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## **Personal Digital Historian: User Interface Design**

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### **Abstract**

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# Personal Digital Historian: User Interface Design

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## ABSTRACT

Desktop computers are not designed for multi-person face-to-face conversation in a social setting. We describe the design of a novel user interface for multi-user interactive informal storytelling. Our design is guided by principles of experience sharing, the disappearing computer, visual navigation, and implicit query formulation.

## Keywords

Multi-person interactive informal storytelling, table top display, visual navigation, the disappearing computer.

## INTRODUCTION

We often find ourselves using photos to "re-connect" with people, whether it be with our family who we have not seen all day, a friend or colleague whom we have not seen in a year, or our parents who live across the country. In this paper, we describe a novel interface design for multi-person interactive informal storytelling as part of our PDH (Personal Digital Historian) project. The goal of PDH is to enable informal storytelling using personal digital data such as photos, audio and video in a face-to-face social setting. The project as a whole includes research in the areas of the design of the shared-display devices, on-line authoring, story-listening, user-guided image layout, content-based information retrieval and data mining.

## DESIGN PRINCIPLES

Our design is guided by the following principles:

- (1) The display device should enable natural face-to-face conversation – not forcing everyone to face in the same direction (desktop) or at their own version of the pictures (handheld devices).
- (2) The physical sharing device must be convenient and customary to use – helping to make the computer disappear.
- (3) Easy and fun to use across generations of users – minimizing time spent typing or formulating queries.
- (4) Enabling interactive and exploratory storytelling – blending authoring and presentation.

Current software and hardware do not meet our requirements. Most existing software in this area provides users with either powerful query methods or authoring tools. In the former case, the users can repeatedly query their collections of digital content to retrieve information to show some one[3]. In the latter case, a user experienced in the use of the authoring tool can carefully craft a story out of their digital content to show or send to someone at a later time. Furthermore, current hardware is also lacking. Desktop computers are not suitably designed for group, face-to-face conversation in a social setting, while handheld story-telling devices [2] have limited screen sizes and can be used only by a small number of people at once.

In contrast, our design supports multi-person, exploratory, interactive, face-to-face experience sharing. Our goal is for the PDH to enrich conversations among people, by putting peoples' digital content at their fingertips.

## SYSTEM DESIGN

We designed our system to work on a touch-sensitive, circular table-top display, as shown in Figure 1. The layout of the entire table-top display, as shown in Figure 2, consists of (1) a large story-space area encompassing most of the table-top until the perimeter, (2) one or more narrow arched control panels, and (3) an outer rim. The number of control panels is not fixed. Using sensing or simple vision techniques, the table top can automatically instantiate a number of control panels equal to the number of people around the table.



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Figure 1. PDH Table.

When people use the system they will cause different sets of their pictures to be displayed on the table. The pictures will be displayed in a radial-pattern in the story-space, so that pictures initially will be oriented towards the outer rim of the table. Users have the option of moving or re-orienting pictures using the touch-screen, in a rough simulation of how real pictures would slide along a table. By dragging one's hand along the outer rim of the table, the users can spin the entire contents of the table, much like a lazy-susan.

The primary method of navigation is organized about four questions essential to storytelling: who?, when?, where?, and what?<sup>1</sup> Control panels located on the perimeter of the table contain buttons labeled "people", "calendar", "location", and "events", corresponding to these four questions. When a user presses the "location" button, for example, the display on the table changes to show a map of the world. Every picture in the database that is annotated with a location will appear as a tiny thumbnail at its location. The user can pan and zoom in on the map to a region of interest, which increase the size of the thumbnails. Similarly, by pressing one of the other three buttons, the user can cause the pictures to be organized by the time they were taken along a linear straight timeline, the people they contain, or the event-keywords which the pictures were annotated with.<sup>2</sup>

The user can form implicit Boolean queries, or filters, by selecting items or regions in the different navigational views. For example, if someone selects two friends in the people view, then (until this selection is retracted) only pictures containing one or both of these friends will be highlighted in subsequent navigation. If the user next selected "location", for example, then they would see where they have traveled with either of these friends by observing where the highlighted pictures appear on the map. If the user selected "calendar" instead, they would see when they have taken pictures with these friends. Another non-menu driven query metaphor used in PDH is invoked when the user presses and holds down a particular picture. The system then offers the user the ability to display pictures taken at a similar time, or a similar place, or with the same people, or at the same event as the selected picture

