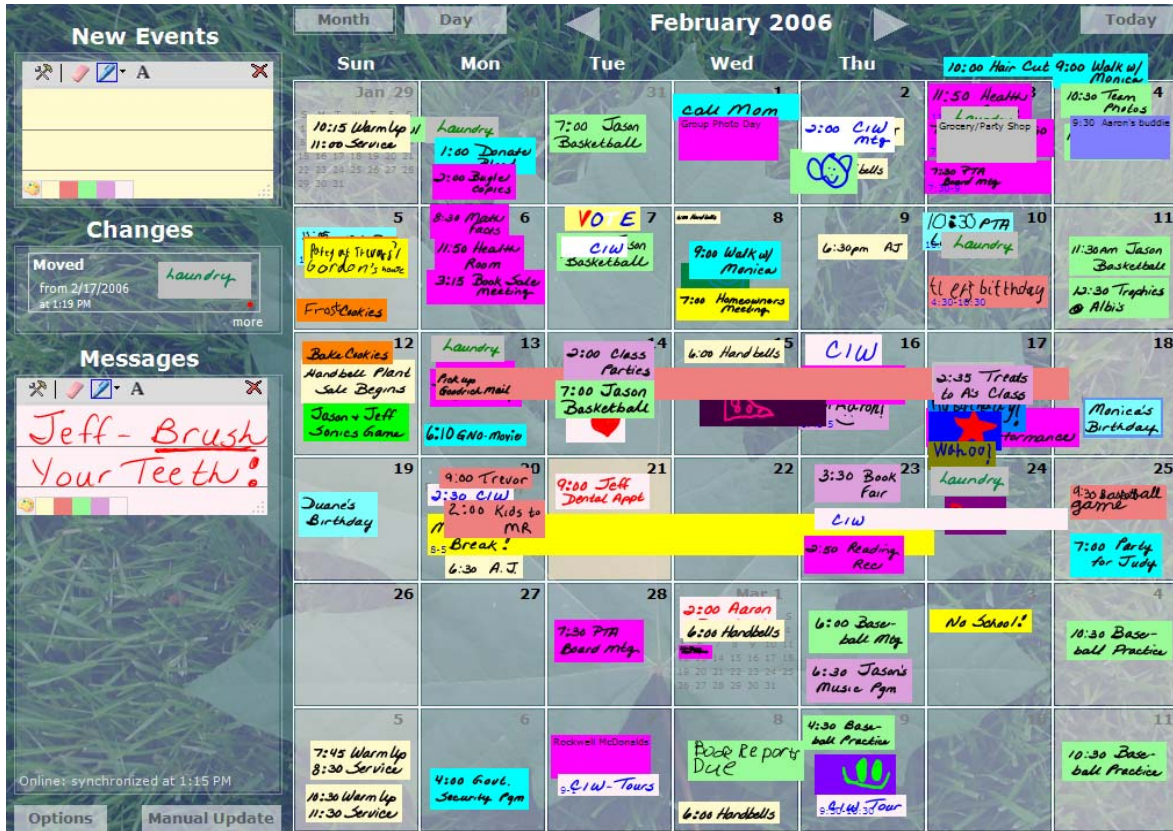
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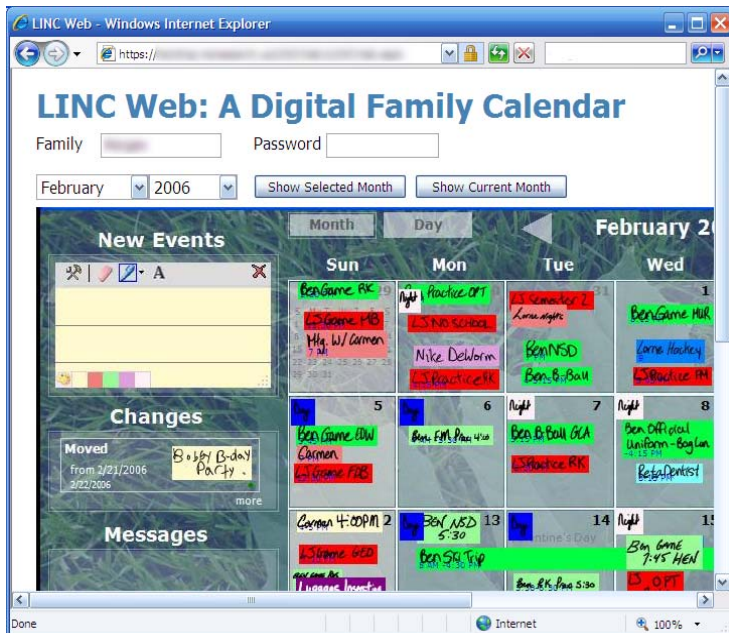
## BIOGRAPHY

Carman Neustaedter is a researcher in the Multimedia Systems group at Kodak's Research Laboratories. His research interests are in human-computer interaction with a focus in domestic and ubiquitous computing. In these areas, he seeks to understand the socio-technical factors of ubiquitous technology design to support the everyday social practices of individuals and groups. Carman holds a Ph.D. in Computer Science from the University of Calgary, Canada.

**APPENDIX: ADDITIONAL SYSTEM IMAGES**



**LINC:** month view for the Tablet PC, other home displays, or a work PC display (copied with permission from [13]).



**LINC Web:** access the calendar on a web page at work (copied with permission from [13]).



**LINC Mobile:** access the calendar on a mobile phone (copied with permission from [13]).



**StickySpots:** a distributed message board for families that runs on displays in multiple home locations. Handwritten messages and photos can be sent to any display (image copied with permission from [5]).



**Souvenirs system** for collocated photo sharing (image copied with permission from [14]):

- 1) users attach an RFID tag to a physical memento (a rock in this case) and, through special software, link photos to the memento;
- 2) swiping the memento over an RFID reader (wooden box with blue lid) next to a large display causes the photo collection to appear on the display.