Additionally, our system will optionally project a slowly moving stream of pictures along the unused portions of the perimeter of the table. These pictures are one way in which computers can add value to experience sharing by suggesting related information, either from the users personal information or from more public sources (e.g., the web), that might be related to the digital media that are specifically requested by the user. The simplest form of

<sup>1</sup> We do not currently support "why?", which is also useful for storytelling.

<sup>2</sup> We assume the pictures are *partially* annotated.

this can simply be to randomly show photos that were taken at similar locations or times as the other photos that are being displayed. As another example, when looking at a picture of one's grandparents, the PDH might bring out images and passages that related to historical events around the time the pictures were taken.

## IMPLEMENTATION

There are a number of ways to implement this design. The physical sharing device can be either a touch sensitive table surface, or a rear projected or top projected horizontal table surface with infrared cameras to track hand motions [1]. A portable device with projection and sensing capabilities can also be created so that the virtual table top can travel with people to places. Our first prototype is constructed as a top projection table with a whiteboard as the table surface. This implementation provides a high resolution as well as a sturdy surface, which serves well as both a display device and a table to set familiar objects such as tea cups on. We will add vision capabilities to the current table set up to enable both object avoidance in image display and multiple simultaneous control. The initial user interface is being constructed using Java.

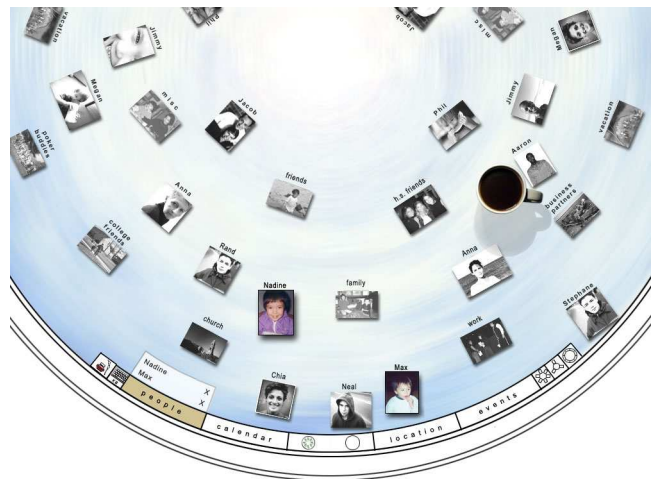


Figure 2. Closeup of "People" view on table

## REFERENCES

1. Leibe, B., Starner, T., Ribarsky, W., Wartell, Z., Krum, D., Singletary, B., The Perceptive Workbench: Toward Spontaneous and Natural Interaction in Semi Immersive Virtual Environments, in *Proceedings of IEEE Virtual Reality 2000* (New Brunswick, NJ, March 2000).
2. Balabanovic, M., Chu, L., Wolff, G., Storytelling with Digital Photographs, in *the Proceedings of CHI 2000*, (April, 2000. The Hague, The Netherlands).
3. Kang, H., Shneiderman, B., [Visualization Methods for Personal Photo Collections: Browsing and Searching in the PhotoFinder](#), in *Proceedings of IEEE International Conference on Multimedia and Expo (ICME2000)*, New York City, New York.

**Addendum (Description of the Visual Illustration)**

The visual illustration of this submission is a walk-through narrative of a sequence of html pages with JPEG images, all contained in the file

chi2001-cs2.zip

Once extracted, one will see two items only, a file named "start.htm" and one folder called "content". To start the narrative, simply click on start.htm (or load start.htm into a html browser) and the walk-through will be self contained from there.

The storyboard runs in a browser with html and Shockwave animations. Please select the full-screen option (function F11 on our PC) for a full view of the storyboard. The storyboard contains roughly 40 screens. To advance to the next screen, simply click anywhere on the large image shown in the current screen.